238C

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~~102~~
3600000
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L        ASSEMBLY AND OPERATION INFORMATION                                        USER'S PAGE NO.   1      E0

R00001  THIS LGC PROGRAM IS INTENDED FOR USE IN THE LM DURING THE MANNED LUNAR LANDING MISSION OR ANY SUBSET THEREOF.
R00002  THE DETAILS OF IMPLEMENTATION ARE SPECIFIED IN REPORT R-567, AS AMENDED.


R000025                            GUIDANCE SYSTEM OPERATIONS PLAN
R00003                     FOR MANNED LM EARTH ORBITAL AND LUNAR MISSIONS
R000035                                  USING PROGRAM LUMINARY


R00004  THIS PROGRAM AND R-567 HAVE BEEN PREPARED BY THE INSTRUMENTATION LABORATORY, MASSACHUSETTS INSTITUTE OF
R00005  TECHNOLOGY  75 CAMBRIDGE PARKWAY, CAMBRIDGE, MASSACHUSETTS UNDER PROJECT55-238-70, SPONSORED BY THE MANNED
R00006  SPACECRAFT CENTER OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CONTRACT NAS 9-4065.


R00007                        THIS PROGRAM IS REFERRED TO AS LUMINARY 1A
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R0001   TABLE OF LOG CARDS

R0002   ASSEMBLY AND OPERATION INFORMATION
R0003   TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS
R0005   CONTROLLED CONSTANTS
R0006   INPUT/OUTPUT CHANNEL BIT DESCRIPTIONS
R0007   FLAGWORD ASSIGNMENTS
R0008   SUBROUTINE CALLS


R0009   TABLE OF SUBROUTINE LOG SECTIONS
R0010             LUMERASE
R0011                       ERASABLE ASSIGNMENTS
R0012             LEMONAID
R0013                       INTERRUPT LEAD INS
R0014                       T4RUPT PROGRAM
R0015                       RCS FAILURE MONITOR
R0016                       DOWNLINK LISTS
R0017                       AGS INITIALIZATION
R0018                       FRESH START AND RESTART
R0019                       RESTART TABLES
R0020                       AOTMARK
R0021                       EXTENDED VERBS
R0022                       PINBALL NOUN TABLES
R0023                       LEM GEOMETRY
R0024                       IMU COMPENSATION PACKAGE
R0025                       R63
R0026                       ATTITUDE MANEUVER ROUTINE
R0027                       GIMBAL LOCK AVOIDANCE
R0028                       KALCMANU STEERING
R0029                       SYSTEM TEST STANDARD LEAD INS
R0030                       IMU PERFORMANCE TESTS 2
R0031                       IMU PERFORMANCE TESTS 4
R0032                       PINBALL GAMES BUTTONS AND LIGHTS
R0033                       R60,R62
R0034                       S-BAND ANTENNA FOR LM
R0035             LEMP20S
R0036                       RADAR LEADIN ROUTINES
R0037                       P20-P25
R0038             LEMP30S
R0039                       P30,P37
R0040                       P32-P35, P72-P75
R0041                       GENERAL LAMBERT AIMPOINT GUIDANCE
R0042             KISSING
R0043                       GROUND TRACKING DETERMINATION PROGRAM - P21
R0044                       P34-P35, P74-P75
R0045                       R31
R0046                       P76
R0047                       R30
R0048                       STABLE ORBIT - P38-P39
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R0049           FLY
R0050                  BURN, BABY, BURN -- MASTER IGNITION ROUTINE
R0051                  P40-P47
R0052                  THE LUNAR LANDING
R0053                  THROTTLE CONTROL ROUTINES
R0054                  LUNAR LANDING GUIDANCE EQUATIONS
R0055                  P70-P71
R0056                  P12
R0057                  ASCENT GUIDANCE
R0058                  SERVICER
R0059                  LANDING ANALOG DISPLAYS
R0060                  FINDCDUW - GUIDAP INTERFACE
R0061           LEMP50S
R0062                  P51-P53
R0063                  LUNAR AND SOLAR EPHEMERIDES SUBROUTINES
R0064           SKIPPER
R0065                  DOWN-TELEMETRY PROGRAM
R0066                  INTER-BANK COMMUNICATION
R0067                  INTERPRETER
R0068                  FIXED-FIXED CONSTANT POOL
R0069                  INTERPRETIVE CONSTANTS
R0070                  SINGLE PRECISION SUBROUTINES
R0071                  EXECUTIVE
R0072                  WAITLIST
R0073                  LATITUDE LONGITUDE SUBROUTINES
R0074                  PLANETARY INERTIAL ORIENTATION
R0075                  MEASUREMENT INCORPORATION
R0076                  CONIC SUBROUTINES
R0077                  INTEGRATION INITIALIZATION
R0078                  ORBITAL INTEGRATION
R0079                  INFLIGHT ALIGNMENT ROUTINES
R0080                  POWERED FLIGHT SUBROUTINES
R0081                  TIME OF FREE FALL
R0082                  AGC BLOCK TWO SELF-CHECK
R0083                  PHASE TABLE MAINTENANCE
R0084                  RESTARTS ROUTINE
R0085                  IMU MODE SWITCHING ROUTINES
R0086                  KEYRUPT, UPRUPT
R0087                  DISPLAY INTERFACE ROUTINES
R0088                  SERVICE ROUTINES
R0089                  ALARM AND ABORT
R0090                  UPDATE PROGRAM
R0091                  RTB OP CODES
R0092           LMDAP
R0093                  T6-RUPT PROGRAMS
R0094                  DAP INTERFACE SUBROUTINES
R0095                  DAPIDLER PROGRAM
R0096                  P-AXIS RCS AUTOPILOT
R0097                  Q,R-AXIS RCS AUTOPILOT
R0098                  TJET LAW
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R0099                     KALMAN FILTER
R0100                     TRIM GIMBAL CONTROL SYSTEM
R0101                     AOSTASK AND AOSJOB
R0102                     SPS BACK-UP RCS CONTROL


R0103              SYMBOL TABLE LISTING
R0104              UNREFERENCED SYMBOL LISTING
R0105              ERASABLE & EQUALS CROSS-REFERENCE TABLE
R0106              SUMMARY OF SYMBOL TABLE LISTINGS
R0107              MEMORY TYPE & AVAILABLITY DISPLAY
R0108              COUNT TABLE
R0109              PARAGRAPHS GENERATED FOR THIS ASSEMBLY
R0110              OCTAL LISTING
R0111              OCCUPIED LOCATIONS TABLE
R0112              SUBROS CALLED & PROGRAM STATUS
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R0113              VERB LIST FOR LUMINARY

R0114    REGULAR VERBS

R0115    00 NOT IN USE
R0116    01 DISPLAY OCTAL COMP 1 IN R1
R0117    02 DISPLAY OCTAL COMP 2 IN R1
R0118    03 DISPLAY OCTAL COMP 3 IN R1
R0119    04 DISPLAY OCTAL COMP 1,2 IN R1,R2
R0120    05 DISPLAY OCTAL COMP 1,2,3 IN R1,R2,R3
R0121    06 DISPLAY DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0122    07 DISPLAY DP DECIMAL IN R1,R2 (TEST ONLY)
R0123    08
R0124    09
R0125    10
R0126    11 MONITOR OCTAL COMP 1 IN R1
R0127    12 MONITOR OCTAL COMP 2 IN R1
R0128    13 MONITOR OCTAL COMP 3 IN R1
R0129    14 MONITOR OCTAL COMP 1,2 IN R1,R2
R0130    15 MONITOR OCTAL COMP 1,2,3 IN R1,R2,R3
R0131    16 MONITOR DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0132    17 MONITOR DP DECIMAL IN R1,R2 (TEST ONLY)
R0133    18
R0134    19
R0135    20
R0136    21 LOAD COMPONENT 1 INTO R1
R0137    22 LOAD COMPONENT 2 INTO R2
R0138    23 LOAD COMPONENT 3 INTO R3
R0139    24 LOAD COMPONENT 1,2 INTO R1,R2
R0140    25 LOAD COMPONENT 1,2,3 INTO R1,R2,R3
R0141    26
R0142    27 DISPLAY FIXED MEMORY
R0143    28
R0144    29
R0145    30 REQUEST EXECUTIVE
R0146    31 REQUEST WAITLIST
R0147    32 RECYCLE PROGRAM
R0148    33 PROCEED WITHOUT DSKY INPUTS
R0149    34 TERMINATE FUNCTION
R0150    35 TEST LIGHTS
R0151    36 REQUEST FRESH START
R0152    37 CHANGE PROGRAM (MAJOR MODE)
R0153    38
R0154    39
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P0155   EXTENDED VERBS

R0156   40 ZERO CDU-S
R0157   41 COARSE ALIGN CDU-S
R0158   42 FINE ALIGN IMU
R0159   43 LOAD IMU ATT ERROR METERS
R0160   44 TERMINATE RR CONTINUOUS DESIGNATE (V41N72 OPTION 2)
R0161   45
R0162   46
R0163   47 INITIALIZE AGS (R47)
R0164   48 REQUEST DAP DATA LOAD ROUTINE (R03)
R0165   49 REQUEST CREW DEFINED MANEUVER ROUTINE (R62)
R0166   50 PLEASE PERFORM
R0167   51
R0168   52 MARK X-RETICLE
R0169   53 MARK Y-RETICLE
R0170   54 MARK X OR Y-RETICLE
R0171   55 INCREMENT AGC TIME (DECIMAL)
R0172   56 TERMINATE TRACKING (P20 + P25)
R0173   57 PERMIT LANDING RADAR UPDATES
R0174   58 INHIBIT LANDING RADAR UPDATES
R0175   59
R0176   60 COMMAND LR TO POSITION 2.
R0177   61 DISPLAY DAP FOLLOWING ATTITUDE ERRORS.
R0178   62 DISPLAY TOTAL ATTITUDE ERRORS WITH RESPECT TO NOUN 22.
R0179   63 SAMPLE RADAR ONCE PER SECOND (R04).
R0180   64 REQUEST S-BAND ANTENNA ROUTINE (R05)
R0181   65 DISABLE U AND V JET FIRINGS DURING DPS BURNS.
R0182   66 VEHICLES ARE ATTACHED.  MOVE THIS VEHICLE STATE TO OTHER VEHICLE.
R0183   67 DISPLAY W MATRIX
R0184   68
R0185   69 CAUSE RESTART
R0186   70 UPDATE LIFTOFF TIME
R0187   71 UNIVERSAL UPDATE-BLOCK  ADR
R0188   72 UNIVERSAL UPDATE-SINGLE ADR
R0189   73 UPDATE AGC TIME (OCTAL)
R0190   74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
R0191   75 ENABLE U AND V JET FIRINGS DURING DPS BURNS.
R0192   76 MINIMUM IMPULSE COMMAND MODE
R0193   77 RATE COMMAND AND ATTITUDE HOLD MODE
R0194   78 LR SPURIOUS RETURN TEST START (R77)
R0195   79 LR SPURIOUS RETURN TEST STOP
R0196   80 UPDATE LEM STATE VECTOR
R0197   81 UPDATE CSM STATE VECTOR
R0198   82 REQUEST ORBIT PARAM DISPLAY (R30)
R0199   83 REQUEST REND PARAM DISPLAY (R31)
R0200   84
R0201   85 DISPLAY RR LOS AZ AND ELEV
R0202   86
R0203   87
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R0204    88
R0205    89 REQUEST RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)
R0206    90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY ROUTINE (R36)
R0207    91 DISPLAY BANK SUM
R0208    92 OPERATE IMU PERFORMANCE TEST (P07)
R0209    93 ENABLE W MATRIX INITIALIZATION
R0210    94
R0211    95 NO UPDATE OF EITHER STATE VECTOR (P20 OR P22)
R0212    96 INTERRUPT INTEGRATION AND GO TO P00
R0213    97 PERFORM ENGINE FAIL PROCEDURE
R0214    98
R0215    99 PLEASE ENABLE ENGINE
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 R0216   IN THE FOLLOWING NOUN LIST THE :NO LOAD: RESTRICTION MEANS THE NOUN
 R0217   CONTAINS AT LEAST ONE COMPONENT WHICH CANNOT BE LOADED, I.E. OF
 R0218   SCALE TYPE L (MIN/SEC), PP (2 INTEGERS) OR TT (LANDING RADAR POSITION).
 R0219   IN THIS CASE VERBS 24 AND 25 ARE NOT ALLOWED, BUT VERBS 21, 22 OR 23
 R0220   MAY BE USED TO LOAD ANY OF THE NOUN:S COMPONENTS WHICH ARE NOT OF THE
 R0221   ABOVE SCALE TYPES.
 R0222   THE :DEC ONLY: RESTRICTION MEANS ONLY DECIMAL OPERATION IS ALLOWED ON
 R0223   EVERY COMPONENT IN THE NOUN. (NOTE THAT :NO LOAD: IMPLIES :DEC ONLY:.)

 R0224   NORMAL NOUNS                         COMPONENTS  SCALE AND DECIMAL POINT          RESTRICTIONS

 R0226   00  NOT IN USE
 R0227   01  SPECIFY MACHINE ADDRESS (FRACTIONAL)   3COMP    .XXXXX FOR EACH
 R0228   02  SPECIFY MACHINE ADDRESS (WHOLE)        3COMP    XXXXX. FOR EACH
 R0229   03  SPECIFY MACHINE ADDRESS (DEGREES)      3COMP    XXX.XX DEG FOR EACH
 R0230   04  ANGULAR ERROR/DIFFERENCE               1COMP    XXX.XX DEG
 R0231   05  ANGULAR ERROR/DIFFERENCE               1COMP    XXX.XX DEG
 R0232   06  OPTION CODE                            3COMP    OCTAL ONLY FOR EACH
 R0233   LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE REGISTER
 R0234   07  ECADR OF WORD TO BE MODIFIED           3COMP    OCTAL ONLY FOR EACH
 R0235       ONES FOR BITS TO BE MODIFIED
 R0236       1 TO SET OR 0 TO RESET SELECTED BITS
 R0237   08  ALARM DATA                             3COMP    OCTAL ONLY FOR EACH
✓R0238   09  ALARM CODES                            3COMP    OCTAL ONLY FOR EACH
 R0239   10  CHANNEL TO BE SPECIFIED                1COMP    OCTAL ONLY
 R0240   11  TIG OF CSI                             3COMP    00XXX. HRS                      DEC ONLY
 R0242                                                       000XX. MIN                      MUST LOAD 3 COMPS
 R0244                                                       0XX.XX SEC
 R0245   12  OPTION CODE                            2COMP    OCTAL ONLY FOR EACH
 R0246        (USED BY EXTENDED VERBS ONLY)
 R0247   13  TIG OF CDH                             3COMP    00XXX. HRS                      DEC ONLY
 R0249                                                       000XX. MIN                      MUST LOAD 3 COMPS
 R0251                                                       0XX.XX SEC
 R0252   14  CHECKLIST                              3COMP    XXXXX. FOR EACH
 R0253        (USED BY EXTENDED VERBS ONLY)
 R0254        (NOUN 25 IS PASTED AFTER DISPLAY)
 R0255   15  INCREMENT MACHINE ADDRESS              1COMP    OCTAL ONLY
 R0256   16  TIME OF EVENT                          3COMP    00XXX. HRS                      DEC ONLY
 R0258        (USED BY EXTENDED VERBS ONLY)                  000XX. MIN                      MUST LOAD 3 COMPS
 R0260                                                       0XX.XX SEC
 R0261   17  SPARE
 R0262   18  AUTO MANEUVER BALL ANGLES              3COMP    XXX.XX DEG FOR EACH
 R0263   19  SPARE
 R0264   20  ICDU ANGLES                            3COMP    XXX.XX DEG FOR EACH
 R0265   21  PIPAS                                  3COMP    XXXXX. PULSES FOR EACH
 R0267   22  NEW ICDU ANGLES                        3COMP    XXX.XX DEG FOR EACH
 R0268   23  SPARE
 R0269   24  DELTA TIME FOR AGC CLOCK               3COMP    00XXX. HRS                      DEC ONLY
 R0271                                                       000XX. MIN                      MUST LOAD 3 COMPS
 R0273                                                       0XX.XX SEC
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R0274   25  CHECKLIST                              3COMP    XXXXX. FOR EACH
R0275        (USED WITH PLEASE PERFORM ONLY)
R0276   26  PRIORITY/DELAY, ADRES, BBCON           3COMP    OCTAL ONLY FOR EACH
R0277   27  SELF TEST ON/OFF SWITCH                1COMP    XXXXX.
R0278   28  SPARE
R0279   29  SPARE
R0280   30  SPARE
R0281   31  SPARE
R0282   32  TIME FROM PERIGEE                      3COMP    00XXX. HRS                          DEC ONLY
R0284                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0286                                                       0XX.XX SEC
R0287   33  TIME OF IGNITION                       3COMP    00XXX. HRS                          DEC ONLY
R0289                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0291                                                       0XX.XX SEC
R0292   34  TIME OF EVENT                          3COMP    00XXX. HRS                          DEC ONLY
R0294                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0296                                                       0XX.XX SEC
R0297   35  TIME FROM EVENT                        3COMP    00XXX. HRS                          DEC ONLY
R0299                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0301                                                       0XX.XX SEC
R0302   36  TIME OF AGC CLOCK                      3COMP    00XXX. HRS                          DEC ONLY
R0304                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0306                                                       0XX.XX SEC
R0307   37  TIG OF TPI                             3COMP    00XXX. HRS                          DEC ONLY
R0309                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0311                                                       0XX.XX SEC
R0312   38  TIME OF STATE BEING INTEGRATED         3COMP    00XXX. HRS                          DEC ONLY
R0314                                                       000XX. MIN                          MUST LOAD 3 COMPS
R0316                                                       0XX.XX SEC
R0317   39  SPARE
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P0318   MIXED NOUNS                              COMPONENTS  SCALE AND DECIMAL POINT          RESTRICTIONS

R0320   40  TIME FROM IGNITION/CUTOFF               3COMP    XXBXX  MIN/SEC                   NO LOAD, DEC ONLY
R0322       VG,                                              XXXX.X FT/SEC
R0323       DELTA V (ACCUMULATED)                            XXXX.X FT/SEC
R0324   41  TARGET  AZIMUTH,                        2COMP    XXX.XX DEG                       (FOR SYSTEM TEST)
R0326               ELEVATION                                XX.XXX DEG
R0327   42  APOGEE,                                 3COMP    XXXX.X NAUT MI                   DEC ONLY
R0329       PERIGEE,                                         XXXX.X NAUT MI
R0330       DELTA V (REQUIRED)                               XXXX.X FT/SEC
R0331   43  LATITUDE,                               3COMP    XXX.XX DEG                       DEC ONLY
R0333       LONGITUDE,                                       XXX.XX DEG
R0334       ALTITUDE                                         XXXX.X NAUT MI
R0335   44  APOGEE,                                 3COMP    XXXX.X NAUT MI                   NO LOAD, DEC ONLY
R0337       PERIGEE,                                         XXXX.X NAUT MI
R0338       TFF                                              XXBXX  MIN/SEC
R0339   45  MARKS,                                  3COMP    XXXXX.                           NO LOAD, DEC ONLY
R0341       TFI OF NEXT BURN                                 XXBXX  MIN/SEC
R0342       MGA                                              XXX.XX DEG
R0343   46  AUTOPILOT CONFIGURATION                 1COMP    OCTAL ONLY
R0344   47  LEM WEIGHT,                             2COMP    XXXXX. LBS                       DEC ONLY
R0346       CSM WEIGHT                                       XXXXX. LBS
R0347   48  GIMBAL PITCH TRIM,                      2COMP    XXX.XX DEG                       DEC ONLY
R0349       GIMBAL ROLL TRIM                                 XXX.XX DEG
R0350   49  DELTA R,                                3COMP    XXXX.X NAUT MI                   DEC ONLY
R0352       DELTA V,                                         XXXX.X FT/SEC
R03521      RADAR DATA SOURCE CODE                           XXXXX.
R0353   50  SPARE
R0354   51  S-BAND ANTENNA ANGLES PITCH             2COMP    XXX.XX DEG                       DEC ONLY
R0356                               YAW                      XXX.XX DEG
R0357   52  CENTRAL ANGLE OF ACTIVE VEHICLE         1COMP    XXX.XX DEG
R0358   53  SPARE
R0359   54  RANGE,                                  3COMP    XXX.XX NAUT MI                   DEC ONLY
R0361       RANGE RATE,                                      XXXX.X FT/SEC
R0362       THETA                                            XXX.XX DEG
R0363   55  NO. OF APSIDAL CROSSINGS                3COMP    XXXXX.                           DEC ONLY
R0365       ELEVATION ANGLE                                  XXX.XX DEG
R0366       CENTRAL ANGLE OF PASSIVE VEHICLE                 XXX.XX DEG
R0367   56  RR LOS AZIMUTH                          2COMP    XXX.XX DEG
R0368              ELEVATION                                 XXX.XX DEG
R0369   57  DELTA R                                 1COMP    XXXX.X NAUT MI                   DEC ONLY
R0371   58  PERIGEE ALT (POST TPI)                  3COMP    XXXX.X NAUT MI                   DEC ONLY
R0373       DELTA V TPI                                      XXXX.X FT/SEC
R0374       DELTA V TPF                                      XXXX.X FT/SEC
R0375   59  DELTA VELOCITY LOS                      3COMP    XXXX.X FT/SEC FOR EA.            DEC ONLY
R0377   60  HORIZONTAL VELOCITY                     3COMP    XXXX.X FT/SEC                    DEC ONLY
R0379       ALTITUDE RATE                                    XXXX.X FT/SEC
R0380       COMPUTED ALTITUDE                                XXXXX. FEET
R0381   61  TIME TO GO IN BRAKING PHASE             3COMP    XXBXX  MIN/SEC                   NO LOAD, DEC ONLY
R0383       TIME FROM IGNITION                               XXBXX  MIN/SEC
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R0384         CROSS RANGE DISTANCE                            XXXX.X NAUT MI
R0385    62   ABSOLUTE VALUE OF VELOCITY               3COMP  XXXX.X FT/SEC                     NO LOAD, DEC ONLY
R0387         TIME FROM IGNITION                              XXBXX  MIN/SEC
R0388         DELTA V (ACCUMULATED)                           XXXX.X FT/SEC
R0389    63   ABSOLUTE VALUE OF VELOCITY               3COMP  XXXX.X FT/SEC                     DEC ONLY
R0391         ALTITUDE RATE                                   XXXX.X FT/SEC
R0392         COMPUTED ALTITUDE                               XXXXX. FEET
R0393    64   TIME LEFT FOR REDESIGNATION- LPD ANGLE   3COMP  XXBXX                             NO LOAD, DEC ONLY
R0395         ALTITUDE RATE                                   XXXX.X FT/SEC
R0396         COMPUTED ALTITUDE                               XXXXX. FEET
R0397    65   SAMPLED AGC TIME                         3COMP  OOXXX. HRS                        DEC ONLY
R0399          (FETCHED IN INTERRUPT)                         OOOXX. MIN                        MUST LOAD 3 COMPS
R0401                                                         OXX.XX SEC
R0402    66   LR RANGE                                 2COMP  XXXXX. FEET                       NO LOAD, DEC ONLY
R0404            POSITION                                     +0000X
R0405    67   LRVX                                     3COMP  XXXXX. FT/SEC
R0406         LRVY                                            XXXXX. FT/SEC
R0407         LRVZ                                            XXXXX. FT/SEC
R0408    68   SLANT RANGE TO LANDING SITE              3COMP  XXXX.X NAUT MI                    NO LOAD, DEC ONLY
R0410         TIME TO GO IN BRAKING PHASE                     XXBXX  MIN/SEC
R0411         LR ALTITUDE - COMPUTED ALTITUDE                 XXXXX. FEET
R0412    69   SPARE
R0413    70   AOT DETENT CODE/STAR CODE                3COMP  OCTAL ONLY FOR EACH
R0414    71   AOT DETENT CODE/STAR CODE                3COMP  OCTAL ONLY FOR EACH
R0415    72   RR  360 - TRUNNION ANGLE                 2COMP  XXX.XX DEG
R0416             SHAFT ANGLE                                 XXX.XX DEG
R0417    73   NEW RR  360 - TRUNNION ANGLE             2COMP  XXX.XX DEG
R0418                   SHAFT ANGLE                           XXX.XX DEG
R0419    74   TIME FROM IGNITION                       3COMP  XXBXX  MIN/SEC                    NO LOAD, DEC ONLY
R0421         YAW AFTER VEHICLE RISE                          XXX.XX DEG
R0422         PITCH AFTER VEHICLE RISE                        XXX.XX DEG
R0423    75   DELTA ALTITUDE CDH                       3COMP  XXXX.X NAUT MI                    NO LOAD, DEC ONLY
R0425         DELTA TIME (CDH-CSI OR TPI-CDH)                 XXBXX  MIN/SEC
R0426         DELTA TIME (TPI-CDH OR TPI-NOMTPI)              XXBXX  MIN/SEC
R0427    76   DESIRED HORIZONTAL VELOCITY              3COMP  XXXX.X FT/SEC                     DEC ONLY
R0429         DESIRED RADIAL VELOCITY                         XXXX.X FT/SEC
R04291        CROSS-RANGE DISTANCE                            XXXX.X NAUT MI
R0430    77   TIME TO ENGINE CUTOFF                    2COMP  XXBXX  MIN/SEC                    NO LOAD, DEC ONLY
R0432         VELOCITY NORMAL TO CSM PLANE                    XXXX.X FT/SEC
R0433    78   RR RANGE                                 2COMP  XXX.XX NAUT MI
R0434            RANGE RATE                                   XXXXX. FT/SEC
R0435    79   CURSOR ANGLE                             3COMP  XXX.XX DEG                        DEC ONLY
R0437         SPIRAL ANGLE                                    XXX.XX DEG
R0438         POSITION CODE                                   XXXXX.
R0439    80   DATA INDICATOR,                          2COMP  XXXXX.
R0440         OMEGA                                           XXX.XX DEG
R0441    81   DELTA V (LV)                             3COMP  XXXX.X FT/SEC FOR EACH            DEC ONLY
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R0443   82  DELTA V (LV)                           3COMP   XXXX.X FT/SEC FOR EACH              DEC ONLY
R0445   83  DELTA V (BODY)                         3COMP   XXXX.X FT/SEC FOR EACH              DEC ONLY
R0447   84  DELTA V (OTHER VEHICLE)                3COMP   XXXX.X FT/SEC FOR EACH              DEC ONLY
R0449   85  VG (BODY)                              3COMP   XXXX.X FT/SEC FOR EACH              DEC ONLY
R0451   86  VG (LV)                                3COMP   XXXX.X FT/SEC FOR EACH              DEC ONLY
R0453   87  BACKUP OPTICS LOS AZIMUTH              2COMP   XXX.XX DEG
R0454                       ELEVATION                      XXX.XX DEG
R0455   88  HALF UNIT SUN OR PLANET VECTOR         3COMP   .XXXXX FOR EACH                     DEC ONLY
R0457   89  LANDMARK LATITUDE                      3COMP   XX.XXX DEG                          DEC ONLY
R0459                LONGITUDE/2                           XX.XXX DEG
R0460                ALTITUDE                              XXX.XX NAUT MI
R0461   90  Y                                      3COMP   XXX.XX NM                           DEC ONLY
R0463       Y DOT                                          XXXX.X FPS
R0464       PSI                                            XXX.XX DEG
R0465   91  ALTITUDE                               3COMP   XXXXXB. NAUT MI
R04651      VELOCITY                                       XXXXX.  FT/SEC
R04652      FLIGHT PATH ANGLE                              XXX.XX  DEG
R0466   92  SPARE
R0467   93  DELTA GYRO ANGLES                      3COMP   XX.XXX DEG FOR EACH
R0468   94  SPARE
R0469   95  SPARE
R0470   96  SPARE
R0471   97  SYSTEM TEST INPUTS                     3COMP   XXXXX. FOR EACH
R0472   98  SYSTEM TEST RESULTS AND INPUTS         3COMP   XXXXX.
R0473                                                      .XXXXX
R0474                                                      XXXXX.
R0475   99  RMS IN POSITION                        3COMP   XXXXX.FT                            DEC ONLY
R0477       RMS IN VELOCITY                                XXXX.X FT/SEC
R04771      RMS IN BIAS                                    XX.XXX RADIANS
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P0478   REGISTERS AND SCALING  FOR NORMAL NOUNS

R0479   NOUN            REGISTER        SCALE TYPE

R0480   00       NOT IN USE
R0481   01       SPECIFY ADDRESS        B
R0482   02       SPECIFY ADDRESS        C
R0483   03       SPECIFY ADDRESS        D
R0484   04              DSPTEM1         H
R0485   05              DSPTEM1         H
R0486   06              OPTION1         A
R0487   07              XREG            A
R0488   08              ALMCADR         A
R0489   09              FAILREG         A
R0490   10       SPECIFY CHANNEL        A
R0491   11              TCSI            K
R0492   12              OPTIONX         A
R0493   13              TCDH            K
R0494   14              DSPTEMX         C
R0495   15       INCREMENT ADDRESS      A
R0496   16              DSPTEMX         C
R0497   17       SPARE
R0498   18              FDAIX           D
R0499   19       SPARE
R0500   20              CDUX            D
R0501   21              PIPAX           C
R0502   22              THETAD          D
R0503   23       SPARE
R0504   24              DSPTEM2 +1      K
R0505   25              DSPTEM1         C
R0506   26              DSPTEM1         A
R0507   27              SMODE           C
R0508   28       SPARE
R0509   29       SPARE
R0510   30       SPARE
R0511   31       SPARE
R0512   32              -TPER           K
R0513   33              TIG             K
R0514   34              DSPTEM1         K
R0515   35              TTOGO           K
R0516   36              TIME2           K
R0517   37              TTPI            K
R0518   38              TET             K
R0519   39       SPARE
```

```
R0520   REGISTERS AND SCALING FOR MIXED NOUNS

R0521   NOUN    COMP    REGISTER        SCALE TYPE

R0522   40      1       TTOGO           L
R0523           2       VGDISP          S
R0524           3       DVTOTAL         S
R0525   41      1       DSPTEM1         D
R0526           2       DSPTEM1 +1      E
R0527   42      1       HAPO            Q
R0528           2       HPER            Q
R0529           3       VGDISP          S
R0530   43      1       LAT             H
R0531           2       LONG            H
R0532           3       ALT             Q
R0533   44      1       HAPOX           Q
R0534           2       HPERX           Q
R0535           3       TFF             L
R0536   45      1       TRKMKCNT        C
R0537           2       TTOGO           L
R0538           3       +MGA            H
R0539   46      1       DAPDATR1        A
R0540   47      1       LEMMASS         KK
R0541           2       CSMMASS         KK
R0542   48      1       PITTIME         NN
R0543           2       ROLLTIME        NN
R0544   49      1       R22DISP         Q
R0545           2       R22DISP +2      S
R05451          3       WHCHREAD        C
R0546   50      SPARE
R0547   51      1       ALPHASB         H
R0548           2       BETASB          H
R0549   52      1       ACTCENT         H
R0550   53      SPARE
R0551   54      1       RANGE           JJ
R0552           2       RRATE           S
R0553           3       RTHETA          H
R0554   55      1       NN              C
R0555           2       ELEV            H
R0556           3       CENTANG         H
R0557   56      1       RR-AZ           H
R0558           2       RR-ELEV         H
R0559   57      1       DELTAR          Q
R0560   58      1       POSTTPI         Q
R0561           2       DELVTPI         S
R0562           3       DELVTPF         S
R0563   59      1       DVLOS           S
R0564           2       DVLOS +2        S
R0565           3       DVLOS +4        S
R0566   60      1       VHORIZ          S
```

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L         ASSEMBLY AND OPERATION INFORMATION                                      USER'S PAGE NO.  15       E0

R0567               2         HDOTDISP          S
R0568               3         HCALC             RR
R0569    61         1         TTFDISP           L
R0570               2         TTOGO             L
R0571               3         OUTOFPLN          QQ
R0572    62         1         ABVEL             S
R0573               2         TTOGO             L
R0574               3         DVTOTAL           S
R0575    63         1         ABVEL             S
R0576               2         HDOTDISP          S
R0577               3         HCALC1            RR
R0578    64         1         FUNNYDSP          PP
R0579               2         HDOTDISP          S
R0580               3         HCALC             FR
R0581    65         1         SAMPTIME          K
R0582               2         SAMPTIME          K
R0583               3         SAMPTIME          K
R0584    66         1         RSTACK +6         W
R0585               2         CHANNEL  33       TT
R0586    67         1         RSTACK            X
R0587               2         RSTACK +2         Y
R0588               3         RSTACK +4         Z
R0589    68         1         RANGEDSP          QQ
R0590               2         TTFDISP           L
R0591               3         DELTAH            FR
R0592    69       SPARE
R0593    70         1         AOTCODE           A
R0594               2         AUTCODE +1        A
R0595               3         AOTCODE +2        A
R0596    71         1         AOTCODE           A
R0597               2         AOTCODE +1        A
R0598               3         AOTCODE +2        A
R0599    72         1         CDUT              WW
R0600               2         CDUS              D
R0601    73         1         TANG              WW
R0602               2         TANG +1           D
R0603    74         1         TTOGO             L
R0604               2         YAW               H
R0605               3         PITCH             H
R0606    75         1         DIFFALT           Q
R0607               2         T1TOT2            L
R0608               3         T2TOT3            L
R0609    76         1         ZDOTD             S
R0610               2         RDOTD             S
R06101              3         XRANGE            Q
R0611    77         1         TTOGO             L
R0612               2         YDOT              S
R0613    78         1         RSTACK            U
R0614               2         RSTACK +2         V
R0615    79         1         CURSOR            D
```

```
R0616              2         SPIRAL             D
R0617              3         POSCODE            C
R0618     80       1         DATAGOOD           C
R0619              2         OMEGAD             H
R0620     81       1         DELVLVC            S
R0621              2         DELVLVC +2         S
R0622              3         DELVLVC +4         S
R0623     82       1         DELVLVC            S
R0624              2         DELVLVC +2         S
R0625              3         DELVLVC +4         S
R0626     83       1         DELVIMU            S
R0627              2         DELVIMU +2         S
R0628              3         DELVIMU +4         S
R0629     84       1         DELVOV             S
R0630              2         DELVOV +2          S
R0631              3         DELVOV +4          S
R0632     85       1         VGBODY             S
R0633              2         VGBODY +2          S
R0634              3         VGBODY +4          S
R0635     86       1         DELVLVC            S
R0636              2         DELVLVC +2         S
R0637              3         DELVLVC +4         S
R0638     87       1         AZ                 D
R0639              2         EL                 D
R0640     88       1         STARAD             B
R0641              2         STARAD +2          B
R0642              3         STARAD +4          B
R0643     89       1         LANDLAT            G
R0644              2         LANDLONG           G
R0645              3         LANDALT            JJ
R0646     90       1         RANGE              JJ
R0647              2         RRATE              S
R0648              3         RTHETA             H
R0649     91       1         P21ALT             Q (MEMORY/100 TO DIPLAY TENS N.M.)
R06491             2         P21VEL             P
R06492             3         P21GAM             H
R0650     92       SPARE
R0651     93       1         OGC                G
R0652              2         OGC +2             G
R0653              3         OGC +4             G
R0654     94       SPARE
R0655     95       SPARE
R0656     96       SPARE
R0657     97       1         DSPTEM1            C
R0658              2         DSPTEM1 +1         C
R0659              3         DSPTEM1 +2         C
R0660     98       1         DSPTEM2            C
R0661              2         DSPTEM2 +1         B
R0662              3         DSPTEM2 +2         C
R0663     99       1         WWPOS              XX
```

```
R0664           2       WWVEL           YY
R06641          3       WWBIAS          AAA
```

```
P0665    NOUN SCALES AND FORMATS

R0666    -SCALE TYPE-                            PRECISION
R0667    UNITS                 DECIMAL FORMAT         -- AGC FORMAT
R0668    ------------          --------------         -- ----------

R0669    -A-
R0670    OCTAL                 XXXXX                  SP OCTAL

R0671    -B-                                                     -14
R0672    FRACTIONAL            .XXXXX                 SP BIT 1 = 2     UNITS
R0673                          (MAX .99996)

R0674    -C-
R0675    WHOLE                 XXXXX.                 SP BIT 1 = 1 UNIT
R0676                          (MAX 16383.)

R0677    -D-                                                          15
R0678    CDU DEGREES           XXX.XX DEGREES         SP BIT 1 = 360/2    DEGREES
R0679                          (MAX 359.99)              (USES 15 BITS FOR MAGNI-
R0680                                                     TUDE AND 2-S COMP.)

R0681    -E-                                                        14
R0682    ELEVATION DEGREES     XX.XXX DEGREES         SP BIT 1 = 90/2    DEGREES
R0683                          (MAX 89.999)

R0684    -F-                                                          14
R0685    DEGREES (180)         XXX.XX DEGREES         SP BIT 1 = 180/2    DEGREES
R0686                          (MAX 179.99)

R0687    -G-
R0688    DP DEGREES(90)        XX.XXX DEGREES         DP BIT 1 OF LOW REGISTER =
R0689                                                          28
R0690                                                    360/2    DEGREES
R0691    -H-
R0692    DP DEGREES (360)      XXX.XX DEGREES         DP BIT 1 OF LOW REGISTER =
R0693                                                          28
R0694                          (MAX 359.99)              360/2    DEGREES
```

```
R0695   -K-
R0696   TIME (HR, MIN, SEC)  00XXX. HR             DP BIT 1 OF LOW REGISTER =
R0697                        000XX. MIN                 -2
R0698                        0XX.XX SEC               10    SEC
R0699                        (DECIMAL ONLY.
R0700                        MAX MIN COMP=59
R0701                        MAX SEC COMP=59.99
R0702                        MAX CAPACITY=745 HRS
R0703                                      39 MINS
R0704                                      14.55 SECS.
R0705                        WHEN LOADING, ALL 3
R0706                        COMPONENTS MUST BE
R0707                        SUPPLIED.)

R0708   -L-
R0709   TIME (MIN/SEC)       XXBXX MIN/SEC         DP BIT 1 OF LOW REGISTER =
R0710                        (B IS A BLANK              -2
R0711                        POSITION, DECIMAL        10    SEC
R0712                        ONLY, DISPLAY OR
R0713                        MONITOR ONLY. CANNOT
R0714                        BE LOADED.
R0715                        MAX MIN COMP=59
R0716                        MAX SEC COMP=59
R0717                        VALUES GREATER THAN
R0718                        59 MIN 59 SEC
R0719                        ARE DISPLAYED AS
R0720                        59 MIN 59 SEC.)

R0721   -M-                                                     -2
R0722   TIME (SEC)           XXX.XX SEC            SP BIT 1 = 10    SEC
R0723                        (MAX 163.83)

R0724   -N-
R0725   TIME(SEC) DP         XXX.XX SEC            DP BIT 1 OF LOW REGISTER =
R0726                                                   -2
R0727                                                 10    SEC

R0728   -P-
R0729   VELOCITY 2           XXXXX. FEET/SEC       DP BIT 1 OF HIGH REGISTER =
R0730                        (MAX 41996.)              -7
R0731                                                 2    METERS/CENTI-SEC

R0732   -Q-
R0733   POSITION 4           XXXX.X NAUTICAL MILES DP BIT 1 OF LOW REGISTER =
R0734                                                 2 METERS

R0735   -S-
R0736   VELOCITY 3           XXXX.X FT/SEC         DP BIT 1 OF HIGH REGISTER =
R0737                                                  -7
R0738                                                 2    METERS/CENTI-SEC
```

```
R0739   -T-                                                      -2
R0740   G                     XXX.XX G              SP BIT 1 = 10   G
R0741                         (MAX 163.83)

R0742   -U-
R0743   RENDEZVOUS            XXX.XX NAUT MI        DP LOW ORDER BIT OF LOW ORDER
R0744   RADAR RANGE                                    WORD = 9.38 FEET

R0745   -V-
R0746   RENDEZVOUS            XXXXX. FEET/SEC       DP LOW ORDER BIT OF LOW ORDER
R0747   RADAR RANGE RATE                               WORD = -.6278 FEET/SEC

R0748   -W-
R0749   LANDING RADAR         XXXXX. FEET           DP LOW ORDER BIT OF LOW ORDER
R0750   ALTITUDE                                       WORD = 1.079 FEET

R0751   -X-
R0752   LANDING RADAR         XXXXX. FEET/SEC       DP LOW ORDER BIT OF LOW ORDER
R0753   VELX                                           WORD = -.6440 FEET/SEC

R0754   -Y-
R0755   LANDING RADAR         XXXXX. FEET/SEC       DP LOW ORDER BIT OF LOW ORDER
R0756   VELY                                           WORD = 1.212  FEET/SEC

R0757   -Z-
R0758   LANDING RADAR         XXXXX. FEET/SEC       DP LOW ORDER BIT OF LOW ORDER
R0759   VELZ                                           WORD = .8668  FEET/SEC

R0760   -AA-
R0761   INITIAL/FINAL         XXXXX. FEET           DP LOW ORDER BIT OF LOW ORDER
R0762   ALTITUDE                                       WORD = 2.345 FEET

R0763   -BB-
R0764   ALTITUDE RATE         XXXXX. FEET/SEC       SP LOW ORDER BIT = .5
R0765                         (MAX 08191.)             FEET/SEC

R0766   -CC-
R0767   FORWARD/LATERAL       XXXXX. FEET/SEC       SP LOW ORDER BIT = .5571
R0768   VELOCITY              (MAX 09126.)             FEET/SEC

R0769   -DD-
R0770   ROTATIONAL HAND       XXXXX. DEG/SEC        SP FRACTIONAL PART OF PI RAD
R0771   CONTROLLER ANGULAR    (MAX 00044.)                                 4  SEC
R0772   RATES

R0773   -EE-
R0774   OPTICAL TRACKER       XXX.XX DEG.           DP LOW ORDER BIT OF LOW ORDER
R0775   AZIMUTH ANGLE                                              15
R0776                                                  WORD = 360/2   DEGREES
```

```
-JJ-
POSITION5              XXX.XX NAUT MI         DP BIT 1 OF LOW REGISTER =
                                                 2 METERS
-KK-                                                                 16
WEIGHT2                XXXXX. LBS             SP FRACTIONAL PART OF 2   KG

-NN-
TRIM DEGREES 2         XXX.XX DEG             SP BIT 1=.01SEC(TIME)
                       (MAX 032.76)

-PP-
2 INTEGERS             +XXBYY                 DP BIT 1 OF HIGH REGISTER =
                       (B IS A BLANK              1 UNIT OF XX
                       POSITION. DECIMAL         BIT 1 OF LOW REGISTER =
                       ONLY, DISPLAY OR           1 UNIT OF YY
                       MONITOR ONLY. CANNOT      (EACH REGISTER MUST
                       BE LOADED.)               CONTAIN A POSITIVE INTEGER
                       (MAX 99B99)                LESS THAN 100)

-QQ-
POSITION7              XXXX.X NAUT MI         DP BIT 1 OF LOW REGISTER =
                       (MAX 9058.9)               -4
                                                 2   METERS

-RR-
COMPUTED ALTITUDE      XXXXX. FEET            DP BIT 1 OF LOW REGISTER =
                                                  -4
                                                 2   METERS

-SS-
DP DEGREES             XXXX.X DEGREES         DP BIT 1 OF HIGH REGISTER =
                                                 1 DEGREE

-TT-
LANDING RADAR          +0000X                 CHANNEL 33,BIT 6=NOT POSIT. 1
POSITION               (DECIMAL ONLY.         CHANNEL 33,BIT 7=NOT POSIT. 2
                       DISPLAY OR MONITOR     X = 1 FOR LR POSITION 1
                       ONLY. CANNOT BE        X = 2 FOR LR POSITION 2
                       LOADED.)

-WW-                                                                15
360-CDU DEGREES        XXX.XX DEGREES         SP BIT 1 = 360 - (360/2  )
                       (MAX 359.99)              DEGREES
                                                 (USES 15 BITS FOR MAGNI-
                                                  TUDE AND 2-S COMP.)

-XX-
POSITION 9             XXXXX. FEET            DP BIT 1 OF LOW REGISTER =
                                                  -9
                                                 2   METERS
```

```
R0819   -YY-
R0820   VELOCITY 4            XXXX.X FEET/SEC       DP FRACTIONAL PART OF
R08201                        (MAX 328.0)              METERS/CENTI-SEC

R0821   -AAA-
R08211  RADIANS               XX.XXX RADIANS        DP BIT 1 OF HIGH REGISTER =
R08212                        (MAX 31.999)              -9
R08213                                                 2   RADIANS

R0822   THAT-S ALL ON THE NOUNS.
```

```
R0823            ALARM CODES FOR LUMINARY

R0824   *9       *18                                       *60   COLUMN

R0825   CODE   * TYPE                                      SET BY

R0826   00105 ** AOTMARK SYSTEM IN USE
R0827   00107    MORE THAN 5 MARK PAIRS                    AOTMARK
R0828   00111    MARK MISSING                              AOTMARK
R0829   00112    MARK OR MARK REJECT NOT BEING ACCEPTED    AOTMARK
R0830   00113    NO INBITS                                 AOTMARK
R0831   00114    MARK MADE BUT NOT DESIRED                 AOTMARK
R0832   00115    NO MARKS IN LAST PAIR TO REJECT           AOTMARK
R0833   00206    ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN IMU MODE SWITCHING
R0834   00206     + GIMBAL LOCK.
R0835   00207    ISS TURNON REQUEST NOT PRESENT FOR 90 SEC T4RUPT
R0836   00210    IMU NOT OPERATING                         IMU MODE SWITCH, IMU-2, R02, P51, P57
R0837   00211    COARSE ALIGN ERROR                        IMU MODE SWITCH
R0839   00212    PIPA FAIL BUT PIPA IS NOT BEING USED      IMU MODE SWITCH,T4RPT
R0840   00213    IMU NOT OPERATING WITH TURN-ON REQUEST    T4RUPT
R0841   00214    PROGRAM USING IMU WHEN TURNED OFF         T4RUPT
R0842   00217    BAD RETURN FROM IMUSTALL                  P51,P52,P57
R0843   00220    IMU NOT ALIGNED - NO REFSMMAT             R02,R47
R0844   00401    DESIRED GIMBAL ANGLE YIELDS GIMBAL LOCK   INF ALIGN, IMU-2,
R0845                                                      FINDCDUW
R0846   00402    FINDCDUW NOT CONTROLLING ATTITUDE         FINDCDUW
R0847   00404    TWO STARS NOT AVAILABLE IN ANY DETENT     R59, LUNAR SURFACE
R0848   00405    TWO STARS NOT AVAILABLE                   P52
R0849   00421    W-MATRIX OVERFLOW                         INTEGRV
R08495  00430 ** ACCELERATION OVERFLOW IN INTEGRATION      ORBITAL INTEGRATION
R0850   00501  P RADAR ANTENNA OUT OF LIMITS               R23
R0851   00502    BAD RADAR GIMBAL ANGLE INPUT              V41N72
R0852   00503  P RADAR ANTENNA DESIGNATE FAIL              R21, NON-P IN V41N72
R0853   00510    RADAR AUTO DESCRETE NOT PRESENT           R25
R0854   00511    LR NOT IN POSITION 2 OR REPOSITIONING     SERVICER
R0855   00514  P RR GOES OUT OF AUTO MODE WHILE IN USE     P20
R0856   00515    RR CDU FAIL DISCRETE PRESENT              R25
R0857   00520    RADAR RUPT NOT EXPECTED AT THIS TIME      RADAR READ
R0858   00521    COULD NOT READ RADAR                      P20
R0859   00522    LANDING RADAR POSITION CHANGE             RADAR READ
R0860   00523  P LR ANTENNA DIDN'T ACHIEVE POSITION 2      SERVICER, V60 (NON-P IN V60)
R0862   00525  P DELTA THETA GREATER THAN 3 DEGREES        R22
R0863   00526  P RANGE GREATER THAN 400 NAUT. MILES        P20,P22
R0864   00527  P LOS NOT IN MODE II COVERAGE WHILE ON      R21,R24
R0865            LUNAR SURFACE
R0866            OR VEHICLE MANEUVER REQUIRED              R24 (20)
R08665  00530  P LOS NOT IN MODE2 COVERAGE                 R21
R08666           ON LUNAR SURFACE AFTER 600 SECS.
R0867   00600    IMAGINARY ROOTS ON FIRST ITERATION        P32, P72
R0868   00601    PERIGEE ALTITUDE CSI LT PMIN1             P32,P72,
R0869   00602      PERIGEE ALTITUDE CDH LT PMIN2              P32,P72,
R0870   00603      CSI TO CDH TIME LT TMIN12                  P32,P72,P33,P73
R0871   00604      CDH TO TPI TIME LT TMIN23                  P32,P72,
R0872   OR COMPUTED CDH TIME GREATER THAN INPUT TPI TIME
R0873   00605      NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM  P32, P72
R0874   00606      DV EXCEEDS MAXIMUM                         P32,P72,
R08745  00607 **   NO SOLN FROM TIME-THETA OR TIME-RADIUS     TIMETHET,TIMERAD
R0875   00611      NO TIG FOR GIVEN ELEV ANGLE                P34,P74
R0876   00701      ILLEGAL OPTION CODE SELECTED               P57
R0877   00777      PIPA FAIL CAUSED THE ISS WARNING           T4RUPT
R0878   01102      AGC SELF TEST ERROR                        SELF CHECK
R0879   01103 **   UNUSED CCS BRANCH EXECUTED                 ABORT
R0880   01104  *   DELAY ROUTINE BUSY                         EXEC
R0881   01105      DOWNLINK TOO FAST                          T4RUPT
R0882   01106      UPLINK TOO FAST                            T4RUPT
R0883   01107      PHASE TABLE FAILURE.  ASSUME               RESTART
R0884              ERASABLE MEMORY IS SUSPECT.                RESTART
R0885   01201  *   EXECUTIVE OVERFLOW-NO VAC AREAS            EXEC
R0886   01202  *   EXECUTIVE OVERFLOW-NO CORE SETS            EXEC
R0887   01203  *   WAITLIST OVERFLOW-TOO MANY TASKS           WAITLIST
R0888   01204 **   WAITLIST, VARDELAY, FIXDELAY, OR LONGCALL   WAITLIST ROUTINES
R0889                CALLED WITH ZERO OR NEGATIVE DELTA-TIME
R0890   01206 **   SECOND JOB ATTEMPTS TO GO TO SLEEP         PINBALL
R0891   01206       VIA KYBD AND DISPLAY PROGRAM
R0892   01207  *   NO VAC AREAS FOR MARKS                     AOTMARK
R0893   01210  *   TWO PROGRAMS USING DEVICE AT SAME TIME     MODE SWITCHING
R0894   01211  *   ILLEGAL INTERRUPT OF EXTENDED VERB         AOTMARK
R0895   01301      ARCSIN-ARCCOS ARGUMENT TOO LARGE           INTERPRETER
R0896   01302 **   SQRT CALLED WITH NEGATIVE ARGUMENT         INTERPRETER
R0897   01406      BAD RETURN FROM ROOTPSRS                   DESCENT GUIDANCE EQS.
R08975  01406 **   BAD RETURN FROM ROOTPSRS                   IGNITION ALGORITHM

R08976       NOTE:  1406 IS A POODOO DURING THE IGNITION ALGORITHM
R08977       AND AN ALARM DURING THE ACTUAL GUIDANCE PHASE.

R0898   01407      VG INCREASING (DELTA-V ACCUMULATED         S40.8
R0899              .GT. 90 DEGREES AWAY FROM DESIRED THRUST   S40.8
R08995             VECTOR.)                                   S40.8
R0900   01410      UNINTENTIONAL OVERFLOW IN GUIDANCE         DESCENT GUIDANCE EQS.
R0901   01412      DESCENT IGNALG NOT CONVERGING              P63
R0902   01501 **   KEYBOARD AND DISPLAY ALARM DURING          PINBALL
R0903   01501       INTERNAL USE(NVSUB).ABORT
R0904   01502 **   ILLEGAL FLASHING DISPLAY                   GOPLAY
R0905   01520      V37 REQUEST NOT PERMITTED AT THIS TIME     V37
R0906   01600      OVERFLOW IN DRIFT TEST                     IMU 4
R0907   01601      BAD IMU TORQUE                             OPT PRE ALIGN CALIB
R0908   01601                                                 IMU 4 (LEM)
R0909   01703      IGNITION TIME SLIPPED                      MIDTOAVE
R0910   01706      INCORRECT PROGRAM REQUESTED FOR VEHICLE
R0911              CONFIGURATION                              P40, P42
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```
R0912    02000  * DAP STILL IN PROGRESS AT NEXT TIME5 RUPT  DAP
R0913    02001    JET FAILURES HAVE DISABLED Y-Z TRANS.      DAP
R0914    02002    JET FAILURES HAVE DISABLED X TRANSLATION   DAP
R0915    02003    JET FAILURES HAVE DISABLED P-ROTATION      DAP
R0916    02004    JET FAILURES HAVE DISABLED U-V ROTATION    DAP
R0917    03777    ICDU FAIL CAUSED THE ISS WARNING           T4RUPT
R0918    04777    ICDU , PIPA FAILS CAUSED THE ISS WARNING   T4RUPT
R0919    07777    IMU FAIL CAUSED THE ISS WARNING            T4RUPT
R0920    10777    IMU , PIPA FAILS CAUSED THE ISS WARNING    T4RUPT
R0921    13777    IMU , ICDU  FAILS CAUSED THE ISS WARNING   T4RUPT
R0922    14777    IMU,ICDU,PIPA FAILS CAUSED THE ISSWNING    T4RUPT
R0923           * INDICATES AN ABORT CODE THAT RESULTS IN A SOFTWARE RESTART.

R0924          ** INDICATES A MORE SERIOUS ABORT CODE THAT RESULTS IN THE
R0925             PROGRAM GOING TO R00.

R0926           P INDICATES A PRIORITY ALARM.

R0927             ALL OTHERS ARE NON-ABORTIVE
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L        ASSEMBLY AND OPERATION INFORMATION                                 USER'S PAGE NO. 26      E0

P0928              CHECKLIST CODES FOR LUMINARY

R0929    *9       *17       *26                                              *9    COLUMN

R0931    PICODE             ACTION TO BE EFFECTED                            PROGRAM

R0933    00013    KEY IN    NORMAL OR GYRO TORQUE COARSE ALIGN               P52
R0935    00014    PROCEED   DO IMU FINE ALIGN ROUTINE                        R51,P63,P57
R09352   00014    ENTER     DO LANDING SITE  DETERMINATION(N89DISP)          P57OPTION2
R0937    00015    PERFORM   CELESTIAL BODY ACQUISITION                       R51,P51
R0939    00062    SWITCH    AGC POWER DOWN                                   P06
R0941    00201    SWITCH    RR MODE TO AUTOMATIC                             P20,P22,R04
R0943    00203     SWITCH   GUID CONTROL TO GNC, MODE TO AUTO...             P12,P42,P71
R0945                       ALSO THR CONT TO AUTO                            P40,P63,P70
R0947    00205    PERFORM   MANUAL ACQUISITION OF RR                         R23
R0949    00500    SWITCH    LR ANTENNA TO POSITION 1                         P63
R0951
R0952                         SWITCH DENOTES CHANGE POSITION OF A CONSOLE SWITCH
R0953                         PERFORM DENOTES START OR END OF A TASK
R0954                         KEY IN DENOTES KEY IN OF DATA THRU THE DSKY
```

```
P0955           OPTION CODES FOR LUMINARY

R0956   THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN
R0957   CONJUNCTION WITH V04N06 OR V04N12 (FOR EXTENDED VERBS) TO REQUEST THE
R0958   ASTRONAUT TO LOAD INTO COMPONENT R2 THE OPTION HE DESIRES.

R0959   *9      *17                                 *52                            *11           *25   COLUMN

R0961   OPTION
R0962   CODE    PURPOSE                             INPUT FOR COMPONENT 2          PROGRAM(S)    APPLICABILITY

R0964   00001   SPECIFY IMU ORIENTATION             1=PREF 2=NOM 3=REFSMMAT        P52           ALL
R0966                                               4=LAND SITE
R0967   00002   SPECIFY VEHICLE                     1=THIS 2=OTHER                 P21,P30       ALL
R0969   00003   SPECIFY TRACKING ATTITUDE           1=PREFERRED 2=OTHER            R63           ALL
R0971   00004   SPECIFY RADAR                       1=RR 2=LR                      R04           SUNDANCE + LUMINARY
R0973   00005   SPECIFY SOR PHASE                   1=FIRST 2=SECOND               P38           COLOSSUS + LUMINARY
R0975   00006   SPECIFY RR COARSE ALIGN OPTION      1=LOCKON 2=CONTINUOUS DESIG.   V41N72        SUNDANCE + LUMINARY
R0977   00010   SPECIFY ALIGNMENT MODE              0=ANY TIME 1=REFSMMAT +G       P57           LUMINARY
R0979                                               2=TWO BODIES 3=ONE BODY + G
R0980   00012   SPECIFY CSM ORBIT OPTION            1=NO ORBIT CHANGE 2=CHANGE     P22           LUMINARY
R0982                                               ORBIT TO PASS OVER LM
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                  USER'S PAGE NO.   1       E0

 0001    REF    1                                                  COUNT   BANKSUM
R0002                MODULE 1 CONTAINS BANKS 0 THROUGH 5

 0003                               4000                           BLOCK   02
 0004                               4000                  RADARFF  EQUALS
 0005                               4000                  FFTAG1   EQUALS
 0006                               4000                  FFTAG2   EQUALS
 0007                               4000                  FFTAG3   EQUALS
 0008                               4000                  FFTAG4   EQUALS
 0009                               4000                  FFTAG7   EQUALS
 0010                               4000                  FFTAG8   EQUALS
 0011                               4000                  FFTAG9   EQUALS
 0012                               4000                  FFTAG10  EQUALS
 0013                               4000                  FFTAG11  EQUALS
 0014                               4000                  FFTAG12  EQUALS
 0015                               4000                  FFTAG13  EQUALS
 0016      2 WORDS LEFT             5775   05775 1                 BNKSUM 02
 0016                               5776   05776 1


 0017                               6000                           BLOCK   03
 0018                               6000                  FFTAG5   EQUALS
 0019                               6000                  FFTAG6   EQUALS
 0020     17 WORDS LEFT             7756   07756 1                 BNKSUM 03
 0020                               7757   07757 0


 0021                            00,2000                           BANK    00
 0022                            00,2000                  PLAYJOB  EQUALS
 0023      3 WORDS LEFT          00,3774   03774 0                 BNKSUM 00
 0023                            00,3775   03775 1


 0024                            01,2000                           BANK    01
 0025                            01,2000                  RESTART  EQUALS
 0026                            01,2000                  LOADDAP1 EQUALS
 0027      1 WORDS LEFT          01,3776   03776 1                 BNKSUM 01


 0028                            04,2000                           BANK    04
 0029                            04,2000                  R02      EQUALS
 0030                            04,2000                  VERB37   EQUALS
 0031                            04,2000                  PINBALL4 EQUALS
 0032                            04,2000                  CONICS1  EQUALS
 0033                            04,2000                  KEYRUPT  EQUALS
 0034                            04,2000                  R36LM    EQUALS
 0035                            04,2000                  UPDATE2  EQUALS
 0036                            04,2000                  E/PROG   EQUALS
 00365                           04,2000                  AOTMARK2 EQUALS
 0037      6 WORDS LEFT          04,3771   03771 0                 BNKSUM 04
 0037                            04,3772   03772 0
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                         USER'S PAGE NO.   2       E0

 0038                            05,2000                      BANK    05
 0039                            05,2000            FRANDRES  EQUALS
 0040                            05,2000            DOWNTELM  EQUALS
 0041                            05,2000            ABORTS1   EQUALS
 0042                            05,2000            EPHEM1    EQUALS
 00425                           05,2000            ASENT3    EQUALS
 0043      5 WORDS LEFT          05,3772   03772 0            BNKSUM 05
 0043                            05,3773   03773 1


R0044              MODULE 2 CONTAINS BANKS 6 THROUGH 13

 0045                            06,2000                      BANK    06
 0046                            06,2000            IMUCOMP   EQUALS
 0047                            06,2000            T4RUP     EQUALS
 0048                            06,2000            RCSMONT   EQUALS
 00485                           06,2000            MIDDGIM   EQUALS
 00486                           06,2000            EARTHLOC  EQUALS
 0049     11 WORDS LEFT          06,3764   03764 1            BNKSUM 06
 0049                            06,3765   03765 0

 0050                            07,2000                      BANK    07
 0051                            07,2000            AOTMARK1  EQUALS
 0052                            07,2000            MODESW    EQUALS
 00525                           07,2000            ASENT2    EQUALS
 0053      4 WORDS LEFT          07,3773   03773 1            BNKSUM 07
 0053                            07,3774   03774 0

 0054                            10,2000                      BANK    10
 0055                            10,2000            RTBCODES  EQUALS
 0056                            10,2000            DISPLAYS  EQUALS
 0057                            10,2000            PHASETAB  EQUALS
 0058                            10,2000            FLESHLOC  EQUALS
 00585                           10,2000            SLCTMU    EQUALS
 0059      2 WORDS LEFT          10,3775   03775 1            BNKSUM 10
 0059                            10,3776   03776 1

 0060                            11,2000                      BANK    11
 0061                            11,2000            ORBITAL   EQUALS
 0062                            11,2000            F2DPS*11  EQUALS
 0063                            11,2000            INTVEL    EQUALS
 0065      1 WORDS LEFT          11,3776   03776 1            BNKSUM 11

 0066                            12,2000                      BANK    12
 0067                            12,2000            CONICS    EQUALS
 00675                           12,2000            ORBITAL1  EQUALS
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                              USER'S PAGE NO.   3       E0

 00676                         12,2000              INTPRET2 EQUALS
 0068       1 WORDS LEFT       12,3776   03776 1             BNKSUM 12


 0069                          13,2000                       BANK    13
 0070                          13,2000              LATLONG  EQUALS
 0071                          13,2000              INTINIT  EQUALS
 0072                          13,2000              LEMGEOM  EQUALS
 0073                          13,2000              P76LOC   EQUALS
 0074                          13,2000              ORBITAL2 EQUALS
 00745                         13,2000              ABTFLGS  EQUALS
 0075       8 WORDS LEFT       13,3767   03767 1             BNKSUM 13
 0075                          13,3770   03770 1
```

```
P0076           MODULE 3 CONTAINS BANKS 14 THROUGH 21

 0077                      14,2000                       BANK    14
 0078                      14,2000              P50S1    EQUALS
 0079                      14,2000              STARTAB  EQUALS
 00795                     14,2000              ASENT4   EQUALS
 0080        3 WORDS LEFT  14,3774   03774 0             BNKSUM 14
 0080                      14,3775   03775 1


 0081                      15,2000                       BANK    15
 0082                      15,2000              P50S     EQUALS
 0083                      15,2000              EPHEM    EQUALS
 0084        1 WORDS LEFT  15,3776   03776 1             BNKSUM 15


 0085                      16,2000                       BANK    16
 0086                      16,2000              DAPS1    EQUALS
 0087        5 WORDS LEFT  16,3772   03772 0             BNKSUM 16
 0087                      16,3773   03773 1


 0088                      17,2000                       BANK    17
 0089                      17,2000              DAPS2    EQUALS
 00895                     17,2000              P40S3    EQUALS
 0090       27 WORDS LEFT  17,3744   03744 0             BNKSUM 17
 0090                      17,3745   03745 1


 0091                      20,2000                       BANK    20
 0092                      20,2000              DAPS3    EQUALS
 0093                      20,2000              LOADDAP  EQUALS
 00935                     20,2000              RODTRAP  EQUALS
 0094        5 WORDS LEFT  20,3772   03772 0             BNKSUM 20
 0094                      20,3773   03773 1


 0095                      21,2000                       BANK    21
 0096                      21,2000              DAPS4    EQUALS
 0098                      21,2000              R10      EQUALS
 0099                      21,2000              R11      EQUALS
 0100        7 WORDS LEFT  21,3770   03770 1             BNKSUM 21
 0100                      21,3771   03771 0
```

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L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                          USER'S PAGE NO.  5      E0

P0101             MODULE 4 CONTAINS BANKS 22 THROUGH 27

 0102                           22,2000                    BANK     22
 0103                           22,2000           KALCMON1 EQUALS
 0104                           22,2000           KALCMON2 EQUALS
 0105                           22,2000           R30LOC   EQUALS
 0106                           22,2000           RENDEZ   EQUALS
 01065                          22,2000           SERV2    EQUALS
 01066                          22,2000           LANDCNST EQUALS
 0107        4 WORDS LEFT       22,3773   03773 1          BNKSUM 22
 0107                           22,3774   03774 0

 0108                           23,2000                    BANK     23
 0109                           23,2000           POWFLITE EQUALS
 0110                           23,2000           POWFLIT1 EQUALS
 0111                           23,2000           INFLIGHT EQUALS
 0112                           23,2000           APOPERI  EQUALS
 0113                           23,2000           R61      EQUALS
 0114                           23,2000           R62      EQUALS
 0115                           23,2000           INTPRET1 EQUALS
 0116                           23,2000           MEASINC  EQUALS
 0117                           23,2000           MEASINC1 EQUALS
 0118                           23,2000           EXTVB1   EQUALS
 01185                          23,2000           P12A     EQUALS
 01186                          23,2000           NORMLIZ  EQUALS
 01187                          23,2000           ASENT7   EQUALS
 0119        8 WORDS LEFT       23,3767   03767 1          BNKSUM 23
 0119                           23,3770   03770 1

 0120                           24,2000                    BANK     24
 0121                           24,2000           PLANTIN  EQUALS
 0122                           24,2000           P20S     EQUALS
 0123        2 WORDS LEFT       24,3775   03775 1          BNKSUM 24
 0123                           24,3776   03776 1

 0124                           25,2000                    BANK     25
 0125                           25,2000           P20S1    EQUALS
 0126                           25,2000           P20S2    EQUALS
 0127                           25,2000           RADARUPT EQUALS
 0128                           25,2000           RRLEADIN EQUALS
 0129                           25,2000           R29S1    EQUALS
 01295                          25,2000           PLANTIN3 EQUALS
 0130        7 WORDS LEFT       25,3770   03770 1          BNKSUM 25
 0130                           25,3771   03771 0

 0131                           26,2000                    BANK     26
 0132                        26,2000                P20S3    EQUALS
 0133                        26,2000                BAWLANGS EQUALS
 0134                        26,2000                MANUVER  EQUALS
 0135                        26,2000                MANUVER1 EQUALS
 01355                       26,2000                PLANTIN1 EQUALS
 01356                       26,2000                PLANTIN2 EQUALS
 0136       2 WORDS LEFT     26,3775   03775 1               BNKSUM 26
 0136                        26,3776   03776 1


 0137                        27,2000                         BANK    27
 0138                        27,2000                TOF-FF   EQUALS
 0139                        27,2000                TOF-FF1  EQUALS
 0140                        27,2000                P40S1    EQUALS
 0141                        27,2000                VECPT    EQUALS
 0142                        27,2000                ASENT1   EQUALS
 01425                       27,2000                SERV3    EQUALS
 0143       5 WORDS LEFT     27,3772   03772 0               BNKSUM 27
 0143                        27,3773   03773 1
```

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P0144            MODULE 5 CONTAINS BANKS 30 THROUGH 35

 0145                        30,2000                      BANK   30
 0146                        30,2000            LOWSUPER  EQUALS
 0147                        30,2000            P12       EQUALS
 0148                        30,2000            ASENT     EQUALS
 0149                        30,2000            FCDUW     EQUALS
 01495                       30,2000            FLOGSUB   EQUALS
 01496                       30,2000            VB67A     EQUALS
 01497                       30,2000            ASENT5    EQUALS
 0150      2 WORDS LEFT      30,3775   03775 1            BNKSUM 30
 0150                        30,3776   03776 1


 0151                        31,2000                      BANK   31
 0152                        31,2000            FTHROT    EQUALS
 0153                        31,2000            F2DPS*31  EQUALS
 0154                        31,2000            VB67      EQUALS
 0155     14 WORDS LEFT      31,3761   03761 1            BNKSUM 31
 0155                        31,3762   03762 1


 0156                        32,2000                      BANK   32
 0157                        32,2000            P20S4     EQUALS
 0158                        32,2000            F2DPS*32  EQUALS
 0159                        32,2000            ABORTS    EQUALS
 0160                        32,2000            LRS22     EQUALS
 0161                        32,2000            P66LOC    EQUALS
 0163                        32,2000            P47       EQUALS
 01635                       32,2000            SERV      EQUALS
 0164      4 WORDS LEFT      32,3773   03773 1            BNKSUM 32
 0164                        32,3774   03774 0


 0165                        33,2000                      BANK   33
 0166                        33,2000            SERVICES  EQUALS
 0167                        33,2000            R29/SERV  EQUALS
 01675                       33,2000            ASENT6    EQUALS
 0168      0 WORDS LEFT      33,2000  NO NEED             BNKSUM 33


 0169                        34,2000                      BANK   34
 0170                        34,2000            STBLEORB  EQUALS
 0171                        34,2000            P30S1     EQUALS
 0172                        34,2000            CSI/CDH1  EQUALS
 0173                        34,2000            ASCFILT   EQUALS
 01735                       34,2000            R12STUFF  EQUALS
 01736                       34,2000            SERV4     EQUALS
 0174      2 WORDS LEFT      34,3775   03775 1            BNKSUM 34
 0174                        34,3776   03776 1
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                USER'S PAGE NO.   9      E0

 0175                        35,2000                    BANK    35
 0176                        35,2000           CSI/CDH  EQUALS
 0177                        35,2000           P30S     EQUALS
 0178                        35,2000           GLM      EQUALS
 0179                        35,2000           P40S2    EQUALS
 0180       1 WORDS LEFT     35,3776   03776 1          BNKSUM 35
```

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L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                   USER'S PAGE NO.   9        E0

P0181               MODULE 6 CONTAINS BANKS 36 THROUGH 43

 0182                           36,2000                         BANK    36
 0183                           36,2000             P40S        EQUALS
 0184     10 WORDS LEFT         36,3765   03765 0               BNKSUM 36
 0184                           36,3766   03766 0


 0185                           37,2000                         BANK    37
 0186                           37,2000             P05P06      EQUALS
 0187                           37,2000             IMU2        EQUALS
 0188                           37,2000             IMU4        EQUALS
 0189                           37,2000             R31         EQUALS
 0190                           37,2000             IMUSUPER    EQUALS
 0191                           37,2000             SERV1       EQUALS
 0192      3 WORDS LEFT         37,3774   03774 0               BNKSUM 37
 0192                           37,3775   03775 1


 0193                           40,2000                         BANK    40
 0194                           40,2000             PINBALL1    EQUALS
 0195                           40,2000             SELFSUPR    EQUALS
 0196                           40,2000             PINSUPER    EQUALS
 01965                          40,2000             R31LOC      EQUALS
 0197     52 WORDS LEFT         40,3713   03713 1               BNKSUM 40
 0197                           40,3714   03714 0


 0198                           41,2000                         BANK    41
 0199                           41,2000             PINBALL2    EQUALS
 0200     38 WORDS LEFT         41,3731   03731 1               BNKSUM 41
 0200                           41,3732   03732 1


 0201                           42,2000                         BANK    42
 0202                           42,2000             SBAND       EQUALS
 0203                           42,2000             PINBALL3    EQUALS
 0204      5 WORDS LEFT         42,3772   03772 0               BNKSUM 42
 0204                           42,3773   03773 1


 0205                           43,2000                         BANK    43
 0206                           43,2000             EXTVERBS    EQUALS
 0207                           43,2000             SELFCHEC    EQUALS

 0208     21 WORDS LEFT         43,3752   03752 1               BNKSUM 43
 0208                           43,3753   03753 0
```

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L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                         USER'S PAGE NO. 10       E0

 0209    REF    1                 23,2521          HI6ZEROS EQUALS ZEROVECS          ZERO VECTOR ALWAYS IN HIGH MEMORY
 0210    REF    1                 12,2006          LO6ZEROS EQUALS ZEROVEC           ZERO VECTOR ALWAYS IN LOW MEMORY
 0211    REF    1                 23,2517          HIDPHALF EQUALS UNITX
 0212    REF    1                 12,2004          LODPHALF EQUALS XUNIT
 0213    REF    1                 23,2511          HIDP1/4  EQUALS DP1/4TH
 0214    REF    1                 04,3036          LODP1/4  EQUALS D1/4              2DEC .25
 0215    REF    2  LAST    37     23,2517          HIUNITX  EQUALS UNITX
 0216    REF    1                 23,2515          HIUNITY  EQUALS UNITY
 0217    REF    1                 23,2513          HIUNITZ  EQUALS UNITZ
 0218    REF    2  LAST    37     12,2004          LOUNITX  EQUALS XUNIT             2DEC  .5
 0219    REF    1                 12,2002          LOUNITY  EQUALS YUNIT             2DEC  0
 0220    REF    1                 12,2000          LOUNITZ  EQUALS ZUNIT             2DEC  0
R0221

 0222    REF    1                 22,3541          DELRSPL  EQUALS SPLRET            COL PGM, ALSO CALLED BY R30 IN LUMINARY
R0223    ROPE-SPECIFIC ASSIGNS OBVIATING NEED TO CHECK COMPUTER FLAG IN                DETERMINING INTEGRATION AREA ENTRIES.

 0225    REF    1                 13,2734          ATOPTHIS EQUALS ATOPLEM
 0226    REF    1                 13,2661          ATOPOTH  EQUALS ATOPCSM
 0227    REF    1                 13,3043          OTHPREC  EQUALS CSMPREC
 0228    REF    1                    0174          MOONTHIS EQUALS LMOONFLG
 0229    REF    1                    0173          MOONOTH  EQUALS CMOONFLG
 0230    REF    1                 13,2747          MOVATHIS EQUALS MOVEALEM
 0231    REF    1                 12,2017          RMM      =      LODPMAX
 0232    REF    1                 12,2021          RME      =      LODPMAX1
 0233    REF    1                 13,3057          THISPREC EQUALS LEMPREC
 0234    REF    2  LAST    37     23,2513          THISAXIS =      UNITZ
 0235    REF    1                 23,2513          NB1NB2   EQUALS THISAXIS          FOR R31
 0236    REF    1                    5011          ERASID   EQUALS BITS2-10          DOWNLINK ERASABLE DUMP ID
 0237    REF    1                    4752          DELAYNUM EQUALS TWO
```

```
P0001   DPS AND APS ENGINE PARAMETERS


 0002   REF     1              36,2000                     SETLOC P40S
 0003                          36,2000                     BANK
 0004   REF     1                                          COUNT* $$/P40

R0005   *** THE ORDER OF THE FOLLOWING SIX CONSTANTS MUST NOT BE CHANGED ***

 0006                          36,2000   01056 0  FDPS     2DEC   4.3670 B-7       9817.5 LBS FORCE IN NEWTONS
 0006                          36,2001   37167 0
 0007                          36,2002   00457 1  MDOTDPS  2DEC   0.1480 B-3       32.62 LBS/SEC IN KGS/CS.
 0007                          36,2003   03250 0
 0008                          36,2004   77777 0  DTDECAY  2DEC   -38
 0008                          36,2005   77731 1
 0009                          36,2006   00307 0  FAPS     2DEC   1.5569 B-7       3500 LBS FORCE IN NEWTONS
 0009                          36,2007   11040 0
 0010                          36,2010   00151 1  MDOTAPS  2DEC   0.05135 B-3      11.32 LBS/SEC IN KGS/CS
 0010                          36,2011   05214 0
 0011                          36,2012   77777 0  ATDECAY  2DEC   -10
 0011                          36,2013   77765 0
R0012   **************************************************************************

 0013                          36,2014   00026 0  FRCS4    2DEC   0.17792 B-7      400 LBS FORCE IN NEWTONS
 0013                          36,2015   30605 1
 0014                          36,2016   00013 0  FRCS2    2DEC   0.08896 B-7      200 LBS FORCE IN NEWTONS
 0014                          36,2017   14303 1
 0015   REF     1              27,2000                     SETLOC P40S1
 0016                          27,2000                     BANK
 0017   REF     1                                          COUNT* $$/P40

R0018   *** APS IMPULSE DATA FOR P42 *********************************************

 0019                          27,2000   00000 1  K1VAL    2DEC   124.55 B-23      2800 LB-SEC
 0019                          27,2001   07622 0
 0020                          27,2002   00000 1  K2VAL    2DEC   31.138 B-24      700  LB-SEC
 0020                          27,2003   00762 1
 0021                          27,2004   00030 1  K3VAL    2DEC   1.5569 B-10      FAPS ( 3500 LBS THRUST)
 0021                          27,2005   35104 1
R0022   **************************************************************************

 0023                          27,2006   00016 0  S40.136  2DEC   .4671 B-9        .4671 M NEWTONS (DPS)
 0023                          27,2007   36237 1
 0024                          27,2010   35711 0  S40.136_ 2DEC   .4671 B+1        S40.136 SHIFTED LEFT 10.
 0024                          27,2011   35663 1
 0025   REF     1              27,2000                     SETLOC ASENT1
 0026                          27,2012                     BANK
 0027   REF     1                                          COUNT* $$/P70

 0028                          27,2012   03631 0  (1/DV)A  2DEC   15.20 B-7        2 SECONDS WORTH OF INITIAL ASCENT
 0028                          27,2013   23146 0
```

```
A0029                                                                           STAGE ACCELERATION -- INVERTED (M/CS)
A0030                                                                           1) PREDICATED ON A LIFTOFF MASS OF
A0031                                                                              4869.9 KG (SNA-8-D-027  7/11/68)
A0032                                                                           2) PREDICATED ON A CONTRIBUTION TO VEH-
A0033                                                                              ICLE ACCELERATION FROM RCS THRUSTERS
A0034                                                                              EQUIV. TO 1 JET ON CONTINUOUSLY.
 0035                        27,2014  33226 1  K(1/DV)  2DEC   436.70 B-9       DPS ENGINE THRUST IN NEWTONS / 100 CS.
 0035                        27,2015  14632 0
 0036                        27,2016  05306 1  (AT)A    2DEC   3.2883 E-4 B9    INITIAL ASC. STG. ACCELERATION ** M/CS.
 0036                        27,2017  15503 0
A0037                                                                           ASSUMPTIONS SAME AS FOR (1/DV)A.
 0038                        27,2020  26337 1  (TBUP)A  2DEC   91902 B-17       ESTIMATED BURN-UP TIME OF THE ASCENT STG
 0038                        27,2021  30000 1
A0039                                                                           ASSUMPTIONS SAME AS FOR (1/DV)A WITH THE
A0040                                                                           ADDITIONAL ASSUMPTION THAT NET MASS-FLOW
A0041                                                                           RATE = 5.299 KG/SEC = 5.135 (APS) +
A0042                                                                           .164 (1 RCS JET).
 0043   REF     1            30,2000                    SETLOC ASENT
 0044                        30,2000                    BANK
 0045   REF     1                                       COUNT* $$/ASENT
 0046                        30,2000  02445 0  AT/RCS   2DEC   .0000785 B+10    4 JETS IN A DRY LEM
 0046                        30,2001  00274 0
 0047   REF     1            33,2000                    SETLOC SERVICES
 0048                        33,2000                    BANK
 0049   REF     1                                       COUNT* $$/SERV

R0050   *** THE ORDER OF THE FOLLOWING TWO CONSTANTS MUST NOT BE CHANGED *******

 0051                        33,2000  41545 0  APSVEX   DEC    -3030 E-2 B-5    9942 FT/SEC IN M/CS.

 0052                        33,2001  42341 1  DPSVEX   DEC*   -2.95588868E+ 1B-05*     VE (DPS)     +2.95588868E+ 3

R0053   ************************************************************************

 0054   REF     1            31,2000                    SETLOC F2DPS*31
 0055                        31,2000                    BANK
 0056   REF     1                                       COUNT* $$/F2DPS

 0057                        31,2000  00222 0  TRIMACCL 2DEC*  +3.50132708E- 5B+08*     A (T)        +3.50132708E- 1
 0057                        31,2001  33316 0
```

```
P0058    THROTTLING AND THRUST DETECTION PARAMETERS

 0059    REF   2  LAST    38   36,2000                   SETLOC P40S
 0060                          36,2020                   BANK
 0061    REF   2 LAST   38 TO   38:     16     16*       COUNT* $$/P40

 0062                          36,2020   00030 1 THRESH1 DEC    24

 0063                          36,2021   00014 1 THRESH3 DEC    12

 0064    REF   1                  4737           HIRTHROT =      BIT13

 0065    REF   1                  6000                   SETLOC FFTAG5
 0066                             6000                   BANK
 0067    REF   1                                         COUNT* $$/P40

 0068                             6000   00464 1 THRESH2 DEC    308

 0069    REF   1               31,2000                   SETLOC FTHROT
 0070                          31,2002                   BANK
 0071    REF   1                                         COUNT* $$/THROT

 0072                          31,2002   07401 0 FMAXODD DEC    +      3841                FSAT        +4.81454413E+ 4

 0073                          31,2003   06613 0 FMAXPOS DEC    +      3467                FMAX        +4.34546769E+ 4

 0074                          31,2004   00024 1 THROTLAG DEC   +        20                TAU (TH)    +1.99999999E- 1

 00745                         31,2005   00307 0 SCALEFAC 2DEC* +7.97959872E+ 2B-16*       BITPERF     +7.97959872E- 2
 00745                         31,2006   17534 0
 0075    REF   1               32,2000                   SETLOC F2DPS*32
 0076                          32,2000                   BANK
 0077    REF   1                                         COUNT* $$/F2DPS

 0078                          32,2000   00044 1 DPSTHRSH DEC   36                 (THRESH1 + THRESH3 FOR P63)
```

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P0082   LM HARDWARE-RELATED PARAMETERS


 0083   REF    1              25,2000                              SETLOC RADARUPT
 0084                         25,2000                              BANK
 0085   REF    1                                                   COUNT* $$/RRUPT

 0086                         25,2000    47777 0  LVELBIAS DEC     -12238            LANDING RADAR BIAS FOR 153.6 KC.

 0087                         25,2001    00001 0  RDOTBIAS 2DEC    17000             BIAS COUNT FOR RR RANGE RATE.
 0087                         25,2002    01150 1

 0088   REF    1              32,2000                              SETLOC LPS22
 0089                         32,2001                              BANK
 0090   REF    1                                                   COUNT* $$/LPS22

 0091                         32,2001    70123 0  RDOTCONV 2DEC    -.0019135344 B7 CONVERTS RR RDOT READING TO M/CS AT 2(7)
 0091                         32,2002    40702 0
 0092                         32,2003    13337 1  RANGCONV 2DEC    2.859024 B-3      CONVERTS RR RANGE READING TO M. AT 2(-29
 0092                         32,2004    10776 0
 0098   REF    2  LAST    39  33,2000                              SETLOC SERVICES
 0099                         33,2002                              BANK
 0100   REF    2 LAST    33 TO   39:     2       2*                COUNT* $$/SERV

 0101                         33,2002    61000 0  HBEAMANT 2DEC    -.4687013041      RANGE BEAM IN LR ANTENNA COORDINATES.
 0101                         33,2003    71210 1
 0102                         33,2004    00000 1           2DEC    0
 0102                         33,2005    00000 1
 0103                         33,2006    72333 1           2DEC    -.1741224271
 0103                         33,2007    45546 1

 0104                         33,2010    65363 1  HSCAL    2DEC    -.3288792         SCALES 1.079 FT/BIT TO 2(22)M.
 0104                         33,2011    64451 0
R0105   ***** THE SEQUENCE OF THE FOLLOWING CONSTANTS MUST BE PRESERVED ********

 0106                         33,2012    21241 0  VZSCAL   2DEC    +.5410829105      SCALES .8668 FT/SEC/BIT TO 2(13) M/CS.
 0106                         33,2013    03216 1

 0107                         33,2014    30153 0  VYSCAL   2DEC    +.7565672446      SCALES 1.212 FT/SEC/BIT TO 2(18) M/CS.
 0107                         33,2015    23101 0

 0108                         33,2016    63105 0  VXSCAL   2DEC    -.4020043770      SCALES -.644 FT/SEC/BIT TO 2(18) M/CS.
 0108                         33,2017    61733 1

R0109   **************************************************************************

 0110                         33,2020    01507 1  KPIP     DEC     .0512             SCALES DELV TO UNITS OF 2(5) M/CS.
 0111                         33,2021    00321 1  KPIP1    2DEC    .0128             SCALES DELV TO UNITS OF 2(7) M/CS.
 0111                         33,2022    26706 1
 0112                         33,2023    00150 0  KPIP2    2DEC    .0064             SCALES DELV TO UNITS OF 2(8) M/CS.
 0112                         33,2024    33343 0
 0113                      33,2025   02630 0  ALTCONV   2DEC    1.399078846 B-4 CONVERTS M*2(-24) TO BIT UNITS *2(-28).
 0113                      33,2026   25010 1
 0114                      33,2027   24402 1  ARCONV1   2DEC    656.167979 B-10 CONV. ALTRATE COMP. TO BIT UNITS<
 0114                      33,2030   26003 0
 0115   REF    1           21,2000                      SETLOC R10
 0116                      21,2000                      BANK
 0117   REF    1                                        COUNT* $$/R10

 0118                      21,2000   24402 1  ARCONV    OCT     24402            656.16797988-10 CONV ALTRATE TO BIT UNIT

 0119                      21,2001   01551 1  ARTOA     DEC     .1066098 B-1     .25/2.345 B-1 4X/SEC CYCLE RATE.

 0120                      21,2002   21357 0  ARTOA2    DEC     .0021322 B8      (.5)/(2.345)(100)

 0121                      21,2003   22316 0  VELCONV   OCT     22316            588.914 B-10 CONV VEL. TO BIT UNITS.

 0122                      21,2004   01507 1  KPIP1(5)  DEC     .0512            SCALES DELV TO M/CS*2(-5).

 0123                      21,2005   00547 1  MAXVBITS  OCT     00547            MAX. DISPLAYED VELOCITY 199.9989 FT/SEC.

 0124   REF    1           20,2000                      SETLOC DAPS3
 0125                      20,2000                      BANK
 0126   REF    1                                        COUNT* $$/DAPAO

 0127                      20,2000   01150 1  TORKJET1  DEC     .03757           550 / .2 SCALED AT (+16) 64 / 180
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L         CONTROLLED CONSTANTS                                                          USER'S PAGE NO.  6       EO S3

P0128     PARAMETERS RELATING TO MASS, INERTIA, AND VEHICLE DIMENSTIONS

 0129     REF    1                05,2000                     SETLOC FRANDRES
 0130                             05,2000                     BANK
 0131     REF    1                                            COUNT* $$/START

 0132                             05,2000  02357 1  FULLAPS   DEC    5050 B-16            NOMINAL FULL ASCENT MASS -- 2(16) KG.

 0133     REF    1                01,2000                     SETLOC LOADDAP1
 0134                             01,2000                     BANK
 0135     REF    1                                            COUNT* $$/R03

 0136                             01,2000  76466 1  MINLMD    DEC    -2850 B-16           MIN. DESCENT STAGE MASS -- 2(16) KG.

 0137                             01,2001  76731 0  MINMINLM  DEC    -2200 B-16           MIN ASCENT STAGE MASS -- 2(16) KG.

 0138     REF    1                   4741           MINCSM    =      BIT11                MIN CSM MASS (OK FOR 1/ACCS)  = 9050 LBS

 0139     REF    2  LAST    42    20,2000                     SETLOC DAPS3
 0140                             20,2001                     BANK
 0141     REF    2 LAST    42 TO   43:      1      1*         COUNT* $$/DAPAO

 0142                             20,2001  01046 1  LOASCENT  DEC    2200 B-16            MIN ASCENT LEM MASS -- 2(16) KG.

 0143                             20,2002  07361 1  HIDESCNT  DEC    15300 B-16           MAX DESCENT LEM MASS -- 2(16) KG.

 0144                             20,2003  00666 1  LODESCNT  DEC    1750 B-16            MIN DESCENT STAGE (ALONE) -- 2(16) KG.
```

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P0145   PHYSICAL CONSTANTS ( TIME - INVARIANT )


 0146   REF    1               37,2000                          SETLOC IMU2
 0147                          37,2000                          BANK
 0148   REF    1                                                COUNT* $$/P07

 0149                          37,2000   07623 1  OMEG/MS  2DEC    .24339048
 0149                          37,2001   26552 1
 0150   REF    1               22,2000                          SETLOC R30LOC
 0151                          22,2000                          BANK
 0152   REF    1                                                COUNT* $$/R30

R0153   *** THE ORDER OF THE FOLLOWING TWO CONSTANTS MUST BE PRESERVED *********

 0154                          22,2000   27533 1  1/RTMUM  2DEC*   .45162595 E-4 B14*
 0154                          22,2001   07571 0
 0155                          22,2002   25004 1  1/RTMUE  2DEC*   .50087529 E-5 B17*
 0155                          22,2003   06702 1
R0156   ****************************************************************************

 0157   REF    2  LAST   38    27,2000                          SETLOC P40S1
 0158                          27,2022                          BANK
 0159   REF    1                                                COUNT* $$/S40.9

 0160                          27,2022   55340 0  EARTHMU  2DEC*  -3.986032 E10 B-36*            M(3)/CS(2)
 0160                          27,2023   61710 0
 0165   REF    2  LAST   38    27,2000                          SETLOC ASENT1
 0166                          27,2024                          BANK
 0167   REF    1                                                COUNT* $$/P12

 0168                          27,2024   00072 1  MUM(-37) 2DEC*  4.9027780 E8 B-37*
 0168                          27,2025   16206 1
 0169                          27,2026   00344 1  MOONRATE 2DEC*  .2661699489006299 1 E-7 B+19*  RAD/CS.
 0169                          27,2027   24331 0
 0170   REF    3  LAST   41    33,2000                          SETLOC SERVICES
 0171                          33,2031                          BANK
 0172   REF    3 LAST   41 TO   42:     23     25*              COUNT* $$/SERV

R0173   *** THE ORDER OF THE FOLLOWING TWO CONSTANTS MUST BE PRESERVED *********

 0174                          33,2031   61377 0  -MUDT    2DEC*  -7.9720645 E+12 B-44*
 0174                          33,2032   55754 1
 0175                          33,2033   77644 1  -MUDT1   2DEC*  -9.8055560 E+10 B-44*
 0175                          33,2034   65556 1
R0176   ****************************************************************************

 0177                          33,2035   64453 1  -MUDTMUN 2DEC*  -9.8055560 E+10 B-38*
 0177                          33,2036   55670 0
 0178                          33,2037   00002 0  RESQ     2DEC*  40.6809913 E12 B-58*
 0178                          33,2040   11777 0
 0179                      33,2041   01023 1  20J       2DEC     3.24692010 E-2
 0179                      33,2042   37155 1
 0180                      33,2043   00065 1  2J        2DEC     3.24692010 E-3
 0180                      33,2044   06244 0
 0181   REF    1           14,2000                      SETLOC P50S1
 0182                      14,2000                      BANK
 0183   REF    1                                        COUNT* $$/LOSAM

 0184                      14,2000   26723 0  RSUBEM    2DEC     384402000 B-29
 0184                      14,2001   00450 0
 0185                      14,2002   00065 1  RSUBM     2DEC     1738090 B-29
 0185                      14,2003   01265 1
 0186                      14,2004   00302 0  RSUBE     2DEC     6378166 B-29
 0186                      14,2005   24533 1
 0187                      14,2006   00052 0  ROE       2DEC     .00257125
 0187                      14,2007   04047 0
 0188   REF    1           04,2000                      SETLOC CONICS1
 0189                      04,2000                      BANK
 0190   REF    1                                        COUNT* $$/LT-LG

 0191                      04,2000   00302 0  ERAD      2DEC     6373338 B-29     PAD RADIUS
 0191                      04,2001   17755 0
 0192                      04,2002   00065 1  504RM     2DEC     1738090 B-29     METERS B-29 (EQUATORIAL MOON RADIUS)
 0192                      04,2003   01255 1
 0193   REF    2  LAST     04,2000                      SETLOC CONICS1
 0194                      04,2004                      BANK
 0195   REF    1                                        COUNT* $$/CONIC

P0196   *** THE ORDER OF THE FOLLOWING CONSTANTS MUST BE PRESERVED ************

 0197                      04,2004   22437 1  MUTABLE   2DEC*    3.986032 E10 B-36* MUE
 0197                      04,2005   16067 1
 0198                      04,2006   15625 1            2DEC*    .25087606 E-10 B+34*      1/MUE
 0198                      04,2007   21042 1
 0199                      04,2010   30276 1            2DEC*    1.99650495 E5 B-18*       SQRT(MUE)
 0199                      04,2011   04773 0
 0200                      04,2012   25004 1            2DEC*    .50087529 E-5 B+17*       1/SQRT(MUE)
 0200                      04,2013   06702 1


 0201                      04,2014   16471 1            2DEC*    4.902778 E8 B-30*         MUM
 0201                      04,2015   01352 1
 0202                      04,2016   21412 0            2DEC*    .203966 E-8 B+28*         1/MUM
 0202                      04,2017   20500 0
 0203                      04,2020   25477 1            2DEC*    2.21422176 E4 B-15*       SQRT(MUM)
 0203                      04,2021   03367 0
 0204                      04,2022   27533 1            2DEC*    .45162595 E-4 B+14*       1/SQRT(MUM)
 0204                      04,2023   07571 0
P0205   *****************************************************************************
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 0206    REF     1             13,2000                             SETLOC INTINIT
 0207                          13,2000                             BANK
 0208    REF     1                                                 COUNT* $$/INTIN

 0209                          13,2000   07112 1  OMEGMOON 2DEC*   2.66169947 E-8 B+23*
 0209                          13,2001   06620 0
 0210    REF     1             13,2000                             SETLOC ORBITAL2
 0211                          13,2002                             BANK
 0212    REF     1                                                 COUNT* $$/ORBIT

R0213    *** THE ORDER OF THE FOLLOWING CONSTANTS MUST NOT BE CHANGED **********

 0214                          13,2002   27446 1           2DEC*   1.32715445 E16 B-54*      S
 0214                          13,2003   14620 0
 0215                          13,2004   16471 1  MUM      2DEC*   4.9027780 E8 B-30*        M
 0215                          13,2005   01352 1
 0216                          13,2006   22437 1  MUEARTH  2DEC*   3.986032 E10 B-36*
 0216                          13,2007   16067 1
 0217                          13,2010   00000 1           2DEC    0
 0217                          13,2011   00000 1
 0218                          13,2012   02302 1  J4REQ/J3 2DEC*   .4991607391 E7 B-26*
 0218                          13,2013   24736 0
 0219                          13,2014   77651 0           2DEC    -176236.02 B-25
 0219                          13,2015   76237 0
 0220                          13,2016   77776 1  2J3RE/J2 2DEC*   -.1355426363 E5 B-27*
 0220                          13,2017   53032 0
 0221                          13,2020   10407 0           2DEC*   .3067493316 E18 B-60*
 0221                          13,2021   05344 1
 0222                          13,2022   13710 0  J2REQSQ  2DEC*   1.75501139 E21 B-72*
 0222                          13,2023   35320 0
 0223                          13,2024   12160 0  3J22R2MU 2DEC*   9.20479048 E16 B-58*
 0223                          13,2025   12124 0
R0224    ********************************************************************

 0225    REF     1             27,2000                             SETLOC TOF-FF1
 0226                          27,2030                             BANK
 0227    REF     1                                                 COUNT* $$/TFF

 0228                          27,2030   24775 1  1/RTMU   2DEC*   .5005750271 E-5 B17*   MODIFIED EARTH MU
 0228                          27,2031   30424 0
 0229    REF     1             42,2000                             SETLOC SBAND
 0230                          42,2000                             BANK
 0231    REF     1                                                 COUNT* $$/R05

 0232                          42,2000   26723 0  REMDIST  2DEC    384402000 B-29  MEAN DISTANCE BETWEEN EARTH AND MOON.
 0232                          42,2001   00450 0
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L         CONTROLLED CONSTANTS                                                        USER'S PAGE NO.  10        EO S4

P0233     PHYSICAL CONSTANTS (TIME - VARIANT)
 0234     REF    1                  14,2000                   SETLOC STARTAB
 0235                               14,2010                   BANK
 0236     REF    1                                            COUNT* $$/STARS

 0237                               14,2010    15262 0        2DEC    +.8342971408 B-1      STAR 37       X
 0237                               14,2011    21773 1
 0238                               14,2012    74130 0        2DEC    -.2392481515 B-1      STAR 37       Y
 0238                               14,2013    42420 1
 0239                               14,2014    70033 0        2DEC    -.4966976975 B-1      STAR 37       Z
 0239                               14,2015    41533 1
 0240                               14,2016    15014 0        2DEC    +.8139832631 B-1      STAR 36       X
 0240                               14,2017    04650 0
 0241                               14,2020    67067 1        2DEC    -.5557243189 B-1      STAR 36       Y
 0241                               14,2021    60150 0
 0242                               14,2022    02551 1        2DEC    +.1691204557 B-1      STAR 36       Z
 0242                               14,2023    15723 0
 0243                               14,2024    07210 0        2DEC    +.4541086270 B-1      STAR 35       X
 0243                               14,2025    01664 1
 0244                               14,2026    67276 0        2DEC    -.5392368197 B-1      STAR 35       Y
 0244                               14,2027    62232 0
 0245                               14,2030    13262 0        2DEC    +.7092312789 B-1      STAR 35       Z
 0245                               14,2031    00563 1
 0246                               14,2032    05076 0        2DEC    +.3201817378 B-1      STAR 34       X
 0246                               14,2033    35561 0
 0247                               14,2034    70716 0        2DEC    -.4436021946 B-1      STAR 34       Y
 0247                               14,2035    40260 1
 0248                               14,2036    62466 1        2DEC    -.8370786986 B-1      STAR 34       Z
 0248                               14,2037    64656 0
 0249                               14,2040    10652 1        2DEC    +.5520184464 B-1      STAR 33       X
 0249                               14,2041    04246 0
 0250                               14,2042    63235 0        2DEC    -.7933187400 B-1      STAR 33       Y
 0250                               14,2043    44200 0
 0251                               14,2044    73710 0        2DEC    -.2567508745 B-1      STAR 33       Z
 0251                               14,2045    66230 0
 0252                               14,2046    07204 0        2DEC    +.4537196908 B-1      STAR 32       X
 0252                               14,2047    33712 0
 0253                               14,2050    61747 1        2DEC    -.8779508801 B-1      STAR 32       Y
 0253                               14,2051    72343 0
 0254                               14,2052    02343 1        2DEC    +.1527766153 B-1      STAR 32       Z
 0254                               14,2053    21362 0
 0255                               14,2054    03237 1        2DEC    +.2069525789 B-1      STAR 31       X
 0255                               14,2055    13301 1
 0256                               14,2056    62030 0        2DEC    -.8719885748 B-1      STAR 31       Y
 0256                               14,2057    65332 0
 0257                               14,2060    70715 0        2DEC    -.4436288486 B-1      STAR 31       Z
 0257                               14,2061    71267 1
 0258                               14,2062    01745 0        2DEC    +.1217293692 B-1      STAR 30       X
 0258                               14,2063    06477 0
 0259                               14,2064    63531 0        2DEC    -.7702732847 B-1      STAR 30       Y
 0259                               14,2065    75365 0
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L         CONTROLLED CONSTANTS                                                        USER'S PAGE NO.  11        EQ S4

 0260                         14,2066   12010 0        2DEC    +.6259860410 B-1     STAR 30      Z
 0260                         14,2067   03005 1
 0261                         14,2070   76146 0        2DEC    -.1124304773 B-1     STAR 29      X
 0261                         14,2071   77014 1
 0262                         14,2072   60371 1        2DEC    -.9694934200 B-1     STAR 29      Y
 0262                         14,2073   75073 1
 0263                         14,2074   03370 0        2DEC    +.2178116072 B-1     STAR 29      Z
 0263                         14,2075   12003 1
 0264                         14,2076   76125 0        2DEC    -.1146237858 B-1     STAR 28      X
 0264                         14,2077   40037 1
 0265                         14,2100   72436 0        2DEC    -.3399692557 B-1     STAR 28      Y
 0265                         14,2101   77062 0
 0266                         14,2102   61041 0        2DEC    -.9334250333 B-1     STAR 28      Z
 0266                         14,2103   54164 0
 0267                         14,2104   72277 0        2DEC    -.3516493609 B-1     STAR 27      X
 0267                         14,2105   51044 0
 0268                         14,2106   62641 0        2DEC    -.8240752703 B-1     STAR 27      Y
 0268                         14,2107   45471 1
 0269                         14,2110   70711 1        2DEC    -.4441196390 B-1     STAR 27      Z
 0269                         14,2111   70546 1
 0270                         14,2112   67364 1        2DEC    -.5326876930 B-1     STAR 26      X
 0270                         14,2113   47073 0
 0271                         14,2114   64425 0        2DEC    -.7160644554 B-1     STAR 26      Y
 0271                         14,2115   77777 0
 0272                         14,2116   07157 0        2DEC    +.4511047742 B-1     STAR 26      Z
 0272                         14,2117   16322 0
 0273                         14,2120   63327 1        2DEC    -.7861763936 B-1     STAR 25      X
 0273                         14,2121   64446 0
 0274                         14,2122   67515 1        2DEC    -.5217996305 B-1     STAR 25      Y
 0274                         14,2123   55266 0
 0275                         14,2124   05230 0        2DEC    +.3311371675 B-1     STAR 25      Z
 0275                         14,2125   25476 0
 0276                         14,2126   64754 0        2DEC    -.6898393233 B-1     STAR 24      X
 0276                         14,2127   72604 0
 0277                         14,2130   71235 0        2DEC    -.4182330640 B-1     STAR 24      Y
 0277                         14,2131   72553 1
 0278                         14,2132   66427 0        2DEC    -.5909338474 B-1     STAR 24      Z
 0278                         14,2133   42171 0
 0279                         14,2134   66546 0        2DEC    -.5812035376 B-1     STAR 23      X
 0279                         14,2135   70765 1
 0280                         14,2136   73260 1        2DEC    -.2909171294 B-1     STAR 23      Y
 0280                         14,2137   71643 0
 0281                         14,2140   14121 0        2DEC    +.7599800468 B-1     STAR 23      Z
 0281                         14,2141   30153 0
 0282                         14,2142   61247 1        2DEC    -.9170097662 B-1     STAR 22      X
 0282                         14,2143   73310 1
 0283                         14,2144   72313 0        2DEC    -.3502146628 B-1     STAR 22      Y
 0283                         14,2145   41247 0
 0284                         14,2146   74744 0        2DEC    -.1908999176 B-1     STAR 22      Z
 0284                         14,2147   44566 1
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L         CONTROLLED CONSTANTS                                                     USER'S PAGE NO.  12        EO S4

 0285                          14,2150   70606 0        2DEC    -.4523440203 B-1     STAR 21       X
 0285                          14,2151   54564 1
 0286                          14,2152   77153 0        2DEC    -.0493710140 B-1     STAR 21       Y
 0286                          14,2153   61536 0
 0287                          14,2154   61601 1        2DEC    -.8904759346 B-1     STAR 21       Z
 0287                          14,2155   47046 0
 0288                          14,2156   60604 0        2DEC    -.9525211695 B-1     STAR 20       X
 0288                          14,2157   76224 1
 0289                          14,2160   77031 0        2DEC    -.0593434796 B-1     STAR 20       Y
 0289                          14,2161   73354 1
 0290                          14,2162   73161 0        2DEC    -.2986331746 B-1     STAR 20       Z
 0290                          14,2163   53065 1
 0291                          14,2164   60431 1        2DEC    -.9656605484 B-1     STAR 19       X
 0291                          14,2165   51702 0
 0292                          14,2166   00656 1        2DEC    +.0525933156 B-1     STAR 19       Y
 0292                          14,2167   33013 0
 0293                          14,2170   04044 0        2DEC    +.2544280809 B-1     STAR 19       Z
 0293                          14,2171   10627 0
 0294                          14,2172   52164 0        2DEC    -.8608205219 B-1     STAR 18       X
 0294                          14,2173   45040 1
 0295                          14,2174   07325 1        2DEC    +.4636213989 B-1     STAR 18       Y
 0295                          14,2175   37443 0
 0296                          14,2176   03267 1        2DEC    +.2098647835 B-1     STAR 18       Z
 0296                          14,2177   06626 0
 0297                          14,2200   63471 0        2DEC    -.7742591356 B-1     STAR 17       X
 0297                          14,2201   50471 0
 0298                          14,2202   11660 1        2DEC    +.6152504197 B-1     STAR 17       Y
 0298                          14,2203   04151 0
 0299                          14,2204   75501 1        2DEC    -.1482892839 B-1     STAR 17       Z
 0299                          14,2205   46664 1
 0300                          14,2206   70430 1        2DEC    -.4657947941 B-1     STAR 16       X
 0300                          14,2207   46540 1
 0301                          14,2210   07507 1        2DEC    +.4774785033 B-1     STAR 16       Y
 0301                          14,2211   20100 1
 0302                          14,2212   13727 1        2DEC    +.7450164351 B-1     STAR 16       Z
 0302                          14,2213   05455 0
 0303                          14,2214   72160 0        2DEC    -.3612508532 B-1     STAR 15       X
 0303                          14,2215   64202 0
 0304                          14,2216   11144 0        2DEC    +.5747270840 B-1     STAR 15       Y
 0304                          14,2217   05203 0
 0305                          14,2220   64200 1        2DEC    -.7342932655 B-1     STAR 15       Z
 0305                          14,2221   65331 0
 0306                          14,2222   71322 1        2DEC    -.4118589524 B-1     STAR 14       X
 0306                          14,2223   41512 1
 0307                          14,2224   16402 0        2DEC    +.9065485360 B-1     STAR 14       Y
 0307                          14,2225   16205 1
 0308                          14,2226   01365 0        2DEC    +.0924226975 B-1     STAR 14       Z
 0308                          14,2227   04034 1
 0309                          14,2230   75054 1        2DEC    -.1820751783 B-1     STAR 13       X
 0309                          14,2231   56052 0
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L        CONTROLLED CONSTANTS                                          USER'S PAGE NO.  13      EO 54

 0310                              14,2232   17030 1        2DEC    +.9404899369 B-1    STAR 13      Y
 0310                              14,2233   17635 1
 0311                              14,2234   73321 0        2DEC    -.2869271926 B-1    STAR 13      Z
 0311                              14,2235   57603 0
 0312                              14,2236   77010 0        2DEC    -.0614937230 B-1    STAR 12      X
 0312                              14,2237   47623 0
 0313                              14,2240   11515 0        2DEC    +.6031553286 B-1    STAR 12      Y
 0313                              14,2241   01640 1
 0314                              14,2242   53215 1        2DEC    -.7952489957 B-1    STAR 12      Z
 0314                              14,2243   52176 0
 0315                              14,2244   02143 0        2DEC    +.1371725575 B-1    STAR 11      X
 0315                              14,2245   26755 1
 0316                              14,2246   12715 1        2DEC    +.6813721061 B-1    STAR 11      Y
 0316                              14,2247   31470 0
 0317                              14,2250   13401 0        2DEC    +.7189685267 B-1    STAR 11      Z
 0317                              14,2251   31222 1
 0318                              14,2252   03157 1        2DEC    +.2011399589 B-1    STAR 10      X
 0318                              14,2253   27504 0
 0319                              14,2254   17402 1        2DEC    +.9690337941 B-1    STAR 10      Y
 0319                              14,2255   12312 1
 0320                              14,2256   75552 1        2DEC    -.1432348512 B-1    STAR 10      Z
 0320                              14,2257   63657 0
 0321                              14,2260   05471 0        2DEC    +.3807315038 B-1    STAR  9      X
 0321                              14,2261   06122 0
 0322                              14,2262   16220 0        2DEC    +.8926333307 B-1    STAR  9      Y
 0322                              14,2263   16362 1
 0323                              14,2264   04417 1        2DEC    +.2831839492 B-1    STAR  9      Z
 0323                              14,2265   32762 0
 0324                              14,2266   06443 1        2DEC    +.4105636020 B-1    STAR  8      X
 0324                              14,2267   12622 1
 0325                              14,2270   07766 1        2DEC    +.4988110001 B-1    STAR  8      Y
 0325                              14,2271   10237 0
 0326                              14,2272   14154 1        2DEC    +.7632988371 B-1    STAR  8      Z
 0326                              14,2273   36154 1
 0327                              14,2274   13200 1        2DEC    +.7032235469 B-1    STAR  7      X
 0327                              14,2275   31653 0
 0328                              14,2276   13244 1        2DEC    +.7075846047 B-1    STAR  7      Y
 0328                              14,2277   21036 1
 0329                              14,2300   01067 1        2DEC    +.0692868685 B-1    STAR  7      Z
 0329                              14,2301   23106 1
 0330                              14,2302   10560 0        2DEC    +.5450107404 B-1    STAR  6      X
 0330                              14,2303   27227 0
 0331                              14,2304   10402 0        2DEC    +.5314955466 B-1    STAR  6      Y
 0331                              14,2305   00275 1
 0332                              14,2306   65477 0        2DEC    -.6484410356 B-1    STAR  6      Z
 0332                              14,2307   77044 1
 0333                              14,2310   00153 0        2DEC    +.0130968840 B-1    STAR  5      X
 0333                              14,2311   11212 0
 0334                              14,2312   00077 1        2DEC    +.0078062795 B-1    STAR  5      Y
 0334                              14,2313   36275 1
```

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L        CONTROLLED CONSTANTS                                                       USER'S PAGE NO.  14        EO S4

 0335                          14,2314   17777 0             2DEC    +.9998837600 B-1    STAR  5     Z
 0335                          14,2315   01417 1
 0336                          14,2316   07674 0             2DEC    +.4917678276 B-1    STAR  4     X
 0336                          14,2317   21771 0
 0337                          14,2320   03416 1             2DEC    +.2204887125 B-1    STAR  4     Y
 0337                          14,2321   07626 1
 0338                          14,2322   62413 0             2DEC    -.8423473935 B-1    STAR  4     Z
 0338                          14,2323   57536 0
 0339                          14,2324   07510 1             2DEC    +.4775639450 B-1    STAR  3     X
 0339                          14,2325   06414 0
 0340                          14,2326   01673 1             2DEC    +.1156004340 B-1    STAR  3     Y
 0340                          14,2327   06065 1
 0341                          14,2330   15735 1             2DEC    +.8708254803 B-1    STAR  3     Z
 0341                          14,2331   31531 1
 0342                          14,2332   16745 0             2DEC    +.9342640400 B-1    STAR  2     X
 0342                          14,2333   17555 1
 0343                          14,2334   02615 1             2DEC    +.1735073142 B-1    STAR  2     Y
 0343                          14,2335   13716 0
 0344                          14,2336   73010 1             2DEC    -.3115219339 B-1    STAR  2     Z
 0344                          14,2337   40311 0
 0345                          14,2340   15776 0             2DEC    +.8748658918 B-1    STAR  1     X
 0345                          14,2341   34660 0
 0346                          14,2342   00325 0             2DEC    +.0260879174 B-1    STAR  1     Y
 0346                          14,2343   26625 1
 0347                          14,2344   07572 0             2DEC    +.4836621670 B-1    STAR  1     Z
 0347                          14,2345   05105 0
 0348                          14,2346   15472 1  CATLOG     DEC     6970
R0349    ************************************************************************

 0350    REF    1              05,2000                       SETLOC EPHEM1
 0351                          05,2001                       BANK
 0352    REF    1                                            COUNT* $$/EPHEM

 0353                          05,2001   20000 0  KONMAT     2DEC    1.0 B-1                         ************
 0353                          05,2002   00000 1
 0354                          05,2003   00000 1             2DEC    0                                          *
 0354                          05,2004   00000 1
 0355                          05,2005   00000 1             2DEC    0                                          *
 0355                          05,2006   00000 1
 0356                          05,2007   00000 1             2DEC    0                                          *
 0356                          05,2010   00000 1
 0357                          05,2011   16533 0             2DEC    .91745 B-1      K1 COS(OBL)                *
 0357                          05,2012   30007 0
 0358                          05,2013   77333 1             2DEC    -.03571 B-1     K2 SIN(OBL)SIN(IM)         *
 0358                          05,2014   56654 0
 0359                          05,2015   00000 1             2DEC    0                                          *
 0359                          05,2016   00000 1
 0360                          05,2017   06273 1             2DEC    .39784 B-1      K3 SIN(OBL)                *
 0360                          05,2020   03275 1
 0361                    05,2021  01242 1           2DEC    .082354 B-1     K4 COS(OBL)SIN(IM)  *
 0361                    05,2022  24467 1
 0362                    05,2023  00020 0  CSTODAY  2DEC    0640000 B-33                         * NOTE            *
 0362                    05,2024  17260 0
 0363                    05,2025  00002 0  RCB-13   OCT     00002                                * TABLES CONTAIN *
 0364                    05,2026  00000 1           OCT     00000                                * CONSTANTS FOR  *
 0365                    05,2027  22572 1  RATESP   2DEC    .03660098 B+4   LOMR                 * 1969 - 1970    *
 0365                    05,2030  27214 0
 0366                    05,2031  01315 1           2DEC    .00273779 B+4   LOSR
 0366                    05,2032  26177 1
 0367                    05,2033  77731 1           2DEC    -.00014719 B+4  LONR
 0367                    05,2034  55217 0
 0368                    05,2035  32055 0           2DEC    .815282336      LOMO
 0368                    05,2036  22576 0
 0369                    05,2037  10624 0           2DEC    .274674910      LOSO
 0369                    05,2040  10605 0
 0370                    05,2041  37436 1           2DEC    .986209499      LONO
 0370                    05,2042  01635 0
 0371                    05,2043  01065 0  VAL67    2DEC*   .01726666666 B+1* AMOD
 0371                    05,2044  31323 1
 0372                    05,2045  20770 0           2DEC    .530784445      AARG
 0372                    05,2046  13725 0
 0373                    05,2047  02245 0           2DEC    .036291712 B+1  1/27
 0373                    05,2050  06475 1
 0374                    05,2051  00162 1           2DEC    .003505277 B+1  BMOD
 0374                    05,2052  33431 1
 0375                    05,2053  22566 1           2DEC    .585365625      BARG
 0375                    05,2054  24130 0
 0376                    05,2055  02000 0           2DEC    .03125 B+1      1/32
 0376                    05,2056  00000 1
 0377                    05,2057  00256 0           2DEC    .005325277 B+1  CMOD
 0377                    05,2060  17752 1
 0378                    05,2061  77512 1           2DEC    -.01106341036   CARG
 0378                    05,2062  67453 1
 0379                    05,2063  00131 1           2DEC    .002737925 B+1  1/365
 0379                    05,2064  26730 1
P0380     ********************************************************************************************

 0381     REF    1       26,2000                    SETLOC  PLANTIN2
 0382                    26,2000                    BANK
 0383     REF    1                                  COUNT*  $$/LUROT

 0384                    26,2000  17775 1  COSI     2DEC    .99964173 B-1   COS (5521.5  SEC) B-1
 0384                    26,2001  02052 1
 0385                    26,2002  00333 1  SINI     2DEC    .02676579 B-1   SIN (5521.5  SEC) B-1
 0385                    26,2003  10374 0
 0386                    26,2004  77665 1  NODDOT   2DEC    -.457335121 E-2 REVS/CSEC B+28=-1.07047011 E-8  RAD/SEC
 0386                    26,2005  42175 1
 0387                    26,2006  22211 0  FDOT     2DEC    .570863327      REVS/CSEC B+27= 2.67240410 E-6  RAD/SEC
 0387                    26,2007  00625 0
 0388                    26,2010   77777 0  BDOT      2DEC    -3.07500686 E-8 REVS/CSEC B+28=-7.19757301 E-14 RAD/SEC
 0388                    26,2011   77767 1
 0389                    26,2012   37436 1  NODIO     2DEC    .986209434       REVS B-0     = 6.19653663041 RAD
 0389                    26,2013   01613 1
 0390                    26,2014   32417 1  FSUBO     2DEC    .829090536       REVS B-0     = 5.20932947829 RAD
 0390                    26,2015   32160 1
 0391                    26,2016   02052 1  BSUBO     2DEC    .0651201393      REVS B-0     = 0.40916190299 RAD
 0391                    26,2017   35552 0
 0392                    26,2020   37116 0  WEARTH    2DEC    .973561595       REVS/CSEC B+23= 7.29211494 E-5  RAD/SEC
 0392                    26,2021   32523 1
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A000001
R000002     ***  CHANNEL DESCRIPTIONSF WORDS ARE ALLOCATED IN ERASABLE ASSIGNMENTS ***

R000005               CHANNEL 1    IDENTICAL TO COMPUTER REGISTER L (0001)
A0001

R0002                 CHANNEL 2    IDENTICAL TO COMPUTER REGISTER Q (0002)
A0003

R0004                 CHANNEL 3    HISCALAR: INPUT CHANNEL; MOST SIGNIFICANT 14 BITS FROM 33 STAGE BINARY COUNTER. SCALE
R0006                              FACTOR IS B23 IN CSEC, SO MAX VALUE ABOUT 23.3 HOURS AND LEAST SIGNIFICANT BIT 5.12 SECS.
A0008

R0009                 CHANNEL 4    LOSCALAR; INPUT CHANNEL; NEXT MOST SIGNIFICANT 14 BITS FROM THE 33 STAGE BINARY COUNTER
R0011                              ASSOCIATED WITH CHANNEL 3. SCALE FACTOR IS B9 IN  CSEC. SO MAX VAL IS 5.12 SEC AND LEAST
R0013                              SIGNIFICANT BIT IS 1/3200 SEC. SCALE FACTOR OF D.P. WORD WITH CHANNEL 3 IS B23 CSEC.
A0015

R0016                 CHANNEL 5    PYJETS; OUTPUT CHANNEL; PITCH RCS JET CONTROL.   (REACTION CONTROL SYSTEM) USES BITS 1-8.
A0018

R0019                 CHANNEL 6    ROLLJETS; OUTPUT CHANNEL; ROLL RCS JET CONTROL.   (REACTION CONTROL SYSTEM) USES BIT 1-8.
A0021

R0022                 CHANNEL 7    SUPERBNK; OUTPUT CHANNEL; NOT RESET BY RESTART;   FIXED EXTENSION BITS USED TO SELECT THE
R0024                              APPROPRIATE FIXED MEMORY BANK IF FBANK IS 30 OCTAL OR MORE. USES BITS 5-7.
A0026

R0027                 CHANNEL 10   OUT0; OUTPUT CHANNEL; REGISTER USED TO TRANSMIT   LATCHING-RELAY DRIVING INFORMATION FOR
R0029                              THE DISPLAY SYSTEM. BITS 15-12 ARE SET TO THE ROW NUMBER (1-14 OCTAL) OF THE RELAY TO BE
R0031                              CHANGED AND BITS 11-1 CONTAIN THE REQUIRED SETTINGS FOR THE RELAYS IN THE ROW.
A0033

R0034                 CHANNEL 11   DSALMOUT; OUTPUT CHANNEL; REGISTER WHOSE BITS ARE USED FOR ENGINE ON-OFF CONTROL AND TO
R0036                              DRIVE INDIVIDUAL INDICATORS OF THE DISPLAY SYSTEM. BITS 1-7 ARE A RELAYS.
A0038
R0039                   BIT 1      ISS WARNING
A0040
R0041                   BIT 2      LIGHT COMPUTER ACTIVITY LAMP
A0042
R0043                   BIT 3      LIGHT UPLINK ACTIVITY LAMP
A0044
R0045                   BIT 4      LIGHT TEMP CAUTION LAMP
A0046
R0047                   BIT 5      LIGHT KEYBOARD RELEASE LAMP
A0048
R0049                   BIT 6      FLASH VERB AND NOUN LAMPS
A0050
R0051                   BIT 7      LIGHT OPERATOR ERROR LAMP
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A0052
R0053              BIT 8        SPARE
A0054
R0055              BIT 9        TEST CONNECTOR OUTBIT
A0056
R0057              BIT 10       CAUTION RESET
A0058
R0059              BIT 11       SPARE
A0060
R0061              BIT 12       SPARE
A0062
R0063              BIT 13       ENGINE ON
A0064
R0065              BIT 14       ENGINE OFF
A0066
R0067              BIT 15       SPARE
A0068

R0069          CHANNEL 12   CHAN12: OUTPUT CHANNEL; BITS USED TO DRIVE NAVIGATION AND SPAECRAFT HARDWARE
A0071
R0072              BIT 1        ZERO RR CDU; CDU'S GIVE RRADAR INFORMATION FOR LM
A0073
R0074              BIT 2        ENABLE CDU RADAR ERROR COUNTERS
A0075
R0076              BIT 3        NOT USED
A0077
R0078              BIT 4        COARSE ALIGN ENABLE OF IMU
A0079
R0080              BIT 5        ZERO IMU CDU'S
A0081
R0082              BIT 6        ENABLE IMU ERROR COUNTER, CDU ERROR COUNTER.
A0083
R0084              BIT 7        SPARE
A0085
R0086              BIT 8        DISPLAY INERTIAL DATA
A0087
R0088              BIT 9        -PITCH GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0089
R0090              BIT 10       +PITCH GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0091
R0092              BIT 11       -ROLL  GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0093
R0094              BIT 12       +ROLL  GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0095
R0096              BIT 13       LR POSITION 2 COMMAND
A0097
R0098              BIT 14       ENABLE RENDESVOUS RADAR LOCK-ON;AUTO ANGLE TRACK'G
A0099
R0100              BIT 15       ISS TURN ON DELAY COMPLETE
A0101
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R0102               CHANNEL 13    CHAN13: OUTPUT CHANNEL
A0103
R0104                 BIT 1       RADAR C            PROPER SETTING OF THE A,B,C MATRIX
R0105                 BIT 2       RADAR B            SELECTS CERTAIN RADAR
R0106                 BIT 3       RADAR A            PARAMETERS TO BE READ.
A0107
R0108                 BIT 4       RADAR ACTIVITY
A0109
R0110                 BIT 5       NOT USED (CONNECTS AN ALTERNATE INPUT TO UPLINK)
A0111
R0112                 BIT 6       BLOCK INPUTS TO UPLINK CELL
A0113
R0114                 BIT 7       DOWNLINK TELEMETRY WORD ORDER CODE BIT
A0115
R0116                 BIT 8       RHC COUNTER ENABLE (READ HAND CONTROLLER ANGLES)
A0117
R0118                 BIT 9       START RHC READ INTO COUNTERS IF BIT 8 SET
A0119
R0120                 BIT 10      TEST ALARMS, TEST DSKY LIGHTS
A0121
R0122                 BIT 11      ENABLE STANDBY
A0123
R0124                 BIT 12      RESET TRAP 31-A     ALWAYS APPEAR TO BE SET TO 0
A0125
R0126                 BIT 13      RESET TRAP 31-B     ALWAYS APPEAR TO BE SET TO 0
A0127
R0128                 BIT 14      RESET TRAP 32       ALWAYS APPEAR TO BE SET TO 0
A0129
R0130                 BIT 15      ENABLE T6 RUPT
A0131

R0132               CHANNEL 14    CHAN14; OUTPUT CHANNEL; USED TO CONTROL COMPUTER  COUNTER CELLS (CDU,GYRO,SPACECRAFT FUNC.
A0134
R0135                 BIT 1       OUTLINK ACTIVITY (NOT USED)
A0136
R0137                 BIT 2       ALTITUDE RATE OR ALTITIDE SELECTOR
A0138
R0139                 BIT 3       ALTITUDE METER ACTIVITY
A0140
R0141                 BIT 4       THRUST DRIVE ACTIVITY FOR DESCENT ENGINE
A0142
R0143                 BIT 5       SPARE
A0144
R0145                 BIT 6       GYRO ENABLE POWER FOR PULSES
A0146
R0147                 BIT 7       GYRO SELECT B     PAIR OF BITS IDENTIFIES AXIS OF -
R0148                 BIT 8       GYRO SELECT A     GYRO SYSTEM TO BE TORQUED.
A0149
R0150                 BIT 9       GYRO TORQUING COMMAND IN NEGATIVE DIRECTION
A0151
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R0152              BIT 10      GYRO ACTIVITY
A0153
R0154              BIT 11      DRIVE CDU S
A0155
R0156              BIT 12      DRIVE CDU T
A0157
R0158              BIT 13      DRIVE CDU Z
A0159
R0160              BIT 14      DRIVE CDU Y
A0161
R0162              BIT 15      DRIVE CDU X
A0163

R0164          CHANNEL 15   MNKEYIN; INPUT CHANNEL;KEY CODE INPUT FROM KEYBOARD OF DSKY, SENSED BY PROGRAM WHEN
R0166                       PROGRAM INTERRUPT #5 IS RECEIVED. USES BITS 5-1
A0167

R0168          CHANNEL 16   NAVKEYIN; INPUT CHANNEL; OPTICS MARK INFORMATION AND NAVIGATION PANEL DSKY (CM) OR THRUST
R0170                       CONTROL (LM) SENSED BY PROGRAM WHEN PROGRAM INTER-RUPT #6 IS RECEIVED. USES BITS 3-7 ONLY.
A0172
R0173              BIT 1       NOT ASSIGNED
A0174
R0175              BIT 2       NOT ASSIGNED
A0176
R0177              BIT 3       OPTICS X-AXIS MARK SIGNAL FOR ALIGN OPTICAL TSCOPE
A0178
R0179              BIT 4       OPTICS Y-AXIS MARK SIGNAL FOR AOT
A0180
R0181              BIT 5       OPTICS MARK REJECT SIGNAL
A0182
R0183              BIT 6       DESCENT+ ; CREW DESIRED SLOWING RATE OF DESCENT
A0184
R0185              BIT 7       DESCENT- ; CREW DESIRED SPEEDING UP RATE OF D'CENT
A0186

R0187          NOTE: ALL BITS IN CHANNELS 30-33 ARE INVERTED AS SENSED BY THE  PROGRAM, SO THAT A VALUE OF ZERO MEANS
R0189          THAT THE INDICATED SIGNAL IS PRESENT.
A0190

R0191          CHANNEL 30   INPUT CHANNEL
A0192
R0193              BIT 1       ABORT WITH DESCENT STAGE
A0194
R0195              BIT 2          UNUSED
A0196
R0197              BIT 3       ENGINE ARMED SIGNAL
A0198
R0199              BIT 4       ABORT WITH ASCENT ENGINE STAGE
A0200
R0201              BIT 5       AUTO THROTTLE; COMPUTER CONTROL OF DESCENT ENGINE
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A0202
R0203               BIT 6       DISPLAY INERTIAL DATA
A0204
R0205               BIT 7       RR CDU FAIL
A0206
R0207               BIT 8       SPARE
A0208
R0209               BIT 9       IMU OPERATE WITH NO MALFUNCTION
A0210
R0211               BIT 10      LM COMPUTER (NOT AGS) HAS CONTROL OF LM
A0212
R0213               BIT 11      IMU CAGE COMMAND TO DRIVE IMU GIMBAL ANGLES TO 0.
A0214
R0215               BIT 12      IMU CDU FAIL (MALFUNCTION OF IMU CDU,S)
A0216
R0217               BIT 13      IMU FAIL (MALFUNCTION OF IMU STABILIZATION LOOPS)
A0218
R0219               BIT 14      ISS TURN ON REQUESTED
A0220
R0221               BIT 15      TEMPERATURE OF STABLE MEMBER WITHIN DESIGN LIMITS
A0222

R0223             CHANNEL 31    INPUT CHANNEL; BITS ASSOCIATED WITH THE ATTITUDE  CONTROLLER, TRANSLATIONAL CONTROLLER,
R0225                           AND SPACECRAFT ATTITUDE CONTROL; USED BY RCS DAP
A0226
R0227               BIT 1       ROTATION (BY RHC) COMMANDED IN POSITIVE PITCH DIRECTION; MUST BE IN MINIMUM IMPULSE MODE.
R0229                           ALSO POSITIVE ELEVATION CHANGE FOR LANDING POINT  DESIGNATOR
A0231
R0232               BIT 2       AS BIT 1 EXCEPT NEGATIVE PITCH AND ELEVATION
A0233
R0234               BIT 3       ROTATION (BY RHC) COMMANDED IN POSITIVE YAW DIRECTION; MUST BE IN MINUMUM IMPULSE MODE.
A0236
R0237               BIT 4       AS BIT 3 EXCEPT NEGATIVE YAW
A0238
R0239               BIT 5       ROTATION (BY RHC) COMMANDED IN POSITIVE ROLL DIRECTION; MUST BE IN MINIMUM IMPULSE MODE.
R0241                           ALSO POSITIVE AZIMUTH CHANGE FOR LANDING POINT DESIGNATOR
A0243
R0244               BIT 6       AS BIT 5 EXCEPT NEGATIVE ROLL AND AZIMUTH
A0245
R0246               BIT 7       TRANSLATION IN +X DIRECTION COMMANDED BY THC
A0247
R0248               BIT 8       TRANSLATION IN -X DIRECTION COMMANDED BY THC
A0249
R0250               BIT 9       TRANSLATION IN +Y DIRECTION COMMANDED BY THC
A0251
R0252               BIT 10      TRANSLATION IN -Y DIRECTION COMMANDED BY THC
A0253
R0254               BIT 11      TRANSLATION IN +Z DIRECTION COMMANDED BY THC
A0255
R0256               BIT 12      TRANSLATION IN -Z DIRECTION COMMANDED BY THC
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A0257
R0258           BIT 13     ATTITUDE HOLD MODE ON SCS MODE CONTROL SWITCH
A0259
R0260           BIT 14     AUTO STABILIZATION OF ATTITUDE ON SCS MODE SWITCH
A0261
R0262           BIT 15     ATTITUDE CONTROL OUT OF DETENT (RHC NOT IN NEUTRAL
A0263

R0264         CHANNEL 32      INPUT CHANNEL.
A0265
R0266           BIT 1         THRUSTERS 2 & 4 DISABLED BY CREW
A0267
R0268           BIT 2         THRUSTERS 5 & 8 DISABLED BY CREW
A0269
R0270           BIT 3         THRUSTERS 1 & 3 DISABLED BY CREW
A0271
R0272           BIT 4         THRUSTERS 6 & 7 DISABLED BY CREW
A0273
R0274           BIT 5         THRUSTERS 14 & 16 DISABLED BY CREW
A0275
R0276           BIT 6         THRUSTERS 13 & 15 DISABLED BY CREW
A0277
R0278           BIT 7         THRUSTERS 9  & 12 DISABLED BY CREW
A0279
R0280           BIT 8         THRUSTERS 10 & 11 DISABLED BY CREW
A0281
R0282           BIT 9         DESCENT ENGINE GIMBALS DISABLED BY CREW
A0284
R0285           BIT 10        APPARENT DESCENT ENGINE GIMBAL FAILURE
A0286
R0287           BIT 14     INDICATES PROCEED KEY IS DEPRESSED
A0288

R0289         CHANNEL 33   CHAN33: INPUT CHANNEL; FOR HARDWARE STATUS AND COMMAND INFORMATION. BITS 15-11 ARE FLIP-
R0291                      FLOP BITS RESET BY A CHANNEL "WRITE" COMMAND THAT ARE RESET BY A RESTART & BY T4RUPT LOOP.
A0293
R0294           BIT 1      SPARE
A0295
R0296           BIT 2      RR AUTO-POWER ON
A0297
R0298           BIT 3      RR RANGE LOW SCALE
A0299
R0300           BIT 4      RR DATA GOOD
A0301
R0302           BIT 5      LR RANGE DATA GOOD
A0303
R0304           BIT 6      LR POS1
A0305
R0306           BIT 7      LR POS2
A0307
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R0308             BIT 8      LR VEL DATA GOOD
A0309
R0310             BIT 9      LR RANGE LOW SCALE
A0311
R0312             BIT 10     BLOCK UPLINK INPUT
A0313
R0314             BIT 11     UPLINK TOO FAST
A0315
R0316             BIT 12     DOWNLINK TOO FAST
A0317
R0318             BIT 13     PIPA FAIL
A0319
R0320             BIT 14     WARNING OF REPEATED ALARMS: RESTART,COUNTER FAIL, VOLTAGE FAIL,AND SCALAR DOUBLE.
A0322
R0323             BIT 15     LGC OSCILLATOR STOPPED
A0324

R0325          CHANNEL 34    DNT M1; OUTPUT CHANNEL; DOWNLINK 1  FIRST OF TWO WORDS SERIALIZATION.
R0328          CHANNEL 35    DNT M2; OUTPUT CHANNEL DOWNLINK 2 SOCOND OF TWO   WORDS SERIALIZATION.
A0330
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A0001


R0002            FLAGWORDS 0-11 ARE DOWNLINKED AND CAN BE SET AND CLEARED BY UP-FLAG AND DOWN-FLAG INSTRUCTIONS IN THE
R0004                           INTERPRETER. THESE WERE PREVIOUSLY LISTED UNDER "INTERPRETIVE SWITCH BIT ASSIGNMENTS" IN
R0006                           THE ERASABLE LOG SECTION. FLAGWORDS 12 & 13 WEREPREVIOUSLY RADMODES AND DAPBOOLS AND
R0008                           ARE STILL DOWNLINKED UNDER THOSE NAMES.


A0009


R0010            ALPHABETICAL LIST OF FLAGWORDS


R0011    FLAGWORD          DEC. NUMBER       BIT AND FLAG          BIT NAME

R0012    ACCOKFLG          207               BIT 3  FLAG 13        ACCSOKAY
R0013    ACC4-2FL          199               BIT 11 FLAG 13        ACC4OR2X
R0014    ACMODFLG          032               BIT 13 FLAG 2         ACMODBIT
R0015    ALTSCALE          186               BIT 9  FLAG 12        ALTSCBIT
R0016    ANTENFLG          183               BIT 12 FLAG 12        ANTENBIT
R0017    AORBSFLG          205               BIT 5  FLAG 13        AORBSYST
R0018    AORBTFLG          200               BIT 10 FLAG 13        AORBTRAN
R0019    APSESW            130               BIT 5  FLAG 8         APSESBIT
R0020    APSFLAG           152               BIT 13 FLAG 10        APSFLBIT
R0021    ASTNFLAG          108               BIT 12 FLAG 7         ASTNBIT
R0022    ATTFLAG           104               BIT 1  FLAG 6         ATTFLBIT
R0023    AUTOMODE          193               BIT 2  FLAG 12        AUTOMBIT
R0024    AUTR1FLG          209               BIT 1  FLAG 13        AUTRATE1
R0025    AUTR2FLG          208               BIT 2  FLAG 13        AUTRATE2
R0026    AUXFLAG           103               BIT 2  FLAG 6         AUXFLBIT
R0027    AVEGFLAG          115               BIT 5  FLAG 7         AVEGFBIT
R0028    AVEMIDSW          149               BIT 1  FLAG 9         AVEMDBIT
R0029    AVFLAG            040               BIT 5  FLAG 2         AVFLBIT
R0030    CALCMAN2          043               BIT 2  FLAG 2         CALC2BIT
R0031    CALCMAN3          042               BIT 3  FLAG 2         CALC3BIT
R0032    CDESFLAG          180               BIT 15 FLAG 12        CDESBIT
R0033    CMOONFLG          123               BIT 12 FLAG 8         CMOONBIT
R0034    COGAFLAG          131               BIT 4  FLAG 8         COGAFBIT
R0037    CSMDKFLG          197               BIT 13 FLAG 13        CSMDOCKD
R0038    CULTFLAG          053               BIT 7  FLAG 3         CULTBIT
R0040    DAPBOOLS                            FLGWRD13
R0041    DBSELFLG          206               BIT 4  FLAG 13        DBSELECT
R0042    DESIGFLG          185               BIT 10 FLAG 12        DESIGBIT
R0043    DIDFLAG           016               BIT 14 FLAG           DIDFLBIT
R0044    DIMOFLAG          059               BIT 1  FLAG 3         DIMOBIT
R0045    DMENFLG           081               BIT 9  FLAG 5         DMENFBIT
R0046    DRIFTDFL          202               BIT 8  FLAG 13        DRIFTBIT
R0047    DRIFTFLG          030               BIT 15 FLAG 2         DRFTBIT
R0048    DSKYFLAG          075               BIT 15 FLAG 5         DSKYFBIT
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L         FLAGWORD ASSIGNMENTS                                                        USER'S PAGE NO.   2       EO S4

R0049    D6OR9FLG        058              BIT 2  FLAG 3       D6OR9BIT
R0050    ENGONFLG        083              BIT 7  FLAG 5       ENGONBIT
R0051    ERADFLAG        017              BIT 13 FLAG 1       ERADFBIT
R0052    ETPIFLAG        038              BIT 7  FLAG 2       ETPIBIT          EQUIVALENT FLAG NAME:  OPTNSW
R0054    FINALFLG        039              BIT 6  FLAG 2       FINALBIT
R0056    FLAGWRD0        (000-014)        (STATE +0)
R0057    FLAGWRD1        (015-029)        (STATE +1)
R0058    FLAGWRD2        (030-044)        (STATE +2)
R0059    FLAGWRD3        (045-059)        (STATE +3)
R0060    FLAGWRD4        (060-074)        (STATE +4)
R0061    FLAGWRD5        (075-089)        (STATE +5)
R0062    FLAGWRD6        (090-104)        (STATE +6)
R0063    FLAGWRD7        (105-119)        (STATE +7)
R0064    FLAGWRD8        (120-134)        (STATE +8D)
R0065    FLAGWRD9        (135-149)        (STATE +9D)
R0066    FLAP            142              BIT 8  FLAG 9       FLAPBIT
R0067    FLGWRD10        (150-164)        (STATE +10D)
R0068    FLGWRD11        (165-179)        (STATE +11D)
R0069    FLGWRD12        (180-194)        (STATE +12D)
R0070    FLGWRD13        (195-209)        (STATE +13D)
R0071    FLPC            138              BIT 12 FLAG 9       FLPCBIT
R0072    FLPI            139              BIT 11 FLAG 9       FLPIBIT
R0073    FLRCS           140              BIT 10 FLAG 9       FLRCSBIT
R0074    FLUNDISP        125              BIT 10 FLAG 8       FLUNDBIT
R0075    FLVR            136              BIT 14 FLAG 9       FLVRBIT
R0077    FREEFLAG        012              BIT 3  FLAG 0       FREEFBIT
R00775   FSPASFLG        005              BIT 10 FLAG 0       FSPASBIT
R0078    GLOKFAIL        046              BIT 14 FLAG 3       GLOKFBIT
R0079    GMBDRVSW        095              BIT 10 FLAG 6       GMBDRBIT
R0080    GUESSW          028              BIT 2  FLAG 1       GUESSBIT
R0081    HFLSHFLG        179              BIT 1  FLAG 11      HFLSHBIT
R0082    IDLEFLAG        113              BIT 7  FLAG 7       IDLEFBIT
R0083    IGNFLAG         107              BIT 13 FLAG 7       IGNFLBIT
R0084    IMPULSW         036              BIT 9  FLAG 2       IMPULBIT
R0085    IMUSE           007              BIT 8  FLAG 0       IMUSEBIT
R0086    INFINFLG        128              BIT 7  FLAG 8       INFINBIT
R0087    INITALGN        133              BIT 2  FLAG 8       INITABIT
R0088    INTFLAG         151              BIT 14 FLAG 10      INTFLBIT
R0089    INTYPFLG        056              BIT 4  FLAG 3       INTYPBIT
R0090    ITSWICH         105              BIT 15 FLAG 7       ITSWBIT
R0091    JSWITCH         001              BIT 14 FLAG 0       JSWCHBIT
R0092    LETABORT        141              BIT 9  FLAG 9       LETABBIT
R0093    LMOONFLG        124              BIT 11 FLAG 8       LMOONBIT
R0094    LOKONSW         010              BIT 5  FLAG 0       LOKONBIT
R0095    LOSCMFLG        033              BIT 12 FLAG 2       LOSCMBIT
R0096    LRALTFLG        190              BIT 5  FLAG 12      LRALTBIT
R0097    LRBYPASS        165              BIT 15 FLAG 11      LRBYBIT
R0098    LRINH           172              BIT 8  FLAG 11      LRINHBIT
R0099    LRPOSFLG        189              BIT 6  FLAG 12      LRPOSBIT
R0100    LRVELFLG        187              BIT 8  FLAG 12      LRVELBIT
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R0101    LUNAFLAG          048          BIT 12 FLAG 3          LUNABIT
R0102    MANUFLAG          106          BIT 14 FLAG 7          MANUFBIT
R0103    MGLVFLAG          088          BIT 2  FLAG 5          MGLVFBIT
R0104    MIDAVFLG          148          BIT 2  FLAG 9          MIDAVBIT
R0105    MIDFLAG           002          BIT 13 FLAG 0          MIDFLBIT
R0106    MID1FLAG          147          BIT 3  FLAG 9          MID1BIT
R0107    MKOVFLAG          072          BIT 3  FLAG 4          MKOVBIT
R0108    MOONFLAG          003          BIT 12 FLAG 0          MOONBIT
R0109    MRKIDFLG          060          BIT 15 FLAG 4          MRKIDBIT
R0110    MRKNVFLG          066          BIT 9  FLAG 4          MRKNVBIT
R0111    MRUPTFLG          070          BIT 5 FLAG 4           MRUPTBIT
R0112    MUNFLAG           097          BIT 8 FLAG 6           MUNFLBIT
R0113    MWAITFLG          064          BIT 11 FLAG 4          MWAITBIT
R0114    NEEDLFLG          011          BIT 4  FLAG 0          NEEDLBIT
R0115    NEWIFLG           122          BIT 13 FLAG 8          NEWIBIT
R0116    NJETSFLG          015          BIT 15 FLAG            NJETSBIT
R0117    NODOFLAG          044          BIT 1  FLAG 2          NODOBIT
R0118    NOLRREAD          170          BIT 10 FLAG 11         NOLRRBIT
R0119    NORMSW            110          BIT 10 FLAG 7          NORMSBIT
R0120    NORRMON           086          BIT 4  FLAG 5          NORRMBIT
R0121    NOR29FLG          049          BIT 11 FLAG 3          NR29FBIT
R0122    NOTHROTL          078          BIT 12 FLAG 5          NOTHRBIT
R0123    NOUPFLAG          024          BIT 6  FLAG 1          NOUPFBIT
R0124    NRMNVFLG          067          BIT 8  FLAG 4          NRMNVBIT
R0125    NRMIDFLG          062          BIT 13 FLAG 4          NRMIDBIT
R0126    NRUPTFLG          071          BIT 4  FLAG 4          NRUPTBIT
R0127    NTARGFLG          102          BIT 3  FLAG 6          NTARGBIT
R0128    NWAITFLG          065          BIT 10 FLAG 4          NWAITBIT
R0129    OLDESFLG          014          BIT 1  FLAG 0          OLDESBIT
R0130    OPTNSW            038          BIT 7  FLAG 2          OPTNBIT          EQUIVALENT FLAG NAME:  ETPIFLAG
R0132    ORBWFLAG          054          BIT 6  FLAG 3          ORBWFBIT
R0133    ORDERSW           129          BIT 6  FLAG 8          ORDERBIT
R0134    OURRCFLG          198          BIT 12 FLAG 13         OURRCBIT
R0135    POSPFLAG          063          BIT 12 FLAG 4          POSPFBIT
R0136    PFRATFLG          041          BIT 4  FLAG 2          PFRATBIT
R0137    PINBRFLG          069          BIT 6  FLAG 4          PINBRBIT
R0139    PRECIFLG          052          BIT 8  FLAG 3          PRECIBIT
R0140    PRIODFLG          061          BIT 14 FLAG 1          PRIODBIT
R0141    PRONVFLG          068          BIT 7  FLAG 4          PRONVBIT
R0142    PSTHIGAT          169          BIT 11 FLAG 11         PSTHIBIT
R0143    PULSEFLG          195          BIT 15 FLAG 13         PULSES
R01432   P21FLAG           004          BIT 11 FLAG 0          P21FLBIT
R0144    P25FLAG           006          BIT 9  FLAG 0          P25FLBIT
R0145    P39/79SW          126          BIT 9  FLAG 8          P39SWBIT
R0146    QUITFLAG          145          BIT 5  FLAG 9          QUITBIT
R0147    RADMODES                       FLGWRD12
R0148    RASFLAG                        FLGWRD10
R0149    RCDUFAIL          188          BIT 7  FLAG 12         RCDUFBIT
R0150    RCDUOFLG          182          BIT 13 FLAG 12         RCDUOBIT
R0151    READLR            174          BIT 6  FLAG 11         READLBIT
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R0152    READRFLG      051          BIT  9  FLAG  3     READRBIT       EQUIVALENT FLAG NAME:  R04FLAG
R0154    READVEL       175          BIT  5  FLAG 11     READVBIT
R0155    REDFLAG       099          BIT  6  FLAG  6     REDFLBIT
R0156    REFSMFLG      047          BIT 13  FLAG  3     REFSMBIT
R0157    REINTFLG      158          BIT  7  FLAG 10     REINTBIT
R0158    REMODFLG      181          BIT 14  FLAG 12     REMODBIT
R0159    RENDWFLG      089          BIT  1  FLAG  5     RENDWBIT
R0160    REPOSMON      184          BIT 11  FLAG 12     REPOSBIT
R0161    RHCSCFLG      203          BIT  7  FLAG 13     RHCSCALE
R0162    RNDVZFLG      008          BIT  7  FLAG  0     RNDVZBIT
R0163    RNGEDATA      176          BIT  4  FLAG 11     RNGEDBIT
R0164    RNGSCFLG      080          BIT 10  FLAG  5     RNGSCBIT
R01642   RODFLAG       018          BIT 12  FLAG  1     RODFLBIT
R01644   ROTFLAG       144          BIT  6  FLAG  9     ROTFLBIT
R0165    RPQFLAG       120          BIT 15  FLAG  8     RPQFLBIT
R0166    RRDATAFL      191          BIT  4  FLAG 12     RRDATABT
R0167    RRNBSW        009          BIT  6 FLAG  0      RNBBIT
R016[illegible]    RRRSFLAG      192          BIT  3  FLAG 12     RRRSBIT
R0169    RVSW          111          BIT  9  FLAG  7     RVSWBIT
R0170    R04FLAG       051          BIT  9  FLAG  3     R04FLBIT       EQUIVALENT FLAG NAME:  READRFLG
R0172    R10FLAG       013          BIT  2  FLAG  0     R10FLBIT
R0173    R61FLAG       020          BIT 10  FLAG  1     R61FLBIT
R0174    R77FLAG       079          BIT 11  FLAG  5     R77FLBIT
R0175    SCALBAD       177          BIT  3  FLAG 11     SCABBIT
R0176    SLOPESW       027          BIT  3  FLAG  1     SLOPEBIT
R0177    SNUFFER       077          BIT 13  FLAG  5     SNUFFBIT
R0178    SOLNSW        087          BIT  3  FLAG  5     SOLNSBIT
R0179    SRCHOPTN      031          BIT 14  FLAG  2     SRCHOBIT
R0180    STATEFLG      055          BIT  5  FLAG  3     STATEBIT
R0181    STEERSW       034          BIT 11  FLAG  2     STEERBIT
R0182    SURFFLAG      127          BIT  8  FLAG  8     SURFFBIT
R0183    SWANDISP      109          BIT 11  FLAG  7     SWANDBIT
R0184    S32.1F1       090          BIT 15  FLAG  6     S32BIT1
R0185    S32.1F2       092          BIT 14  FLAG  6     S32BIT2
R01[illegible]6    S32.1F3A      092          BIT 13  FLAG  6     S32BIT3A
R0187    S32.1S3B      093          BIT 12  FLAG  6     S32BIT3B
R0188    TFFSW         119          BIT  1  FLAG  7     TFFSWBIT
R0189    TRACKFLG      025          BIT  5  FLAG  1     TRACKBIT
R0190    TURNONFL      194          BIT  1  FLAG 12     TURNONBT
R0191    ULLAGFLG      204          BIT  6  FLAG 13     ULLAGER
R0192    UPDATFLG      023          BIT  7  FLAG  1     UPDATBIT
R0193    UPLOCKFL      116          BIT  4  FLAG  7     UPLOCBIT
R0194    USEQRFLG      196          BIT 14  FLAG 13     USEQRJTS
R0195    VEHUPFLG      022          BIT  8  FLAG  1     VEHUPBIT
R0196    VELDATA       173          BIT  7  FLAG 11     VELDABIT
R0197    VERIFLAG      117          BIT  3  FLAG  7     VERIFBIT
R0198    VFLAG         050          BIT 10  FLAG  3     VFLAGBIT
R0199    VFLSHFLG      178          BIT  2  FLAG 11     VFLSHBIT
R0200    VINTFLAG      057          BIT  3  FLAG  3     VINTFBIT
R0201    VXINH         168          BIT 12  FLAG 11     VXINHBIT
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R0202   V37FLAG          114              BIT 6  FLAG 7      V37FLBIT
R0203   V67FLAG          112              BIT 9  FLAG 7      V67FLBIT
R0204   V82EMFLG         118              BIT 2  FLAG 7      V82EMBIT
R0205   XDELVFLG         037              BIT 8  FLAG 2      XDELVBIT
R0206   XDSPFLAG         074              BIT 1  FLAG 4      XDSPBIT
R0207   XORFLG           171              BIT 9  FLAG 11     XORFLBIT
R0208   XOVINFLG         201              BIT 9  FLAG 13     XOVINHIB
R0210   3AXISFLG         084              BIT 6 FLAG 5       3AXISBIT
R0211   360SW            134              BIT 1  FLAG 8      360SWBIT
A0212

R0213           ASSIGNMENT AND DESCRIPTION OF FLAGWORDS

 0214   REF   1              0074          FLAGWRD0 =      STATE +0      (000-014)

A0215                                                                    (SET)                  (RESET)

A0216                                                      BIT 15 FLAG 0  (S)
A0217                                               =      000D
A0218                                               =      BIT15
A0219

A0220                                                      BIT 14 FLAG 0  (S)
 0221                        0001          JSWITCH  =      001D           INTEGRATION OF W      INTEGRATION OF STATE
 0222   REF   1              4736          JSWCHBIT =      BIT14          MATRIX                VECTOR
A0223

A0224                                                      BIT 13 FLAG 0  (S)
 0225                        0002          MIDFLAG  =      002D           INTEGRATION WITH      INTEGRATION WITHOUT
A0226                                                                     SECONDARY BODY AND    SOLAR PERTURBATIONS
 0227   REF   2  LAST   40   4737          MIDFLBIT =      BIT13          SOLAR PERTURBATIONS
A0228

A0229                                                      BIT 12 FLAG 0  (L)
 0230                        0003          MOONFLAG =      003D           MOON IS SPHERE OF     EARTH IS SPHERE OF
 0231   REF   1              4740          MOONBIT  =      BIT12          INFLUENCE             INFLUENCE
A0232

A0233                                                      BIT 11 FLAG 0
 0234                        0004          P21FLAG  =      004D           USE BASE VECTORS      1ST PASS -- CALC-
 0235   REF   2  LAST   43   4741          P21FLBIT =      BIT11          ALREADY CALCULATED    ULATE BASE VECTORS
A0236

A0237                                                      BIT 10 FLAG 0
 0238                        0005          FSPASFLG =      005D           FIRST PASS THROUGH    NOT FIRST PASS THRU
 0239   REF   1              4742          FSPASBIT =      BIT10          REPOSITION ROUTINE    REPOSITION ROUTINE
A0240
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A0241                                                   BIT 9 FLAG 0     (S)
 0242                    0006        P25FLAG   =        006D             P25 OPERATING          P25 NOT OPERATING
 0243    REF    1        4743        P25FLBIT  =        BIT9
A0244

A0245                                                   BIT 8 FLAG 0     (S)
 0246                    0007        IMUSE     =        007D             IMU IN USE             IMU NOT IN USE
 0247    REF    1        4744        IMUSEBIT  =        BIT8
A0248

A0249                                                   BIT 7 FLAG 0     (S)
 0250                    0010        RNDVZFLG  =        008D             P20 RUNNING (RADAR     P20 NOT RUNNING
 0251    REF    1        4745        RNDVZBIT  =        BIT7             IN USE)
A0252

A0253                                                   BIT 6 FLAG 0     (S)
 0254                    0011        RRNBSW    =        009D             RADAR TARGET IN        RADAR TARGET IN
 0255    REF    1        4746        RRNBBIT   =        BIT6             NB COORDINATES         SM COORDINATES
A0256

A0257                                                   BIT 5 FLAG 0     (S)
 0258                    0012        LOKONSW   =        010D             RADAR LOCK-ON          RADAR LOCK-ON NOT
 0259    REF    1        4747        LOKONBIT  =        BIT5             DESIRED                DESIRED
A0260

A0261                                                   BIT 4 FLAG 0     (S)
 0262                    0013        NEEDLFLG  =        011D             TOTAL ATTITUDE         A/P FOLLOWING
 0263    REF    1        4750        NEEDLBIT  =        BIT4             ERROR DISPLAYED        ERROR DISPLAYED
A0264

A0265                                                   BIT 3 FLAG 0
 0266                    0014        FREEFLAG  =        012D             (USED BY P51-53 TEMP IN MANY DIFFERENT
A0267                                                                    ROUTINES & BY LUNAR + SOLAR EPHEMERIDES)
 0268    REF    1        4751        FREEFBIT  =        BIT3
A0269

A0270                                                   BIT 2 FLAG 0
 0271                    0015        R10FLAG   =        013D             R10 OUTPUTS DATA TO BESIDES OUTPUT WHEN
 0272    REF    1        4752        R10FLBIT  =        BIT2             ALTITUDE & ALTITUDE SET, R10 ALSO OUTPUT
A0273                                                                    RATE METERS ONLY       TO FORWARD & LATERAL
A0274                                                                                           VELOCITY CROSSPOINTR
A0275

A0276                                                   BIT 1 FLAG 0     (L)
 0277                    0016        OLDESFLG  =        014D             R29 GYRO CMD LOOP      R29 GYRO CMD LOOP
 0278    REF    1        4753        OLDESBIT  =        BIT1             REQUESTED              NOT REQUESTED

A0279

 0280    REF    2  LAST    65        0075        FLAGWRD1  =        STATE +1         (015-029)
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L        FLAGWORD ASSIGNMENTS                                                       USER'S PAGE NO.   7        EO S4

A0281                                                                   (SET)                  (RESET)

A0282                                                    BIT 15 FLAG 1  (S)
 0283                        0017          NJETSFLG =    015D           TWO JET RCS BURN       FOUR JET RCS BURN
 0284    REF   1             4735          NJETSBIT =    BIT15
A0285

A0286                                                    BIT 14 FLAG 1  (L)
 0287                        0020          DIDFLAG  =    016D           INERTIAL DATA IS       PERFORM DATA DISPLAY
 0288    REF   2  LAST   65  4736          DIDFLBIT =    BIT14          AVAILABLE              INITIALIZATION FUNCS
A0289

A0290                                                    BIT 13 FLAG 1  (S)
 0291                        0021          ERADFLAG =    017D           COMPUTE REARTH         USE CONSTANT REARTH
 0292    REF   3  LAST   65  4737          ERADFBIT =    BIT13          FISCHER ELLIPSOID      PAD RADIUS
A0293

A0294                                                    BIT12 FLAG 1
 0295                        0022          RODFLAG  =    018D           IF IN P66, NORMAL      IF IN P66, RE-INIT-
 0296    REF   2  LAST   65  4740          RODFLBIT =    BIT12          OPERATION CONTINUES. IALIZATION IS PER-
A0297                                                                   RESTART CLEARS FLAG    FORMED AND FLAG IS
A02975

A0298                                                    BIT 11 FLAG 1
A0299                                               =    019D
A02995                                              =    BIT11
A0300                                                    BIT 10 FLAG 1  (L)
 0301                        0024          R61FLAG  =    020D           RUN R61 LEM            RUN R65 LEM
 0302    REF   2  LAST   65  4742          R61FLBIT =    BIT10
A0303

A0304                                                    BIT 9 FLAG 1
A0305                                               =    021D
A0306                                               =    BIT9
A0307

A0308                                                    BIT 8 FLAG 1   (S)
 0309                        0026          VEHUPFLG =    022D           CSM STATE VECTOR       LEM STATE VECTOR
 0310    REF   2  LAST   66  4744          VEHUPBIT =    BIT8           BEING UPDATED          BEING UPDATED
A0311

A0312                                                    BIT 7 FLAG 1   (S)
 0313                        0027          UPDATFLG =    023D           UPDATING BY MARKS      UPDATING BY MARKS
 0314    REF   2  LAST   66  4745          UPDATBIT =    BIT7           ALLOWED                NOT ALLOWED
A0315

A0316                                                    BIT 6 FLAG 1   (S)
 0317                        0030          NOUPFLAG =    024D           NEITHER CSM            EITHER STATE
A0318                                                                   NOR LM STATE VECTOR    VECTOR MAY BE
 0319    REF   2  LAST   66  4746          NOUPFBIT =    BIT6           MAY BE UPDATED         UPDATED
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A0320

A0321                                                      BIT 5 FLAG 1    (S)
 0322                         0031           TRACKFLG =    025D            TRACKING ALLOWED     TRACKING NOT ALLOWED
 0323    REF    2  LAST   66  4747           TRACKBIT =    BIT5
A0324

A0325                                                      BIT 4 FLAG 1
A0326                                                 =    026D
A0327                                                 =    BIT4
A0328

A0329                                                      BIT 3 FLAG 1    (S)
 0330                         0033           SLOPESW  =    027D            ITERATE WITH BIAS    ITERATE WITH REGULAR
A0331                                                                      METHOD IN ITERATOR   FALSI METHOD IN
 0332    REF    2  LAST   66  4751           SLOPEBIT =    BIT3                                 ITERATOR
A0333

A0334                                                      BIT 2 FLAG 1    (S)
 0335                         0034           GUESSW   =    028D            NO STARTING VALUE    STARTING VALUE FOR
 0336    REF    2  LAST   66  4752           GUESSBIT =    BIT2            FOR ITERATION        ITERATION EXISTS
A0337

A0338                                                      BIT 1 FLAG 1
A0339                                                 =    029D
A0340

 0341    REF    3  LAST   66  0076           FLAGWRD2 =    STATE +2        (030-044)

A0342                                                                      (SET)                (RESET)

A0343                                                      BIT 15 FLAG 2   (S)
 0344                         0036           DRIFTFLG =    030D            T3RUPT CALLS GYRO    T3RUPT DOES NO GYRO
 0345    REF    2  LAST   67  4735           DRFTBIT  =    BIT15           COMPENSATION         COMPENSATION
A0346

A0347                                                      BIT 14 FLAG 2   (S)
 0348                         0037           SRCHOPTN =    031D            RADAR IN AUTOMATIC   RADAR NOT IN AUTO-
 0349    REF    3  LAST   67  4736           SRCHOBIT =    BIT14           SEARCH OPTION(R24)   MATIC SEARCH OPTION
A0350

A0351                                                      BIT 13 FLAG 2   (S)
 0352                         0040           ACMODFLG =    032D            MANUAL ACQUISITION   AUTO ACQUISITION
 0353    REF    4  LAST   67  4737           ACMODBIT =    BIT13           BY RENDESVOUS RADAR  BY RENDESVOUS RADAR
A0354

A0355                                                      BIT 12 FLAG 2   (S)
 0356                         0041           LOSCMFLG =    033D            LINE OF SIGHT BEING  LINE OF SIGHT NOT
A0357                                                                      COMPUTED (R21)       BEING COMPUTED
 0358    REF    3  LAST   67  4740           LOSCMBIT =    BIT12
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A0359                                                                          IN R29 (L): RE GYRO  IN R29 (L): PR GYRO
A0360                                                                          CMD LOOP RUNNING     CMD LOOP OFF

A0361                                                      BIT 11 FLAG 2       (S)
 0362                             0042        STEEPSW  =   034D                SUFFICIENT THRUST    INSUFFICIENT THRUST
 0363   REF    3  LAST    65      4741        STEERBIT =   BIT11               IS PRESENT           IS PRESENT
A0364

A0365                                                      BIT 10 FLAG 2       (S)
A0368

A0369                                                      BIT 9 FLAG 2        (S)
 0370                             0044        IMPULSW  =   036D                MINIMUM IMPULSE      STEERING BURN (NO
A0371                                                                          BURN (CUTOFF TIME    CUTOFF TIME YET
 0372   REF    2  LAST    66      4743        IMPULBIT =   BIT9                SPECIFIED)           AVAILABLE)
A0373

A0374                                                      BIT 8 FLAG 2        (S)
 0375                             0045        XDELVFLG =   037D                EXTERNAL DELTAV VG   LAMBERT (AIMPOINT)
 0376   REF    3  LAST    67      4744        XDELVBIT =   BIT8                COMPUTATION          VG COMPUTATION
A0377

A0378                                                      BIT 7 FLAG 2        (S)
 0379                             0046        ETPIFLAG =   038D                ELEVATION ANGLE      TPI TIME SUPPLIED
A0380                                                                          SUPPLIED FOR         FOR P34,74 TO COMPUT
 0381   REF    3  LAST    67      4745        ETPIBIT  =   BIT7                P34,74               ELEVATION
A0382

A0383                                                      BIT 7 FLAG 2        (L)
 0384   REF    1                  0046        OPTNSW   =   ETPIFLAG            SOI PHASE OF P38/78  SOR PHASE OF P38/78
 0385   REF    4  LAST    69      4745        OPTNBIT  =   BIT7
A0386

A0387                                                      BIT 6 FLAG 2        (S)
 0388                             0047        FINALFLG =   039D                LAST PASS THROUGH    INTERIM PASS THROUGH
A0389                                                                          RENDEZVOUS PROGRAM   RENDEZVOUS PROGRAM
 0390   REF    3  LAST    67      4746        FINALBIT =   BIT6                COMPUTATIONS         COMPUTATIONS
A0391

A0392                                                      BIT 5 FLAG 2        (S)
 0393                             0050        AVFLAG   =   040D                LEM IS ACTIVE        CSM IS ACTIVE
 0394   REF    3  LAST    68      4747        AVFLBIT  =   BIT5                VEHICLE              VEHICLE
A0395

A0396                                                      BIT 4 FLAG 2        (S)
 0397                             0051        PFRATFLG =   041D                PREFERRED ATTITUDE   PREFERRED ATTITUDE
 0398   REF    2  LAST    66      4750        PFRATBIT =   BIT4                COMPUTED             NOT COMPUTED
A0399

A0400                                                      BIT 3 FLAG 2        (S)
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L          FLAGWORD ASSIGNMENTS                                                          USER'S PAGE NO.  10        EO S4

 0401                            0052           CALCMAN3 =       042D              NO FINAL ROLL          FINAL ROLL IS
 0402  REF   3  LAST   68        4751           CALC3BIT =       BIT3                                     NECESSARY
A0403

A0404                                                            BIT 2 FLAG 2      (S)
 0405                            0053           CALCMAN2 =       043D              PERFORM MANEUVER       BYPASS STARTING
 0406  REF   3  LAST   68        4752           CALC2BIT =       BIT2              STARTING PROCEDURE     PROCEDURE
A0407

A0408                                                            BIT 1 FLAG 2      (S)
 0409                            0054           NODOFLAG =       044D              V37 NOT PERMITTED      V37 PERMITTED
 0410  REF   2  LAST   66        4753           NODOBIT  =       BIT1
A0411

 0412  REF   4  LAST   68        0077           FLAGWRD3 =       STATE +3          (045-C59)

A0413                                                                              (SET)                  (RESET)

A0414                                                            BIT 15 FLAG 3
A0415                                                    =       045D
A0416

A0417                                                            BIT 14 FLAG 3     (S)
 0418                            0056           GLOKFAIL =       046D              GIMBAL LOCK HAS        NOT IN GIMBAL LOCK
 0419  REF   4  LAST   68        4736           GLOKFBIT =       BIT14             OCCURRED
A0420

A0421                                                            BIT 13 FLAG 3     *** PROTECTED FROM FRESH START ***
 0422                            0057           REFSMFLG =       047D              REFSMMAT GOOD          REFSMMAT NO GOOD
 0423  REF   5  LAST   68        4737           REFSMBIT =       BIT13
A0424

A0425                                                            BIT 12 FLAG 3     (S)
 0426                            0060           LUNAFLAG =       048D              LUNAR LAT-LONG         EARTH LAT-LONG
 0427  REF   4  LAST   68        4740           LUNABIT  =       BIT12
A0428

A0429                                                            BIT 11 FLAG 3     (L)
 0430                            0061           NOR29FLG =       049D              R29 NOT ALLOWED        R29 ALOWED (FR DES-
 0431  REF   4  LAST   69        4741           NR29FBIT =       BIT11                                    IGNATE, POWERED FLT)
A0432

A0433                                                            BIT 10 FLAG 3     (S)
 0434                            0062           VFLAG    =       050D              LESS THAN TWO STARS    TWO STARS IN FIELD
 0435  REF   3  LAST   67        4742           VFLAGBIT =       BIT10             IN FIELD OF VIEW       OF VIEW
A0436

A0437                                                            BIT 9 FLAG 3      (S)
 0438                            0063           R04FLAG  =       051D              ALARM 521              ALARM 521 ALLOWED
A0439                                                                              SUPPRESSED
```

```
  0440  REF   3  LAST   69      4743           R04FLBIT =        BIT9
 A0441

 A0442                                                           BIT 9 FLAG 3     (L)
  0443  REF   1                 0063           READRFLG =        R04FLAG          READING RR DATA      NOT READING RR DATA
  0444  REF   4  LAST   71      4743           READRBIT =        BIT9             PURSUANT TO P29      PURSUANT TO P29
 A0445

 A0446                                                           BIT 8 FLAG 3     (S)
  0447                          0064           PRECIFLG =        052D             NORMAL INTEGRATION   ENGAGES 4-TIME STEP
 A0448                                                                            IN P00               (P00) LOGIC IN INTE-
  0449  REF   4  LAST   69      4744           PRECIBIT =        BIT8                                  GRATION
 A0450

 A0451                                                           BIT 7 FLAG 3     (S)
  0452                          0065           CULTFLAG =        053D             STAR OCCULTED        STAR NOT OCCULTED
  0453  REF   5  LAST   69      4745           CULTBIT  =        BIT7
 A0454

 A0455                                                           BIT 6 FLAG 3     (S)
  0456                          0066           ORBWFLAG =        054D             W MATRIX VALID FOR   W MATRIX INVALID FOR
  0457  REF   4  LAST   69      4746           ORBWFBIT =        BIT6             ORBITAL NAVIGATION   ORBITAL NAVIGATION
 A045

 A0459                                                           BIT 5 FLAG 3     (S)
  0460                          0067           STATEFLG =        055D             PERMANENT STATE      PERMANENT STATE
  0461  REF   4  LAST           4747           STATEBIT =        BIT5             VECTOR UPDATED       VECTOR NOT UPDATED
 A0462

 A0463                                                           BIT 4 FLAG 3     (S)
  0464                          0070           INTYPFLG =        056D             CONIC INTEGRATION    ENCKE INTEGRATION
  0465  REF   3  LAST   69      4750           INTYPBIT =        BIT4
 A0466

 A0467                                                           BIT 3 FLAG 3     (S)
  0468                          0071           VINTFLAG =        057D             CSM STATE VECTOR     LEM STATE VECTOR
  0469  REF   4  LAST   70      4751           VINTFBIT =        BIT3             BEING INTEGRATED     BEING INTEGRATED
 A0470

 A0471                                                           BIT 2 FLAG 3     (S)
  0472                          0072           D6OR9FLG =        058D             DIMENSION OF W IS 9  DIMENSION OF W IS 6
  0473  REF   4  LAST   70      4752           D6OR9BIT =        BIT2             FOR INTEGRATION      FOR INTEGRATION
 A0474

 A0475                                                           BIT 1 FLAG 3     (S)
  0476                          0073           DIM0FLAG =        059D             W MATRIX IS TO BE    W MATRIX IS NOT TO
  0477  REF   3  LAST   70      4753           DIM0BIT  =        BIT1             USED                 BE USED
 A0478

  0479  REF   5  LAST   70      0100           FLAGWRD4 =        STATE +4         (060-074)
```

```
A0480                                                                   (SET)                 (RESET)

A0481                                                 BIT 15 FLAG 4     (S)
 0482                          0074         MRKIDFLG =    060D              MARK DISPLAY IN       NO MARK DISPLAY IN
 0483     REF   3  LAST   68   4735         MRKIDBIT =    BIT15             ENDIDLE               ENDIDLE
A0484

A0485                                                 BIT 14 FLAG 4     (S)
 0486                          0075         PRIODFLG =    061D              PRIORITY DISPLAY IN NO PRIORITY DISPLAY
 0487     REF   5  LAST   70   4736         PRIODBIT =    BIT14             ENDIDLE               IN ENDIDLE
A0488

A0489                                                 BIT 13 FLAG 4     (S)
 0490                          0076         NRMIDFLG =    062D              NORMAL DISPLAY IN     NO NORMAL DISPLAY
 0491     REF   6  LAST   70   4737         NRMIDBIT =    BIT13             ENDIDLE               IN ENDIDLE
A0492

A0493                                                 BIT 12 FLAG 4     (S)
 0494                          0077         PDSPFLAG =    063D              P20 SETS SO AS TO     LEAVE AS NORMAL DISP
A0495                                                                   TURN A NORMAL DIS-
 0496     REF   5  LAST   70   4740         PDSPFBIT =    BIT12             PLAY INTO A PRIORITY
A0497                                                                   DISPLAY IN R60
A0498

A0499                                                 BIT 11 FLAG 4     (S)
 0500                          0100         MWAITFLG =    064D              HIGHER PRIORITY       NO HIGHER PRIORITY
A0501                                                                   DISPLAY OPERATING     DISPLAY OPERATING
 0502     REF   5  LAST   70   4741         MWAITBIT =    BIT11             WHEN MARK DISPLAY     WHEN MARK DISPLAY
A0503                                                                   INITIATED             INITIATED

A0504                                                 BIT 10 FLAG 4     (S)
 0505                          0101         NWAITFLG =    065D              HIGHER PRIORITY       NO HIGHER PRIORITY
A0506                                                                   DISPLAY OPERATING     DISPLAY OPERATING
 0507     REF   4  LAST   70   4742         NWAITBIT =    BIT10             WHEN NORMAL           WHEN NORMAL DISPLAY
A0508                                                                   DISPLAY INITIATED     INITIATED

A0509                                                 BIT 9 FLAG 4      (S)
 0510                          0102         MRKNVFLG =    066D              ASTRONAUT USING       ASTRONAUT NOT USING
A0511                                                                   KEYBOARD WHEN MARK    KEYBOARD WHEN MARK
 0512     REF   5  LAST   71   4743         MRKNVBIT =    BIT9              DISPLAY INITIATED     DISPLAY INITIATED
A0513

A0514                                                 BIT 8 FLAG 4      (S)
 0515                          0103         NRMNVFLG =    067D              ASTRONAUT USING       ASTRONAUT NOT USING
A0516                                                                   KEYBOARD WHEN         KEYBOARD WHEN
 0517     REF   5  LAST   71   4744         NRMNVBIT =    BIT8              NORMAL DISPLAY        NORMAL DISPLAY
A0518                                                                   INITIATED             INITIATED

A0519                                                 BIT 7 FLAG 4      (S)
 0520                          0104         PRONVFLG =    068D              ASTRONAUT USING       ASTRONAUT NOT USING
```

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A0521                                                                KEYBOARD WHEN      KEYBOARD WHEN
 0522    REF  6  LAST  71    4745        PRONVBIT =   BIT7           PRIORITY DISPLAY   PRIORITY DISPLAY
A0523                                                                INITIATED          INITIATED

A0524                                                 BIT 6 FLAG 4   (S)
 0525                        0105        PINBRFLG =   069D           ASTRONAUT HAS      ASTRONAUT HAS NOT
A0526                                                                INTERFERED WITH    INTERFERED WITH
 0527    REF  5  LAST  71    4746        PINBRBIT =   BIT6           EXISTING DISPLAY   EXISTING DISPLAY
A0528

A0529                                                 BIT 5 FLAG 4   (S)
 0530                        0106        MRUPTFLG =   070D           MARK DISPLAY       MARK DISPLAY NOT
A0531                                                                INTERRUPTED BY     INTERRUPTED BY
 0532    REF  5  LAST  71    4747        MRUPTBIT =   BIT5           PRIORITY DISPLAY   PRIORITY DISPLAY
A0533

A0534                                                 BIT 4 FLAG 4   (S)
 0535                        0107        NRUPTFLG =   071D           NORMAL DISPLAY     NORMAL DISPLAY NOT
A0536                                                                INTERRUPTED BY     INTERRUPTED BY
 0537    REF  4  LAST  71    4750        NRUPTBIT =   BIT4           PRIORITY OR MARK   PRIORITY OR MARK
A0538                                                                DISPLAY            DISPLAY

A0539                                                 BIT 3 FLAG 4   (S)
 0540                        0110        MKOVFLAG =   072D           MARK DISPLAY OVER  NO MARK DISPLAY OVER
 0541    REF  5  LAST  71    4751        MKOVBIT  =   BIT3           NORMAL             NORMAL
A0542

A0543                                                 BIT 2 FLAG 4
A0544                                             =   073D

A0545

A0546                                                 BIT 1 FLAG 4   (S)
 0547                        0112        XDSPFLAG =   074D           MARK DISPLAY NOT   NO SPECIAL MARK
 0548    REF  4  LAST  71    4753        XDSPBIT  =   BIT1           TO BE INTERRUPTED  INFORMATION
A0549

 0550    REF  6  LAST  71    0101        FLAGWRD5 =   STATE +5       (075-089)
A0551                                                                (SET)              (RESET)

A0552                                                 BIT 15 FLAG 5  (S)
 0553                        0113        DSKYFLAG =   075D           DISPLAYS SENT TO   NO DISPLAYS TO DSKY
 0554    REF  4  LAST  72    4735        DSKYFBIT =   BIT15          DSKY
A0555

A0556                                                 BIT 14 FLAG 5
A0557                                             =   076D
A0558                                             =   BIT14
A0559
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A0560                                                       BIT 13 FLAG 5    (S,L)
 0561                          0115          SNUFFFLG  =    077D             U,V JETS DISABLED    U,V JETS ENABLED
A0562                                                                        DURING DPS           DURING DPS
 0563      REF   7  LAST   72  4737          SNUFFBIT  =    BIT13            BURNS (V65)          BURNS (V75)
A0564

A0565                                                       BIT 12 FLAG 5    (S)
 0566                          0116          NOTHROTL  =    078D             INHIBIT FULL         PERMIT FULL THROTTLE
 0567      REF  [illegible]  LAST   72  4740          NOTHRBIT  =    BIT12            THROTTLE
A0568

A0569                                                       BIT 11 FLAG 5    (S,L)
 0570                          0117          R77FLAG   =    079D             R77 IS ON,          R77 IS NOT ON.
A0571                                                                        SUPPRESS ALL RADAR
A0572                                                                        ALARMS AND TRACKER
 0573      REF   6  LAST   72  4741          R77FLBIT  =    BIT11            FAILS
A0574

A0575                                                       BIT 10 FLAG 5    (S)
 0576                          0120          RNGSCFLG  =    080D             SCALE CHANGE HAS     NO SCALE CHANGE HAS
A0577                                                                        OCCURRED DURING      OCCURRED DURING
 0578      REF   5  LAST   72  4742          RNGSCBIT  =    BIT10            RR READING           RR READING
A0579

A0580                                                       BIT 9 FLAG 5     (S)
 0581                          0121          DMENFLG   =    081D             DIMENSION OF W IS 9  DIMENSION OF W IS 6
 0582      REF   6  LAST   72  4743          DMENFBIT  =    BIT9             FOR INCORPORATION    FOR INCORPORATION
A0583

A0584                                                       BIT 8 FLAG 5     (S)
A0585                                                  =    082D
A0586                                                =    BIT8
A0587

A0588                                                       BIT 7 FLAG 5     (S)
 0589                          0123          ENGONFLG  =    083D             ENGINE TURNED ON     ENGINE TURNED OFF
 0590      REF   7  LAST   73  4745          ENGONBIT  =    BIT7
A0591

A0592                                                       BIT 6 FLAG 5     (S)
 0593                          0124          3AXISFLG  =    084D             MANEUVER SPECIFIED   MANEUVER SPECIFIED
A0594                                                                        BY THREE AXES        BY ONE AXIS; R60
 0595      REF   6  LAST   73  4746          3AXISBIT  =    BIT6                                  CALLS VECPOINT.
A0596

A0597                                                       BIT 5 FLAG 5
A0598                                                  =    085D
A0599

A0600                                                       BIT 4 FLAG 5     (S)
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 0601                      0126          NORRMON   =     086D          BYPASS RR GIMBAL    PERFORM
 0602   REF   5  LAST  73  4750          NORRMBIT  =     BIT4          MONITOR             RR GIMBAL MONITOR
A0603

A0604                                                    BIT 3 FLAG 5  (S)
 0605                      0127          SOLNSW    =     087D          LAMBERT DOES NOT    LAMBERT CONVERGES OR
A0606                                                                  CONVERGE,OR TIME-RADTIME-RADIUS NON
 0607   REF   6  LAST  73  4751          SOLNSBIT  =     BIT3          NEARLY CIRCULAR     CIRCULAR
A0608

A0609                                                    BIT 2 FLAG 5  (S)
 0610                      0130          MGLVFLAG  =     088D          LOCAL VERTICAL      MIDDLE GIMBAL ANGLE
A0611                                                                  COORDINATES         COMPUTED
 0612   REF   5  LAST  71  4752          MGLVFBIT  =     BIT2          COMPUTED
A0613

A0614                                                    BIT 1 FLAG 5  (S)
 0615                      0131          RENDWFLG  =     089D          W MATRIX VALID      W MATRIX INVALID
A0616                                                                  FOR RENDEZVOUS      FOR RENDEZVOUS
 0617   REF   5  LAST  73  4753          RENDWBIT  =     BIT1          NAVIGATION          NAVIGATION
A0618

 0619   REF   7  LAST  73  0102          FLAGWRD6  =     STATE +6      (090-104)

A0620                                                                  (SET)               (RESET)

A0621                                                    BIT 15 FLAG 6 (S)
 0622                      0132          S32.1F1   =     090D          DELTA V AT CSI TIME  DVT1 LESS THEN MAX
 0623   REF   5  LAST  73  4735          S32BIT1   =     BIT15         ONE EXCEEDS MAX
A0624

A0625                                                    BIT 14 FLAG 6 (S)
 0626                      0133          S32.1F2   =     091D          FIRST PASS OF       REITERATION OF
 0627   REF   5  LAST  72  4736          S32BIT2   =     BIT14         NEWTON ITERATION    NEWTON
A0628

A0629                                                    BIT 13 FLAG 6 (S)
 0630                      0134          S32.1F3A  =     092D          BIT 13 AND BIT 12 FUNCTION AS AN ORDERED
 0631   REF   8  LAST  74  4737          S32BIT3A  =     BIT13         PAIR (13,12) INDICATING THE POSSIBLE OC-
A0632                                                                  CURRANCE OF 2NEWTON ITERATIONS FOR S32.1
A0633                                                                  IN THE PROGRAM IN THE FOLLOWING ORDER:
A0634                                                    BIT 12 FLAG 6 (0,1) (I.E.BIT 13 RESET,BIT 12 SET)
 0635                      0135          S32.1F3B  =     093D                = FIRST NEWTON ITERATION BEING DONE
 0636   REF   7  LAST  74  4740          S32BIT3B  =     BIT12         (0,0)= FIRST PASS OF SECOND NEWT.ITERAT.
A0637                                                                  (1,1)= 50 FT/SEC STAGE OF SEC. NEWT.ITER
A0638                                                                  (1,0)= REMAINDER OF SECOND NEWTON ITERA.
A0639

A0640                                                    BIT 11 FLAG 6 (S)
A0643
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A0644                                                     BIT 10 FLAG 6    (S)
 0645                       0137         GMBDRVSW =       095D             TRIMGIMB OVER        TRIMGIMB NOT OVER
 0646  REF   6  LAST   74   4742         GMBDRBIT =       BIT10
A0647

A0648                                                     BIT 9 FLAG 6
A0649                                             =       096D
A0650                                             =       BIT9
A0651

A0654                                                     BIT 8 FLAG 6     (S)
 0655                       0141         MUNFLAG  =       097D             SERVICER CALLS       SERVICER CALLS
 0656  REF   6  LAST   72   4744         MUNFLBIT =       BIT8             MUNRVG               CALCRVG
A0657

A0658                                                     BIT 7 FLAG 6     (L)
 0659                       0142                  =       098D
 0660  REF   8  LAST   74   4745                  =       BIT7
A0661

A0662                                                     BIT 6 FLAG 6     (L)
 0663                       0143         REDFLAG  =       099D             LANDING SITE         LANDING SITE
A0664                                                                      REDESIGNATION        REDESIGNATION NOT
 0665  REF   7  LAST   74   4746         REDFLBIT =       BIT6             PERMITTED            PERMITTED
A0666

A0667                                                     BIT 5 FLAG 6
A0668                                             =       100D
A0669

A0670                                                     BIT 4 FLAG 6
A0671                                             =       101D

A0672                                                     BIT 3 FLAG 6     (S)
 0673                       0146         NTARGFLG =       102D             ASTRONAUT DID        ASTRONAUT DID NOT
A0674                                                                      OVERWRITE DELTA      OVERWRITE DELTA
 0675  REF   7  LAST   75   4751         NTARGBIT =       BIT3             VELOCITY AT TPI      VELOCITY
A0676                                                                      OR TPM (P34,35)

A0677                                                     BIT 2 FLAG 6
 0678                       0147         AUXFLAG  =       103D             PROVIDING IDLEFLAG   SERVICER WILL SKIP
 0679  REF   6  LAST   75   4752         AUXFLBIT =       BIT2             IS NOT SET, SERV-    DVMON ON ITS NEXT
A0680                                                                      ICER WILL EXERCISE   PASS EVEN IF THE
A0681                                                                      DVMON ON ITS NEXT    IDLEFLAG IS NOT SET.
A0682                                                                      PASS.                IT WILL THEN SET
A0683                                                                                           AUXFLAG.

A0684                                                     BIT 1 FLAG 6     (L)
 0685                       0150         ATTFLAG  =       104D             LEM ATTITUDE EXISTS  NO LEM ATTITUDE
A0686                                                                      IN MOON-FIXED        AVAILABLE IN MOON-
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  0687  REF   6  LAST   75     4753          ATTFLBIT =       BIT1             COORDINATES            FIXED COORDINATES
 A0688

  0689  REF   8  LAST   75     0103          FLAGWRD7 =       STATE +7         (105-119)

 A0690                                                                          (SET)                  (RESET)

 A0691                                                        BIT 15 FLAG 7    (S)
  0692                         0151          ITSWICH  =       105D             P34:TPI TIME TO BE     TPI HAS BEEN
  0693  REF   6  LAST   75     4735          ITSWBIT  =       BIT15            COMPUTED               COMPUTED
 A0694

 A0695                                                        BIT 14 FLAG 7    (S)
  0696                         0152          MANUFLAG =       106D             ATTITUDE MANEUVER      NO ATTITUDE MANEUVER
 A0697                                                                          GOING DURING RR        DURING RR SEARCH
  0698  REF   7  LAST   75     4736          MANUFBIT =       BIT14            SEARCH
 A0699

 A0700                                                        BIT 13 FLAG 7    (S)
  0701                         0153          IGNFLAG  =       107D             TIG HAS ARRIVED        TIG HAS NOT ARRIVED
  0702  REF   9  LAST   75     4737          IGNFLBIT =       BIT13
 A0703

 A0704                                                        BIT 12 FLAG 7    (S)
  0705                         0154          ASTNFLAG =       108D             ASTRONAUT HAS          ASTRONAUT HAS NOT
  0706  REF   8  LAST   75     4740          ASTNBIT  =       BIT12            OKAYED IGNITION        OKAYED IGNITION
 A0707

 A0708                                                        BIT 11 FLAG 7    (L)
  0709                         0155          SWANDISP =       109D             LANDING ANALOG         LANDING ANALOG
  0710  REF   7  LAST   74     4741          SWANDBIT =       BIT11            DISPLAYS ENABLED       DISPLAYS SUPPRESSED
 A0711

 A0712                                                        BIT 10 FLAG 7    (S)
  0713                         0156          NORMSW   =       110D             UNIT NORMAL INPUT      LAMBERT COMPUTES ITS
  0714  REF   7  LAST   76     4742          NORMSBIT =       BIT10            TO LAMBERT             OWN UNIT NORMAL
 A0715

 A0716                                                        BIT 9 FLAG 7     (S)
  0717                         0157          RVSW     =       111D             DO NOT COMPUTE         COMPUTE FINAL STATE
 A0718                                                                          FINAL STATE VECTOR     VECTOR IN TIME-THETA
  0719  REF   7  LAST   74     4743          RVSWBIT  =       BIT9             IN TIME-THETA
 A0720

 A0721                                                        BIT 8 FLAG 7     (S)
  0722                         0160          V67FLAG  =       112D             ASTRONAUT OVERWRITE    ASTRONAUT DOES NOT
 A0723                                                                          W-MATRIX INITIAL       OVERWRITE W-MATRIX
  0724  REF   7  LAST   76     4744          V67FLBIT =       BIT8             VALUES                 INITIAL VALUES
 A0725
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A0726                                                BIT 7 FLAG 7     (S)
 0727                          0161     IDLEFLAG =   113D             NO DV MONITOR          CONNECT DV MONITOR
 0728   REF    9  LAST    76   4745     IDLEFBIT =   BIT7
A0729

A0730                                                BIT 6 FLAG 7     (S)
 0731                          0162     V37FLAG  =   114D             AVERAGEG (SERVICER) AVERAGEG (SERVICER)
 0732   REF    8  LAST    76   4746     V37FLBIT =   BIT6             RUNNING                OFF
A0733

A0734                                                BIT 5 FLAG 7     (S)
 0735                          0163     AVEGFLAG =   115D             AVERAGEG (SERVICER) AVERAGEG (SERVICER)
 0736   REF    6  LAST    73   4747     AVEGFBIT =   BIT5             DESIRED                NOT DESIRED
A0737

A0738                                                BIT 4 FLAG 7     (S)
 0739                          0164     UPLOCKFL =   116D             K-KBAR-K FAIL          NO K-KBAR-K FAIL
 0740   REF    6  LAST    75   4750     UPLOCBIT =   BIT4
A0741

A0742                                                BIT 3 FLAG 7     (S)
 0743                          0165     VERIFLAG =   117D             CHANGED WHEN V33E OCCURS AT END OF P27
 0744   REF    8  LAST    76   4751     VERIFBIT =   BIT3
A0745

A0746                                                BIT 2 FLAG 7     (L,C)
 0747                          0166     V82EMFLG =   118D             MOON VICINITY          EARTH VICINITY
 0748   REF    7  LAST    76   4752     V82EMBIT =   BIT2
A0749

A0750                                                BIT 1 FLAG 7     (S)
 0751                          0167     TFFSW    =   119D             CALCULATE TPERIGEE  CALCULATE TFF
 0752   REF    7  LAST    77   4753     TFFSWBIT =   BIT1
A0753

 0754   REF    9  LAST    77   0104     FLAGWRD8 =   STATE +8D        (120-134)

A0755                                                                 (SET)                  (RESET)

A0756                                                BIT 15 FLAG 8    (S)
 0757                          0170     RPQFLAG  =   120D             RPQ NOT COMPUTED       RPQ COMPUTED
A0758                                                                 (RPQ = VECTOR BE-
 0759   REF    7  LAST    77   4735     RPQFLBIT =   BIT15            TWEEN SECONDARY BODY
A0760                                                                 AND PRIMARY BODY
A0761

A0762                                                BIT 14 FLAG 8
A0763                                        =       121D
A0764                                        =       BIT14
A0765
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A0766                                                   BIT 13 FLAG 8   (S)
 0767                      0172        NEWIFLG  =       122D            FIRST PASS THROUGH  SUCCEEDING ITERATION
 0768   REF  10  LAST  77  4737        NEWIBIT  =       BIT13           INTEGRATION         OF INTEGRATION
A0769

A0770                                                   BIT 12 FLAG 8   *** PROTECTED FROM FRESH START ***
 0771                      0173        CMOONFLG =       123D            PERMANENT CSM STATE PERMANENT CSM STATE
 0772   REF   9  LAST  77  4740        CMOONBIT =       BIT12           IN LUNAR SPHERE     IN EARTH SPHERE
A0773

A0774                                                   BIT 11 FLAG 8   *** PROTECTED FROM FRESH START ***
 0775                      0174        LMOONFLG =       124D            PERMANENT LM STATE  PERMANENT LM STATE
 0776   REF   8  LAST  77  4741        LMOONBIT =       BIT11           IN LUNAR SPHERE     IN EARTH SPHERE
A0777

A0778                                                   BIT 10 FLAG 8   (L)
 0779                      0175        FLUNDISP =       125D            CURRENT GUIDANCE    CURRENT GUIDANCE
 0780   REF   9  LAST  77  4742        FLUNDBIT =       BIT10           DISPLAYS INHIBITED  DISPLAYS PERMITTED
A0781

A0782                                                   BIT 9 FLAG 8    (L)
 0783                      0176        P39/79SW =       126D            P39/79 OPERATING    P38/P78 OPERATING
 0784   REF   8  LAST  77  4743        P39SWBIT =       BIT9
A0785

A0786                                                   BIT 8 FLAG 8    *** PROTECTED FROM FRESH START ***
 0787                      0177        SURFFLAG =       127D            LM ON LUNAR SURFACE LM NOT ON LUNAR
 0788   REF   8  LAST  77  4744        SURFFBIT =       BIT8                                SURFACE
A0789

A0790                                                   BIT 7 FLAG 8    (S)
 0791                      0200        INFINFLG =       128D            NO CONIC SOLUTION   CONIC SOLUTION
A0792                                                                   (CLOSURE THROUGH    EXISTS
 0793   REF  10  LAST  76  4745        INFINBIT =       BIT7            INFINITY REQUIRED)
A0794

A0795                                                   BIT 6 FLAG 8    (S)
 0796                      0201        ORDERSW  =       129D            ITERATOR USES 2ND   ITERATOR USES 1ST
 0797   REF   9  LAST  78  4746        ORDERBIT =       BIT6            ORDER MINIMUM MODE  ORDER STANDARD MODE
A0798

A0799                                                   BIT 5 FLAG 8    (S)
 0800                      0202        APSESW   =       130D            RDESIRED OUTSIDE    RDESIRED INSIDE
A0801                                                                   PERICENTER-APOCENTERPERICENTER-APOCENTER
 0802   REF   7  LAST  78  4747        APSESBIT =       BIT5            RANGE IN TIME-RADI  RANGE IN TIME-RADIUS
A0803

A0804                                                   BIT 4 FLAG 8    (S)
 0805                      0203        COGAFLAG =       131D            NO CONIC SOLUTION - CONIC SOLUTION
A0806                                                                   TOO CLOSE TO RECTI- EXISTS(COGA DOES NOT
L       FLAGWORD ASSIGNMENTS                                                    USER'S PAGE NO.  20      EO S4

 0807   REF   7  LAST   78      4750          COGAFBIT =      BIT4          LINEAR(COGA OVRFLWS) OVERFLOW)
A0808

A0809                                                         BIT 3 FLAG 8
A0810                                                =        132D

A0811                                                         BIT 2 FLAG 8    (L)
 0812                           0205          INITALGN =      133D            INITIAL PASS THRU   SECOND PASS THRU P57
 0813   REF   8  LAST   78      4752          INITABIT =      BIT2            P57                (CHECK RESET-MILLARD)
A0814

A0815                                                         BIT 1 FLAG 8    (S)
 0816                           0206          360SW    =      134D            TRANSFER ANGLE NEAR TRANSFER ANGLE NOT
 0817   REF   8  LAST   78      4753          360SWBIT =      BIT1            360 DEGREES         NEAR 360 DEGREES
A0818

 0819   REF  10  LAST   78      0105          FLAGWRD9 =      STATE +9D       (135 - 149)

A0820                                                                         (SET)               (RESET)
A0821

A0822                                                         BIT 15 FLAG 9
A0823                                                =        135D
A08231                                               =        BIT15

A0824                                                         BIT 14 FLAG 9   (L)
 0825                           0210          FLVR     =      136D            VERTICAL RISE       NON-VERTICAL RISE
 0826   REF   8  LAST   77      4736          FLVRBIT  =      BIT14           (ASCENT GUIDANCE)
A0827

A0828                                                         BIT 13 FLAG 9
A0829                                                =        137D
A0830

A0831                                                         BIT 12 FLAG 9   (L)
 0832                           0212          FLPC     =      138D            NO POSITION CONTROL  POSITION CONTROL
 0833   REF  10  LAST   79      4740          FLPCBIT  =      BIT12           (ASCENT GUIDANCE)
A0834

A0835                                                         BIT 11 FLAG 9   (L)
 0836                           0213          FLPI     =      139D            PRE-IGNITION PHASE  REGULAR GUIDANCE
 0837   REF   9  LAST   79      4741          FLPIBIT  =      BIT11           (ASCENT GUIDANCE)
A0838

A0839                                                         BIT 10 FLAG 9   (L)
 0840                           0214          FLRCS    =      140D            RCS INJECTION MODE  MAIN ENGINE MODE
 0841   REF   9  LAST   79      4742          FLRCSBIT =      BIT10           (ASCENT GUIDANCE)
A0842

A0843                                                         BIT 9 FLAG 9    (L)
```

```
  0844                        0215      LETABORT =      141D          ABORT PROGRAMS      ABORT PROGRAMS
  0845  REF   9  LAST   79    4743      LETABBIT =      BIT9          ARE ENABLED         ARE NOT ENABLED
 A0846

 A0847                                                  BIT 8 FLAG 9  (L)
  0848                        0216      FLAP     =      142D          APS CONTINUED ABORT  APS ABORT IS NOT A
 A0849                                                                AFTER DPS STAGING   CONTINUATION
  0850  REF   9  LAST   79    4744      FLAPBIT  =      BIT8          (ASCENT GUIDANCE)
 A0851

 A0852                                                  BIT 7 FLAG 9  (L)
 A0853                                           =      143D

 A0854                                                  BIT 6 FLAG 9  (L)
  0855                        0220      ROTFLAG  =      144D          P70 AND P71 WILL    P70 AND P71 WILL NOT
  0856  REF  10  LAST   79    4746      ROTFLBIT =      BIT6          FORCE VEHICLE       FORCE VEHICLE
 A0857                                                                ROTATION IN THE     ROTATION IN THE
 A0858                                                                PREFERRED DIRECTION. PREFERRED DIRECTION

 A0859                                                  BIT 5 FLAG 9  (S)
  0860                        0221      QUITFLAG =      145D          DISCONTINUE INTEGR. CONTINUE INTEGRATION
  0861  REF   8  LAST   79    4747      QUITBIT  =      BIT5
 A0862

 A0863                                                  BIT 4 FLAG 9
 A0864                                           =      146D
 A0865                                           =      BIT4
 A0866

 A0867                                                  BIT 3 FLAG 9  (L)
  0868                        0223      MID1FLAG =      147D          INTEGRATE TO TDEC   INTEGRATE TO THE
  0869  REF   9  LAST   78    4751      MID1FBIT =      BIT3                              THEN-PRESENT TIME
 A0870

 A0871                                                  BIT 2 FLAG 9  (L)
  0872                        0224      MIDAVFLG =      148D          INTEGRATION ENTERED INTEGRATION WAS
 A0873                                                                FROM ONE OF MIDTOAV NOT ENTERED VIA
  0874  REF   9  LAST   80    4752      MIDAVBIT =      BIT2          PORTALS             MIDTOAV
 A0875
 A0876                                                  BIT 1 FLAG 9  (S)
  0877                        0225      AVEMIDSW =      149D          AVETOMID CALLING    NO AVETOMID W INTEGR
 A0878                                                                FOR W.MATRIX INTEGR ALLOW SET UP RN,VN,
  0879  REF      LAST   80    4753      AVEMDBIT =      BIT1          DONT WRITE OVER RN, PIPTIME
 A0880                                                                VN,PIPTIME

 A0881

  0882  REF   1               0106      RASFLAG  EQUALS FLGWRD10      WAS ONLY AN INSTALL- ERASTALL FLAG
 A0883
 0884  REF  11  LAST  80    0106        FLGWRD10 =    STATE +10D     (150 - 164)

A0885                                                                (SET)             (RESET)

A0886                                                 BIT 15 FLAG 10
A0887                                            =    150D
A0888

A0889                                                 BIT 14 FLAG 10 (L,C)
 0890                       0227        INTFLAG  =    151D           INTEGRATION IN    INTEGRATION NOT IN
 0891  REF   9  LAST  80    4736        INTFLBIT =    BIT14          PROGRESS          PROGRESS
A0892

A0893                                                 BIT 13 FLAG 10 (S,L)
 0894                       0230        APSFLAG  =    152D           ASCENT STAGE      DESCENT STAGE
 0895  REF  11  LAST  79    4737        APSFLBIT =    BIT13          ***PROTECTED FROM FRESH START ***
A0896

A0897                                                 BIT 12 FLAG 10
A0898                                            =    153D
A0899

A0900                                                 BIT 11 FLAG 10
A0901                                            =    154D
A0902

A0903                                                 BIT 10 FLAG 10
A0904                                            =    155D
A0905

A0906                                                 BIT  9 FLAG 10
A0907                                            =    156D
A0908

A0909                                                 BIT  8 FLAG 10
A0910                                            =    157D
A0911

A0912                                                 BIT 7 FLAG 10  (L,C)
 0913                       0236        REINTFLG =    158D           INTEGRATION ROUTINE INTEGRATION ROUTINE
 0914  REF  11  LAST  79    4745        REINTBIT =    BIT7           TO BE RESTARTED    NOT TO BE RESTARTED
A0915

A0916                                                 BIT  6 FLAG 10
A0917                                            =    159D
A0918

A0919                                                 BIT  5 FLAG 10
A0920                                            =    160D
A0921
```

```
A0922                                                  BIT  4 FLAG 10
A0923                                          =       161D
A0924

A0925                                                  BIT  3 FLAG 10
A0926                                          =       162D
A0927

A0928                                                  BIT  2 FLAG 10
A0929                                          =       163D
A0930

A0931                                                  BIT  1 FLAG 10
A0932                                          =       164D
A0933

A0934


 0935  REF  12  LAST   82     0107     FLGWRD11 =      STATE +11D      (165 - 179)

A0936                                                                  (SET)               (RESET)

A0937                                                  BIT 15 FLAG 11  (L)(R12)
 0938                         0245     LRBYPASS =      165D            BYPASS ALL LANDING  DO NOT BYPASS LR
 0939  REF   8  LAST   78     4735     LRBYBIT  =      BIT15           RADAR UPDATES       UPDATES
A0940

A0941                                                  BIT 14 FLAG 11
A0942                                          =       166D
A0943                                          =       BIT14
A0944

A0945                                          =       BIT 13 FLAG 11
A0946                                          =       167D
A0947                                          =       BIT13
A0948

A0949                                                  BIT 12 FLAG 11  (L)(R12)
 0950                         0250     VXINH    =      168D            IF Z VELOCITY DATA  UPDATE X AXIS
A0951                                                                  UNREASONABLE,       VELOCITY
 0952  REF  11  LAST   80     4740     VXINHBIT =      BIT12           BYPASS X VELOCITY
A0953                                                                  UPDATE ON NEXT PASS

A0954                                                  BIT 11 FLAG 11  (L)(R12)
 0955                         0251     PSTHIGAT =      169D            PAST HIGATE         PREHIGATE
 0956  REF  10  LAST   80     4741     PSTHIBIT =      BIT11
A0957

A0958                                                  BIT 10 FLAG 11  (L)(R12)
```

```
 0959                            0252         NOLRREAD  =      170D             LANDING RADAR        LR NOT REPOSITIONING
A0960                                                                           REPOSITIONING;
 0961   REF  10  LAST   80       4742         NOLRRBIT  =      BIT10            BYPASS UPDATE
A0962

A0963                                                          BIT 9 FLAG 11    (L)(R12)
 0964                            0253         XORFLG    =      171D             BELOW LIMIT          ABOVE LIMIT DO
A0965                                                                           INHIBIT X AXIS       NOT INHIBIT
 0966   REF  10  LAST   81       4743         XORFLBIT  =      BIT9             OVERRIDE
A0967

A0968                                                          BIT 8 FLAG 11
 0969                            0254         LRINH     =      172D             LANDING RADAR UP-    LR UPDATES INHIBITED
 0970   REF  10  LAST   81       4744         LRINHBIT  =      BIT8             DATES PERMITTED      BY ASTRONAUT
A0971                                                                           BY ASTRONAUT
A0972

A0973                                                          BIT 7 FLAG 11    (L)(R12)
 0974                            0255         VELDATA   =      173D             LR VELOCITY          LR VELOCITY MEASURE
 0975   REF  12  LAST   82       4745         VELDABIT  =      BIT7             MEASUREMENT MADE     NOT MADE
A0976

A0977                                                          BIT 6 FLAG 11    (L)(R12)
 0978                            0256         READLR    =      174D             OK TO READ LR        DO NOT READ LR RANGE
 0979   REF  11  LAST   81       4746         READLBIT  =      BIT6             RANGE DATA           DATA
A0980

A0981                                                          BIT 5 FLAG 11    (L)(R12)
 0982                            0257         READVEL   =      175D             OK TO READ LR        DO NOT READ LR
 0983   REF   9  LAST   81       4747         READVBIT  =      BIT5             VELOCITY DATA        VELOCITY DATA
A0984

A0985                                                          BIT 4 FLAG 11    (L)(R12)
 0986                            0260         RNGEDATA  =      176D             LR ALTITUDE          LR ALTITUDE MEASURE
 0987   REF   8  LAST   80       4750         RNGEDBIT  =      BIT4             MEASUREMENT MADE     NOT MADE
A0988

A0989                                                          BIT 3 FLAG 11
 0990                            0261         SCALBAD   =      177D             LR LOW SCALE DIS-    LR SCALE DISCRETE
 0991   REF  10  LAST   81       4751         SCABBIT   =      BIT3             CRETE NOT PRESENT    APPEARS OK
A0992                                                                           WHEN IT SHOULD BE
A0993

A0994                                                          BIT 2 FLAG 11    (L)(R12)
 0995                            0262         VFLSHFLG  =      178D             LR VELOCITY FAIL     LR VEL FAIL LAMP
 0996   REF  10  LAST   81       4752         VFLSHBIT  =      BIT2             LAMP SHOULD BE       SHOULDN'T FLASH
A0997                                                                           FLASHING
A0998

A0999                                                          BIT 1 FLAG 11    (L)(R12)
```

```
 1000                        0263          HFLSHFLG =         179D          LR ALTITUDE FAIL     LR ALTITUDE FAIL
 1001   REF  10  LAST   81   4753          HFLSHBIT =         BIT1          LAMP SHOULD BE       LAMP SHOULD NOT BE
A1002                                                                       FLASHING             FLASHING
A1003

 1004   REF   1              0110          RADMODES EQUALS FLGWRD12         RADAR FLAG WORD
A1005

 1006   REF  13  LAST   83   0110          FLGWRD12 =         STATE +12D    (180 - 194)      WAS RADMODES

A1007                                                                       (SET)                (RESET)

A1008                                                         BIT 15 FLAG 12
 1009                        0264          CDESFLAG =         180D          CONTINUOUS DESIG-    LGC CHECKS FOR LOCK-
 1010   REF   9  LAST   83   4735          CDESBIT  =         BIT15         NATE. LGC COMMANDS   ON WHEN ANTENNA
A1011                                                                       RR REGARDLESS OF     BEING DESIGNATED
A1012                                                                       LOCK-ON
A1013

A1014                                                         BIT 14 FLAG 12
 1015                        0265          REMODFLG =         181D          CHANGE IN ANTENNA    NO REMODE REQUESTED
 1016   REF  10  LAST   82   4736          REMODBIT =         BIT14         MODE BEEN REQUESTED OR OCCURRING
A1017                                                                       I.E., REMODE
A1018

A1019                                                         BIT 13 FLAG 12
 1020                        0266          RCDUOFLG =         182D          RR CDU'S BEING       RR CDU'S NOT BEING
 1021   REF  12  LAST   82   4737          RCDUOBIT =         BIT13         ZEROED               ZEROED
A1022

A1023                                                         BIT 12 FLAG 12
 1024                        0267          ANTENFLG =         183D          RR ANTENNA MODE IS   RR ANTENNA IN MODE 1
 1025   REF  12  LAST   83   4740          ANTENBIT =         BIT12         MODE 2
A1026

A1027                                                         BIT 11 FLAG 12
 1028                        0270          REPOSMON =         184D          REPOSITION MONITOR.  NO REPOSITION TAKING
 1029   REF  11  LAST   83   4741          REPOSBIT =         BIT11         RR REPOSITION IS     PLACE
A1030                                                                       TAKING PLACE
A1031

A1032                                                         BIT 10 FLAG 12
 1033                        0271          DESIGFLG =         185D          RR DESIGNATE         RR DESIGNATE NOT
 1034   REF  11  LAST   84   4742          DESIGBIT =         BIT10         REQUESTED OR IN      REQUESTED OR IN
A1035                                                                       PROGRESS             PROGRESS
A1036

A1037                                                         BIT 9 FLAG 12
 1038                        0272          ALTSCALE =         186D          LR ALTITUDE READING LR ALTITUDE READING
 1039   REF  11  LAST   84   4743          ALTSCBIT =         BIT9          IS ON HIGH SCALE     IS ON LOW SCALE
```

```
A1040

A1041                                              BIT 8 FLAG 12
 1042                     0273          LRVELFLG =     187D           LR VELOCITY DATA    NO LR VELOCITY DATA
 1043   REF  11  LAST  84 4744          LRVELBIT =     BIT8           FAIL                FAIL
A1044

A1045                                              BIT 7 FLAG 12
 1046                     0274          RCDUFAIL =     188D           RR CDU FAIL HAS     RR CDU FAIL OCCURRED
 1047   REF  13  LAST  84 4745          RCDUFBIT =     BIT7           NOT OCCURRED
A1048

A1049                                              BIT 6 FLAG 12
 1050                     0275          LRPOSFLG =     189D           LANDING RADAR       LR POSITION 1
 1051   REF  12  LAST  84 4746          LRPOSBIT =     BIT6           POSITION 2
A1052

A1053                                              BIT 5 FLAG 12
 1054                     0276          LRALTFLG =     190D           LR ALTITUDE DATA    NO LR ALTITUDE DATA
 1055   REF  10  LAST  84 4747          LRALTBIT =     BIT5           FAIL. COULD NOT BE  FAIL
A1056                                                                 READ SUCCESSFULLY.
A1057

A1058                                              BIT 4 FLAG 12
 1059                     0277          RRDATAFL =     191D           RR DATA FAIL.       NO RR DATA FAIL.
 1060   REF   9  LAST  84 4750          RRDATABT =     BIT4           DATA COULD NOT BE
A1061                                                                 READ SUCCESSFULLY
A1062

A1063                                              BIT 3 FLAG 12
 1064                     0300          RRRSFLAG =     192D           RR RANGE READING    RR RANGE READING ON
 1065   REF  11  LAST  84 4751          RRRSBIT  =     BIT3           ON THE HIGH SCALE   THE LOW SCALE
A1066

A1067                                              BIT 2 FLAG 12
 1068                     0301          AUTOMODE =     193D           RR NOT IN AUTO MODE.  RR IN AUTO MODE
 1069   REF  11  LAST  84 4752          AUTOMBIT =     BIT2           AUTO MODE DISCRETE
A1070                                                                 IS NOT PRESENT
A1071

A1072                                              BIT 1 FLAG 12
 1073                     0302          TURNONFL =     194D           RR TURN-ON SEQUENCE NO RR TURN-ON
 1074   REF  11  LAST  85 4753          TURNONBT =     BIT1           IN PROGRESS. (ZERO  SEQUENCE IN PROGRESS
A1075                                                                 CDU'S, FIX ANTENNA
A1076                                                                 MODE)
A1077

 1078   REF   1           0111          DAPBOOLS EQUALS FLGWRD13      DIGITAL AUTOPILOT FLAGWORD
A1079
```

```
 1080   REF  14  LAST   85     0111           FLGWRD13 =      STATE +13D       (195 - 209)     WAS DAPBOOLS

A1081                                                                          (SET)                (RESET)

A1082                                                         BIT 15 FLAG 13
 1083                          0303           PULSEFLG =      195D             MINIMUM IMPULSE      NOT IN MINIMUM
 1084   REF  10  LAST   85     4735           PULSES   =      BIT15            COMMAND MODE IN      IMPULSE COMMAND MODE
A1085                                                                          "ATT HOLD" (V76)     (V77)
A1086

A1087                                                         BIT 14 FLAG 13
 1088                          0304           USEQRFLG =      196D             GIMBAL UNUSABLE.     TRIM GIMBAL MAY BE
 1089   REF  11  LAST   85     4736           USEQRJTS =      BIT14            USE JETS ONLY.       USED.
A1090

A1091                                                         BIT 13 FLAG 13
 1092                          0305           CSMDKFLG =      197D             CSM DOCKED. USE      CSM NOT DOCKED TO LM
 1093   REF  13  LAST   85     4737           CSMDOCKD =      BIT13            BACKUP DAP
A1094

A1095                                                         BIT 12 FLAG 13
 1096                          0306           OURRCFLG =      198D             CURRENT DAP PASS     CURRENT DAP PASS IS
 1097   REF  13  LAST   85     4740           OURRCBIT =      BIT12            IS RATE COMMAND      NOT RATE COMMAND
A1098

A1099                                                         BIT 11 FLAG 13
 1100                          0307           ACC4-2FL =      199D             4 JET X-AXIS TRANS-  2 JET X-AXIS TRANS-
 1101   REF  12  LAST   85     4741           ACC4OR2X =      BIT11            LATION REQUESTED     LATION REQUESTED
A1102

A1103                                                         BIT 10 FLAG 13
 1104                          0310           AORBTFLG =      200D             B SYSTEM FOR X-      A SYSTEM FOR X-
 1105   REF  12  LAST   85     4742           AORBTRAN =      BIT10            TRANSLATION          TRANSLATION PREFER'D
A1106

A1107                                                         BIT 9 FLAG 13
 1108                          0311           XOVINFLG =      201D             X-AXIS OVERRIDE      X-AXIS OVERRIDE OKAY
 1109   REF  12  LAST   85     4743           XOVINHIB =      BIT9             LOCKED OUT
A1110

A1111                                                         BIT 8 FLAG 13
 1112                          0312           DRIFTDFL =      202D             ASSUME 0 OFFSET      USE OFFSET ACCELERA-
 1113   REF  12  LAST   86     4744           DRIFTBIT =      BIT8             DRIFTING FLIGHT.     TION ESTIMATE
A1114

A1115                                                         BIT 7 FLAG 13
 1116                          0313           RHCSCFLG =      203D             NORMAL RHC SCALING   FINE RHC SCALING
 1117   REF  14  LAST   86     4745           RHCSCALE =      BIT7             REQUESTED            REQUESTED
A1118
```

```
A1119                                                           BIT 6 FLAG 13
 1120                           0314            ULLAGFLG =      204D            ULLAGE REQUEST BY   NO INTERNAL ULLAGE
 1121   REF  13  LAST   86      4746            ULLAGER  =      BIT6            MISSION PROGRAM     REQUEST
A1122

A1123                                                           BIT 5 FLAG 13
 1124                           0315            AORBSFLG =      205D            P-AXIS COUPLES 7,15 P-AXIS COUPLES 4,12
 1125   REF  11  LAST   86      4747            AORBSYST =      BIT5            AND 8,16 PREFERRED  AND 3,11 PREFERRED
A1126

A1127                                                           BIT 4 FLAG 13
 1128                           0316            DBSELFLG =      206D            MAX DB SELECTED     MIN DB SELECTED BY
 1129   REF  10  LAST   86      4750            DBSELECT =      BIT4            BY CREW (5 DEG)     CREW  (0.3 DEG)
A1130

A1131                                                           BIT 3 FLAG 13
 1132                           0317            ACCOKFLG =      207D            CONTROL AUTHORITY   RESTART OR FRESH ST.
 1133   REF  12  LAST   86      4751            ACCSOKAY =      BIT3            VALUES FROM 1/ACCS  SINCE LAST 1/ACCS;
A1134                                                                           USABLE              OUTPUTS SUSPECT.
A1135

A1136                                                           BIT 2 FLAG 13
 1137                           0320            AUTR2FLG =      208D            THESE FLAGS ARE USED TOGETHER TO INDICAT
 1138   REF  12  LAST   86      4752            AUTRATE2 =      BIT2            ASTRONAUT-CHOSEN KALCMANU MANEUVER RATES
A1139                                                                           (0,0)=(BIT2,BIT1)= 0.2 DEG/SEC
A1140                                                                           (0,1)=  0.5 DEG/SEC
A1141                                                           BIT 1 FLAG 13
 1142                           0321            AUTR1FLG =      209D            (1,0)=  2.0 DEG/SEC
 1143   REF  12  LAST   86      4753            AUTRATE1 =      BIT1            (1,1)= 10.0 DEG/SEC
A1144
```

```
 0001                             0000                    SUBRO  LUMERASE  120
 0002  *                          0000                    SUBRO  AP11AID  001
 0003                             0000                    SUBRO  LEMP20S   127
 0004                             0000                    SUBRO  LEMP30S   103
 0005                             0000                    SUBRO  KISSING   050
 0006                             0000                    SUBRO  FLY       132
 0007                             0000                    SUBRO  LEMP50S   115
 0008                             0000                    SUBRO  SKIPPER   087
 0009                             0000                    SUBRO  LMDAP     015

*** END OF MAIN PROGRAM ***
```

```
R0001   CONVENTIONS AND NOTATIONS UTILIZED FOR ERASABLE ASSIGNMENTS.

R0002             EQUALS IS USED IN TWO WAYS.  IT IS OFTEN USED TO CHAIN A GROUP
R0003                  OF ASSIGNMENTS SO THAT THE GROUP MAY BE MOVED WITH THE
R0004                  CHANGING OF ONLY ONE CARD.  EXAMPLE.

A0005                                    X         EQUALS START
A0006                                    Y         EQUALS X          +SIZE.X
A0007                                    Z         EQUALS Y          +SIZE.Y

R0008                  (X, Y, AND Z ARE CONSECUTIVE AND BEGIN AT START.       )
R0009                  (SIZE.X AND SIZE.Y ARE THE RESPECTIVE SIZES OF X AND Y,
R0010                   USUALLY NUMERIC,  IE. 1, 2, 6, 18D ETC.               )


R0011             EQUALS OFTEN IMPLIES THE SHARING OF REGISTERS (DIFFERENT NAMES
R0012                  AND DIFFERENT DATA).  EXAMPLE.

A0013                                    X         EQUALS Y


R0014             = MEANS THAT MULTIPLE NAMES HAVE BEEN GIVEN TO THE SAME DATA.
R0015                  (THIS IS LOGICAL EQUIVALENCE, NOT SHARING)  EXAMPLE.

A0016                                    X         =       Y


R0017             THE SIZE AND UTILIZATION OF AN ERASABLE ARE OFTEN INCLUDED IN
R0018             THE COMMENTS IN THE FOLLOWING FORM.  M(SIZE)N.

R0019                  M REFERS TO THE MOBILITY OF THE ASSIGNMENT.
R0020                      B   MEANS THAT THE SYMBOL IS REFERENCED BY BASIC
R0021                          INSTRUCTIONS AND THUS IS E-BANK SENSITIVE.
R0022                      I   MEANS THAT THE SYMBOL IS REFERENCED ONLY BY
R0023                          INTERPRETIVE INSTRUCTIONS, AND IS THUS E-BANK
R0024                          INSENSITIVE AND MAY APPEAR IN ANY E-BANK.

R0025                  SIZE IS THE NUMBER OF REGISTERS INCLUDED BY THE SYMBOL.

R0026                  N INDICATES THE NATURE OR PERMANENCE OF THE CONTENTS.
R0027                      PL  MEANS THAT THE CONTENTS ARE PAD LOADED.
R0028                      DSP MEANS THAT THE REGISTER IS USED FOR A DISPLAY.
R0029                      PRM MEANS THAT THE REGISTER IS PERMANENT, IE. IT
R0030                          IS USED DURING THE ENTIRE MISSION FOR ONE
R0031                          PURPOSE AND CANNOT BE SHARED.
R0032                      TMP MEANS THAT THE REGISTER IS USED TEMPORARILY OR
R0033                          IS A SCRATCH REGISTER FOR THE ROUTINE TO WHICH
R0034                          IT IS ASSIGNED.  THAT IS, IT NEED NOT BE SET
R0035                          PRIOR TO INVOCATION OF THE ROUTINE NOR DOES IT
R0036                          CONTAIN USEFUL OUTPUT TO ANOTHER ROUTINE.  THUS
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R0037                            IT MAY BE SHARED WITH ANY OTHER ROUTINE WHICH
R0038                            IS NOT ACTIVE IN PARALLEL.
R0039                        IN  MEANS INPUT TO THE ROUTINE AND IT IS PROBABLY
R0040                            TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
R0041                        OUT MEANS OUTPUT FROM THE ROUTINE, PROBABLY
R0042                            TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
```

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P0043             SPECIAL REGISTERS.

 0044                        0000        A        EQUALS 0
 0045                        0001        L        EQUALS 1          L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0046                        0002        Q        EQUALS 2
 0047                        0003        EBANK    EQUALS 3
 0048                        0004        FBANK    EQUALS 4
 0049                        0005        Z        EQUALS 5          ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0050                        0006        BBANK    EQUALS 6          (DTCB) AND DXCH FBANK (DTCF).
A0051                                                               REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0052                        0010        ARUPT    EQUALS 10         INTERRUPT STORAGE.
 0053                        0011        LRUPT    EQUALS 11
 0054                        0012        QRUPT    EQUALS 12
 0055                        0013        SAMPTIME EQUALS 13         SAMPLED TIME 1 & 2.
 0056                        0015        ZRUPT    EQUALS 15         (13 AND 14 ARE SPARES.)
 0057                        0016        BANKRUPT EQUALS 16         USUALLY HOLDS FBANK OR BBANK.
 0058                        0017        BRUPT    EQUALS 17         RESUME ADDRESS AS WELL.

 0059                        0020        CYR      EQUALS 20
 0060                        0021        SR       EQUALS 21
 0061                        0022        CYL      EQUALS 22
 0062                        0023        EDOP     EQUALS 23         EDITS INTERPRETIVE OPERATION CODE PAIRS.


 0063                        0024        TIME2    EQUALS 24
 0064                        0025        TIME1    EQUALS 25
 0065                        0026        TIME3    EQUALS 26
 0066                        0027        TIME4    EQUALS 27
 0067                        0030        TIME5    EQUALS 30
 0068                        0031        TIME6    EQUALS 31
 0069                        0032        CDUX     EQUALS 32
 0070                        0033        CDUY     EQUALS 33
 0071                        0034        CDUZ     EQUALS 34
 0072                        0035        CDUT     EQUALS 35         REND RADAR TRUNNION CDU
 0073                        0036        CDUS     EQUALS 36         REND RADAR SHAFT CDU
 0074                        0037        PIPAX    EQUALS 37
 0075                        0040        PIPAY    EQUALS 40
 0076                        0041        PIPAZ    EQUALS 41
 0077                        0042        Q-RHCCTR EQUALS 42         RHC COUNTER REGISTERS
 0078                        0043        P-RHCCTR EQUALS 43
 0079                        0044        R-RHCCTR EQUALS 44
 0080                        0045        INLINK   EQUALS 45
 0081                        0046        RNRAD    EQUALS 46
 0082                        0047        GYROCMD  EQUALS 47
 0083                        0050        CDUXCMD  EQUALS 50
 0084                        0051        CDUYCMD  EQUALS 51
 0085                        0052        CDUZCMD  EQUALS 52
 0086                        0053        CDUTCMD  EQUALS 53         RADAR TRUNNION COMMAND
 0087                        0054        CDUSCMD  EQUALS 54         RADAR SHAFT COMMAND
 0088                    0055          THRUST   EQUALS 55
 0089                    0056          LEMONM   EQUALS 56
 0090                    0057          OUTLINK  EQUALS 57
 0091                    0060          ALTM     EQUALS 60


R0092          INTERPRETIVE REGISTERS ADDRESSED RELATIVE TO VAC AREA.

 0093                    0042          LVSQUARE EQUALS 34D              SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
 0094                    0044          LV       EQUALS 36D              LENGTH OF VECTOR INPUT TO UNIT.
 0095                    0046          X1       EQUALS 38D              INTERPRETIVE SPECIAL REGISTERS RELATIVE
 0096                    0047          X2       EQUALS 39D              TO THE WORK AREA.
 0097                    0050          S1       EQUALS 40D
 0098                    0051          S2       EQUALS 41D
 0099                    0052          QPRET    EQUALS 42D


R0100    INPUT/OUTPUT CHANNELS

A0101                                   *** CHANNEL ZERO IS TO BE USED IN AN INDEXED OPERATION ONLY. ***
 0102    REF    1        0001          LCHAN    EQUALS L
 0103    REF    1        0002          QCHAN    EQUALS Q
 0104                    0003          HISCALAR EQUALS 3
 0105                    0004          LOSCALAR EQUALS 4
 0106                    0005          CHAN5    EQUALS 5
 0107                    0006          CHAN6    EQUALS 6
 0108                    0007          SUPERBNK EQUALS 7                SUPER-BANK.
 0109                    0010          OUT0     EQUALS 10
 0110                    0011          DSALMOUT EQUALS 11
 0111                    0012          CHAN12   EQUALS 12
 0112                    0013          CHAN13   EQUALS 13
 0113                    0014          CHAN14   EQUALS 14
 0114                    0015          MNKEYIN  EQUALS 15
 0115                    0016          NAVKEYIN EQUALS 16
 0116                    0030          CHAN30   EQUALS 30
 0117                    0031          CHAN31   EQUALS 31
 0118                    0032          CHAN32   EQUALS 32
 0119                    0033          CHAN33   EQUALS 33
 0120                    0034          DNTM1    EQUALS 34
 0121                    0035          DNTM2    EQUALS 35
R0122    END OF CHANNEL ASSIGNMENTS
```

```
P0123   INTERPRETIVE SWITCH BIT ASSIGNMENTS
A0124

R0125                 **  FLAGWORDS AND BITS NOW ASSIGNED AND DEFINED IN THEIR OWN LOG SECTION.  **
```

```
P0127    GENERAL ERASABLE ASSIGNMENTS.

 0128                              0061                        SETLOC 61
R0129             INTERRUPT TEMPORARY STORAGE POOL.                                     (11D)

R0131                (ITEMP1 THROUGH RUPTREG4)

R0132             ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
R0134    IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

 0136                              0061      0061    ITEMP1    ERASE
 0137   REF    1                   0061              WAITEXIT  EQUALS ITEMP1
 0138   REF    2  LAST    95       0061              EXECTEM1  EQUALS ITEMP1

 0139                              0062      0062    ITEMP2    ERASE
 0140   REF    1                   0062              WAITBANK  EQUALS ITEMP2
 0141   REF    2  LAST    95       0062              EXECTEM2  EQUALS ITEMP2

 0142                              0063      0063    ITEMP3    ERASE
 0143   REF    1                   0063              RUPTSTOR  EQUALS ITEMP3
 0144   REF    2  LAST    95       0063              WAITADR   EQUALS ITEMP3
 0145   REF    3  LAST    95       0063              NEWPRIO   EQUALS ITEMP3

 0146                              0064      0064    ITEMP4    ERASE
 0147   REF    1                   0064              LOCCTR    EQUALS ITEMP4
 0148   REF    2  LAST    95       0064              WAITTEMP  EQUALS ITEMP4

 0149                              0065      0065    ITEMP5    ERASE
 0150   REF    1                   0065              NEWLOC    EQUALS ITEMP5

 0151                              0066      0066    ITEMP6    ERASE
A0152                                                NEWLOC+1  EQUALS ITEMP6            DP ADDRESS.

 0153                              0067                        SETLOC 67
 0154                              0067      0067    NEWJOB    ERASE                    MUST BE AT LOC 67 DUE TO WIRING.


 0155                              0070      0070    RUPTREG1  ERASE
 0156                              0071      0071    RUPTREG2  ERASE
 0157                              0072      0072    RUPTREG3  ERASE
 0158                              0073      0073    RUPTREG4  ERASE
 0159   REF    1                   0073              KEYTEMP1  EQUALS RUPTREG4
 0160   REF    2  LAST    95       0073              DSRUPTEM  EQUALS RUPTREG4

R0161             FLAGWORD RESERVATIONS.                                                (16D)

 0163                              0074      0113    STATE     ERASE           +15D    FLAGWORD REGISTERS.
A0164

R0165             P25 RADAR STORAGE.    (MAY BE UNSHARED IN E7)     (TEMP OVERLAY)      (2D)     OVERLAYS FLGWRD 14 & 15
```

```
L          ERASABLE ASSIGNMENTS                                                                        USER'S PAGE NO.    7        EO S4

 0167    REF  15  LAST    87         0112                LASTYCMD EQUALS STATE     +14D    B(1)PRM   THESE ARE CALLED BY T4RUPT
 0168    REF   1                     0113                LASTXCMD EQUALS LASTYCMD +1       B(1)PRM   THEY MUST BE CONTIGUOUS,Y FIRST
A0169


R0170                 EXEC TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOBS.  (32D) (INTB15+ THROUGH RUPTMXTM)
 0172                                0114       0114     INTB15+   ERASE                   REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 0173    REF   1                     0114                DSEXIT     =        INTB15+       RETURN FOR DSPIN
 0174    REF   2  LAST    96         0114                EXITEM     =        INTB15+       RETURN FOR SCALE FACTOR ROUTINE SELECT
 0175    REF   3  LAST    96         0114                BLANKRET  =        INTB15+        RETURN FOR 2BLANK

 0176                                0115       0115     INTBIT15  ERASE                   SIMILAR TO ABOVE.
 0177    REF   1                     0115                WEDRET     =        INTBIT15      RETURN FOR 5BLANK
 0178    REF   2  LAST    96         0115                WDRET      =        INTBIT15      RETURN FOR DSPWD
 0179    REF   3  LAST    96         0115                DECRET     =        INTBIT15      RETURN FOR PUTCOM(DEC LOAD)
 0180    REF   4  LAST    96         0115                21/22REG  =        INTBIT15       TEMP FOR CHARIN

R0181                 THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 0183                                0116       0116     ADDRWD    ERASE                   12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 0184                                0117       0117     POLISH    ERASE                   HOLDS CADR MADE FROM POLISH ADDRESS.
 0185    REF   1                     0117                UPDATRET  =         POLISH        RETURN FOR UPDATNN, UPDATVB
 0186    REF   2  LAST    96         0117                CHAR       =        POLISH        TEMP FOR CHARIN
 0187    REF   3  LAST    96         0117                ERCNT      =        POLISH        COUNTER FOR ERROR LIGHT RESET
 0188    REF   4  LAST    96         0117                DECOUNT    =        POLISH        COUNTER FOR SCALING AND DISPLAY (DEC)

 0189                                0120       0120     FIXLOC    ERASE                   WORK AREA ADDRESS.
 0190                                0121       0121     OVFIND    ERASE                   SET NON-ZERO ON OVERFLOW.

 0191                                0122       0127     VBUF      ERASE  +5               TEMPORARY STORAGE USED FOR VECTORS.
 0192    REF   1                     0122                SGNON      =        VBUF          TEMP FOR +,- ON
 0193    REF   2  LAST    96         0122                NOUNTEM    =        VBUF          COUNTER FOR MIXNOUN FETCH
 0194    REF   3  LAST    96         0122                DISTEM     =        VBUF          COUNTER FOR OCTAL DISPLAY VERBS
 0195    REF   4  LAST    96         0122                DECTEM     =        VBUF          COUNTER FOR FETCH (DEC DISPLAY VERBS)

 0196    REF   5  LAST    96         0123                SGNOFF     =        VBUF     +1   TEMP FOR +,- ON
 0197    REF   6  LAST    96         0123                NVTEMP     =        VBUF     +1   TEMP FOR NVSUB
 0198    REF   7  LAST    96         0123                SFTEMP1    =        VBUF     +1   STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
 0199    REF   8  LAST    96         0123                HITEMIN    =        VBUF     +1   TEMP FOR LOAD OF HRS, MIN, SEC
A0200                                                                                             MUST = LOTEMIN-1.
 0201    REF   9  LAST    96         0124                CODE       =        VBUF     +2   FOR DSPIN
 0202    REF  10  LAST    96         0124                SFTEMP2    =        VBUF     +2   STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
 0203    REF  11  LAST    96         0124                LOTEMIN    =        VBUF     +2   TEMP FOR LOAD OF HRS, MIN, SEC
A0204                                                                                             MUST = HITEMIN+1.
 0205    REF  12  LAST    96         0125                MIXTEMP    =        VBUF     +3   FOR MIXNOUN DATA
 0206    REF  13  LAST    96         0125                SIGNRET    =        VBUF     +3   RETURN FOR +,- ON

R0207    ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 0208                                0130       0132     BUF       ERASE  +2               TEMPORARY SCALAR STORAGE.
 0209                          0133     0134    BUF2      ERASE  +1
 0210   REF   1                0130             INDEXLOC  EQUALS BUF           CONTAINS ADDRESS OF SPECIFIED INDEX.
 0211   REF   2  LAST    97    0130             SWWORD    EQUALS BUF           ADDRESS OF SWITCH WORD.
 0212   REF   3  LAST    97    0131             SWBIT     EQUALS BUF +1        SWITCH BIT WITHIN SWITCH WORD.
 0213                          0135     0135    MPTEMP    ERASE                TEMPORARY USED IN MULTIPLY AND SHIFT.
 0214   REF   1                0135             DMPNTEMP  =      MPTEMP        DMPSUB TEMPORARY
 0215                          0136     0136    DOTINC    ERASE                COMPONENT INCREMENT FOR DOT SUBROUTINE.
 0216   REF   1                0136             DVSIGN    EQUALS DOTINC        DETERMINES SIGN OF DDV RESULT.
 0217   REF   2  LAST    97    0136             ESCAPE    EQUALS DOTINC        USED IN ARCSIN/ARCCOS.
 0218   REF   3  LAST    97    0136             ENTRET    =      DOTINC        EXIT FROM ENTER

 0219                          0137     0137    DOTRET    ERASE                RETURN FROM DOT SUBROUTINE.
 0220   REF   1                0137             DVNORMCT  EQUALS DOTRET        DIVIDEND NORMALIZATION COUNT IN DDV.
 0221   REF   2  LAST    97    0137             ESCAPE2   EQUALS DOTRET        ALTERNATE ARCSIN/ARCCOS SWITCH.
 0222   REF   3  LAST    97    0137             WDCNT     =      DOTRET        CHAR COUNTER FOR DSPWD
 0223   REF   4  LAST    97    0137             INREL     =      DOTRET        INPUT BUFFER SELECTOR ( X,Y,Z, REG )

 0224                          0140     0140    MATINC    ERASE                VECTOR INCREMENT IN MXV AND VXM.
 0225   REF   1                0140             MAXDVSW   EQUALS MATINC        +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
 0226   REF   2  LAST    97    0140             POLYCNT   EQUALS MATINC        POLYNOMIAL LOOP COUNTER
 0227   REF   3  LAST    97    0140             DSPMMTEM  =      MATINC        DSPCOUNT SAVE FOR DSPMM
 0228   REF   4  LAST    97    0140             MIXBR     =      MATINC        INDICATOR FOR MIXED OR NORMAL NOUN

 0229                          0141     0141    TEM1      ERASE                EXEC TEMP
 0230   REF   1                0141             POLYRET   =      TEM1
 0231   REF   2  LAST    97    0141             DSREL     =      TEM1          REL ADDRESS FOR DSPIN

 0232                          0142     0142    TEM2      ERASE                EXEC TEMP
 0233   REF   1                0142             DSMAG     =      TEM2          MAGNITUDE STORE FOR DSPIN
 0234   REF   2  LAST    97    0142             IDADDTEM  =      TEM2          MIXNOUN INDIRECT ADDRESS STORAGE

 0235                          0143     0143    TEM3      ERASE                EXEC TEMP
 0236   REF   1                0143             COUNT     =      TEM3          FOR DSPIN

 0237                          0144     0144    TEM4      ERASE                EXEC TEMP
 0238   REF   1                0144             LSTPTR    =      TEM4          LIST POINTER FOR GRABUSY
 0239   REF   2  LAST    97    0144             RELRET    =      TEM4          RETURN FOR RELDSP
 0240   REF   3  LAST    97    0144             FREERET   =      TEM4          RETURN FOR FREEDSP
 0241   REF   4  LAST    97    0144             DSPWDRET  =      TEM4          RETURN FOR DSPSIGN
 0242   REF   5  LAST    97    0144             SEPSCRET  =      TEM4          RETURN FOR SEPSEC
 0243   REF   6  LAST    97    0144             SEPMNRET  =      TEM4          RETURN FOR SEPMIN

 0244                          0145     0145    TEM5      ERASE                EXEC TEMP
 0245   REF   1                0145             NOUNADD   =      TEM5          TEMP STORAGE FOR NOUN ADDRESS

 0246                          0146     0146    NNADTEM   ERASE                TEMP FOR NOUN ADDRESS TABLE ENTRY
 0247                          0147     0147    NNTYPTEM  ERASE                TEMP FOR NOUN TYPE TABLE ENTRY
 0248                          0150     0150    IDADITEM  ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0249                                                                          MUST = IDAD2TEM-1, = IDAD3TEM-2.
 0250                          0151     0151    IDAD2TEM  ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
```

```
A0251                                                                          MUST = IDAD1TEM+1, = IDAD3TEM-1.
 0252                         0152      0152   IDAD3TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0253                                                                          MUST = IDAD1TEM+2, = IDAD2TEM+1.
 0254                         0153      0153   RUTMXTEM ERASE                  TEMP FOR SF FOUT TABLE ENTRY(MIXNN ONLY)

R0255             AX*SR*T STORAGE.                                             (6D)

 0257   REF   3  LAST   97    0142             DEXDEX   EQUALS TEM2            B(1)TMP
 0258   REF   2  LAST   97    0143             DEX1     EQUALS TEM3            B(1)TMP
 0259   REF   7  LAST   97    0144             DEX2     EQUALS TEM4            B(1)TMP
 0260   REF   2  LAST   97    0145             RTNSAVER EQUALS TEM5            B(1)TMP
 0261   REF   1               0157             TERM1TMP EQUALS MPAC +3         B(2)TMP

 0262   REF   1               0143             DEXI     =      DEX1


R0263             THE FOLLOWING 10 REGISTERS ARE USED FOR TEMPORARY STORAGE OF THE DERIVATIVE COEFFICIENT TABLE OF
R0265   SUBROUTINE ROOTPSRS.   THEY MUST REMAIN WITHOUT INTERFERENCE WITH ITS SUBROUTINES WHICH ARE POWRSERS (POLY),
R0267   DMPSUB, DMPNSUB, SHORTMP, DDV/BDDV, ABS, AND USPRCADR.

 0268   REF   2  LAST   98    0142             DERCOF-8 =      MPAC      -12   ROOTPSRS DER COF N-4 HI ORDER
 0269   REF   3  LAST   98    0143             DERCOF-7 =      MPAC      -11   ROOTPSRS DER COF N-4 LO ORDER
 0270   REF   4  LAST   98    0144             DERCOF-6 =      MPAC      -10   ROOTPSRS DER COF N-3 HI ORDER
 0271   REF   5  LAST   98    0145             DERCOF-5 =      MPAC      -7    ROOTPSRS DER COF N-3 LO ORDER
 0272   REF   6  LAST   98    0146             DERCOF-4 =      MPAC      -6    ROOTPSRS DER COF N-2 HI ORDER
 0273   REF   7  LAST   98    0147             DERCOF-3 =      MPAC      -5    ROOTPSRS DER COF N-2 LO ORDER
 0274   REF   8  LAST   98    0150             DERCOF-2 =      MPAC      -4    ROOTPSRS DER COF N-1 HI ORDER
 0275   REF   9  LAST   98    0151             DERCOF-1 =      MPAC      -3    ROOTPSRS DER COF N-1 LO ORDER
 0276   REF  10  LAST   98    0152             DERCOFN  =      MPAC      -2    ROOTPSRS DER COF N HI ORDER
 0277   REF  11  LAST   98    0153             DERCOF+1 =      MPAC      -1    ROOTPSRS DER COF N LO ORDER

 0278   REF   5  LAST   96    0117             PWRPTR   =      POLISH          ROOTPSRS POWER TABLE POINTER
 0279   REF  14  LAST   96    0124             DXCRIT   =      VBUF      +2    ROOTPSRS CRITERION FOR ENDING ITERS HI
 0280   REF  15  LAST   98    0125             DXCRIT+1 =      VBUF      +3    ROOTPSRS CRITERION FOR ENDING ITERS LO
 0281   REF  16  LAST   98    0126             ROOTPS   =      VBUF      +4    ROOTPSRS ROOT HI ORDER
 0282   REF  17  LAST   98    0127             ROOTPS+1 =      VBUF      +5    ROOTPSRS ROOT LO ORDER
 0283   REF   4  LAST   97    0132             RETROOT  =      BUF       +2    ROOTPSRS RETURN ADDRESS OF USER
 0284   REF   5  LAST   97    0140             PWRCNT   =      MATINC          ROOTPSRS DER TABLE LOOP COUNTER
 0285   REF   3  LAST   97    0141             DERPTR   =      TEM1            ROOTPSRS DER TABLE POINTER
A0286
```

```
P0287             DYNAMICALLY ALLOCATED CORE SETS FOR JOBS.                                (84D)

 0289                              0154      0162    MPAC      ERASE   +6                  MULTI-PURPOSE ACCUMULATOR.
 0290                              0163      0163    MODE      ERASE                       +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 0291                              0164      0164    LOC       ERASE                       LOCATION ASSOCIATED WITH JOB.
 0292                              0165      0165    BANKSET   ERASE                       USUALLY CONTAINS BBANK SETTING.
 0293                              0166      0166    PUSHLOC   ERASE                       WORD OF PACKED INTERPRETIVE PARAMETERS.
 0294                              0167      0167    PRIORITY  ERASE                       PRIORITY OF PRESENT JOB AND WORK AREA.

 0295                              0170      0313              ERASE   +83D                EIGHT SETS OF  12 REGISTERS EACH
A0296

R0297    INCORP STORAGE: R22 (N29)     (SHARES WITH FOLLOWING SECTION)                     (4D)

 0299    REF    1                  0314              R22DISP   EQUALS  TIME2SAV            I(4) N49 DISPLAY OF DELTA R AND DELTA V
A0300

R0301    STANDBY VERB ERASABLES.  REDOCTR BEFORE THETADS.                                  (14D)

 0303                              0314      0315    TIME2SAV  ERASE   +1
 0304                              0316      0317    SCALSAVE  ERASE   +1
 0305                              0320      0320    REDOCTR   ERASE                       CONTAINS NUMBER OF RESTARTS
 0306                              0321      0323    THETAD    ERASE   +2
 0307    REF    1                  0321              CPHI      =       THETAD              O   DESIRED GIMBAL ANGLES
 0308    REF    2  LAST    99      0322              CTHETA    =       THETAD +1           I   FOR
 0309    REF    3  LAST    99      0323              CPSI      =       THETAD +2           M   MANEUVER.
 0310                              0324      0331    DELV      ERASE   +5
 0311    REF    1                  0324              DELVX     =       DELV
 0312    REF    2  LAST    99      0326              DELVY     =       DELV  +2
 0313    REF    3  LAST    99      0330              DELVZ     =       DELV  +4
A0314

R0315             DOWNLINK STORAGE.                                                        (28D)

 0317    REF    1                  0332              DNLSTADR  EQUALS  DNLSTCOD

 0318                              0332      0332    DNLSTCOD  ERASE                       B(1)PRM DOWNLINK LIST CODE
 0319                              0333      0333    DUMPCNT   ERASE                       B(1)
 0320                              0334      0365    LDATALST  ERASE             +25D      (26D)
 0321    REF    1                  0335              DNTMGOTO  EQUALS  LDATALST +1         B(1)
 0322    REF    1                  0336              TMINDEX   EQUALS  DNTMGOTO +1         B(1)
 0323    REF    1                  0336              DUMPLOC   EQUALS  TMINDEX             CONTAINS ECADR OF AGC DP WORD BEING DUMP
A0324                                                                                      ED AND COUNT OF COMPLETE DUMPS ALREADY S
A0325                                                                                      ENT.
 0326    REF    2  LAST    99      0337              DNQ       EQUALS  TMINDEX  +1         B(1)
 0327    REF    1                  0340              DNTMBUFF  EQUALS  DNQ      +1         B(22)PRM DOWNLINK SNAPSHOT BUFFER

R0328             UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.                               (10D) FIVE MORE IN EBANK 2
```

```
 0330                           0366    0366    RESTREG  ERASE                  B(1)PRM FOR DISPLAY RESTARTS
 0331                           0367    0367    NVWORD   ERASE
 0332                           0370    0370    MARKNV   ERASE
 0333                           0371    0371    NVSAVE   ERASE
R0334                     (RETAIN THE ORDER OF CADRFLSH TO FAILREG +2 FOR DOWNLINK PURPOSES)
 0336                           0372    0372    CADRFLSH ERASE
 0337                           0373    0373    CADRMARK ERASE
 0338                           0374    0374    TEMPFLSH ERASE
 0339                           0375    0377    FAILREG  ERASE            +2    B(3)PRM  3 ALARM CODE REGISTERS

R0340              VAC AREAS. -BE CAREFUL OF PLACEMENT-                         (220D)

 0342                           0400    0400    VAC1USE  ERASE
 0343                          (0401    0453    VAC1     ERASE  +42D
 0344                           0454    0454    VAC2USE  ERASE
 0345                          (0455    0527    VAC2     ERASE  +42D
 0346                           0530    0530    VAC3USE  ERASE
 0347                          (0531    0603    VAC3     ERASE  +42D
 0348                           0604    0604    VAC4USE  ERASE
 0349                          (0605    0657    VAC4     ERASE  +42D
 0350                           0660    0660    VAC5USE  ERASE
 0351                           0661    0733    VAC5     ERASE  +42D


R0352              WAITLIST REPEAT FLAG.                                        (1D)

 0354                           0734    0734    RUPTAGN  ERASE
 0355   REF    1                0734            KEYTEMP2 =      RUPTAGN         TEMP FOR KEYRUPT, UPRUPT
A0356


R0357              STARALIGN ERASABLES.                                         (13D)

 0359                           0735    0735    STARCODE ERASE                   (1)
 0360   REF    1                0735            AOTCODE  =      STARCODE
 0361                           0736    0751    STARALGN ERASE  +11D
 0362   REF    1                0736            SINCDU   =      STARALGN
 0363   REF    2  LAST   100    0744            COSCDU   =      STARALGN +6

 0364   REF    1                0742            SINCDUX  =      SINCDU   +4
 0365   REF    2  LAST   100    0736            SINCDUY  =      SINCDU
 0366   REF    3  LAST   100    0740            SINCDUZ  =      SINCDU   +2
 0367   REF    1                0750            COSCDUX  =      COSCDU   +4
 0368   REF    2  LAST   100    0744            COSCDUY  =      COSCDU
 0369   REF    3  LAST   100    0746            COSCDUZ  =      COSCDU   +2

R0370              PHASE TABLE AND RESTART COUNTERS.                            (12D)

 0372                           0752    0752    -PHASE1  ERASE
```

660

313

314

170

124

314

```
 0373                         0753      0753     PHASE1    ERASE
 0374                         0754      0754     -PHASE2   ERASE
 0375                         0755      0755     PHASE2    ERASE
 0376                         0756      0756     -PHASE3   ERASE
 0377                         0757      0757     PHASE3    ERASE
 0378                         0760      0760     -PHASE4   ERASE
 0379                         0761      0761     PHASE4    ERASE
 0380                         0762      0762     -PHASE5   ERASE
 0381                         0763      0763     PHASE5    ERASE
 0382                         0764      0764     -PHASE6   ERASE
 0383                         0765      0765     PHASE6    ERASE

R0384             A**SR*T STORAGE.                                          (6D)

 0386                         0766      0773     CDUSPOT   ERASE  +5        B(6)

 0387  REF   1                0766               CDUSPOTY  =      CDUSPOT
 0388  REF   2  LAST  101     0770               CDUSPOTZ  =      CDUSPOT +2
 0389  REF   3  LAST  101     0772               CDUSPOTX  =      CDUSPOT +4

R0390             VERB 37 STORAGE.                                          (2D)

 0392                         0774      0774     MINDEX    ERASE            B(1) TMP INDEX FOR MAJOR MODE
 0393                         0775      0775     MMNUMBER  ERASE            B(1) TMP MAJOR MODE REQUESTED BY V37

R0394             PINBALL INTERRUPT ACTION.                                 (1D)

 0396                         0776      0776     DSPCNT    ERASE            B(1)PRM COUNTER FOR DSPOUT.

R0397             PINBALL EXECUTIVE ACTION                                  (44D)

 0399                         0777      0777     DSPCOUNT  ERASE            DISPLAY POSITION INDICATOR.
 0400                         1000      1000     DECBRNCH  ERASE            +DEC, - DEC, OCT INDICATOR
 0401                         1001      1001     VERBREG   ERASE            VERB CODE
 0402                         1002      1002     NOUNREG   ERASE            NOUN CODE
 0403                         1003      1003     XREG      ERASE            R1 INPUT BUFFER
 0404                         1004      1004     YREG      ERASE            R2 INPUT BUFFER
 0405                         1005      1005     ZREG      ERASE            R3 INPUT BUFFER
 0406                         1006      1006     XREGLP    ERASE            LO PART OF XREG (FOR DEC CONV ONLY)
 0407                         1007      1007     YREGLP    ERASE            LO PART OF YREG (FOR DEC CONV ONLY)
 0408  REF   1                1007               HITEMOUT  =      YREGLP    TEMP FOR DISPLAY OF HRS, MIN, SEC
A0409                                                                                  MUST = LOTEMOUT-1.
 0410                         1010      1010     ZREGLP    ERASE            LO PART OF ZREG (FOR DEC CONV ONLY)
 0411  REF   1                1010               LOTEMOUT  =      ZREGLP    TEMP FOR DISPLAY OF HRS, MIN, SEC
A0412                                                                                  MUST = HITEMOUT+1.
 0413                         1011      1011     MODREG    ERASE            MODE CODE
```

```
  0414                   1012     1012    DSPLOCK  ERASE                     KEYBOARD/SUBROUTINE CALL INTERLOCK
  0415                   1013     1013    REQRET   ERASE                     RETURN REGISTER FOR LOAD
  0416                   1014     1014    LOADSTAT ERASE                     STATUS INDICATOR FOR LOADTST
  0417                   1015     1015    CLPASS   ERASE                     PASS INDICATOR CLEAR
  0418                   1016     1016    NOUT     ERASE                     ACTIVITY COUNTER FOR DSPTAB
  0419                   1017     1017    NOUNCADR ERASE                     MACHINE CADR FOR NOUN
  0420                   1020     1020    MONSAVE  ERASE                     N/V CODE FOR MONITOR. (= MONSAVE1-1)
  0421                   1021     1021    MONSAVE1 ERASE                     NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
  0422                   1022     1022    MONSAVE2 ERASE                     NVMONOPT OPTIONS
  0423                   1023     1036    DSPTAB   ERASE   +11D              0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
  0424                   1037     1037    NVQTEM   ERASE                     NVSUB STORAGE FOR CALLING ADDRESS
 A0425                                                                       MUST = NVBNKTEM-1
  0426                   1040     1040    NVBNKTEM ERASE                     NVSUB STORAGE FOR CALLING BANK
 A0427                                                                       MUST = NVQTEM+1
  0428                   1041     1041    VERBSAVE ERASE                     NEEDED FOR RECYCLE
  0429                   1042     1042    CADRSTOR ERASE                     ENDIDLE STORAGE
  0430                   1043     1043    DSPLIST  ERASE                     WAITING REG FOR DSP SYST INTERNAL USE
  0431                   1044     1044    EXTVBACT ERASE                     EXTENDED VERB ACTIVITY INTERLOCK
  0432                   1045     1047    DSPTEM1  ERASE          +2         BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
  0433                   1050     1052    DSPTEM2  ERASE          +2         BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)

  0434   REF    1        1051             DSPTEMX  EQUALS DSPTEM2  +1        B(2) S-S DISPLAY BUFFER FOR EXT. VERBS
  0435   REF    1        1045             NORMTEM1 EQUALS DSPTEM1            B(3)DSP NORMAL DISPLAY REGISTERS.
 A0436

 R0437             DISPLAY FOR EXTENDED VERBS (V82, R04(V62), V41(N72) )     (2D)

  0439   REF    1        1051             OPTIONX  EQUALS DSPTEMX            (2) EXTENDED VERB OPTION CODE
 A0440

 R0441             TBASES AND PHSPRDT S.                                     (12D)

  0443                   1053     1053    TBASE1   ERASE
  0444                   1054     1054    PHSPRDT1 ERASE
  0445                   1055     1055    TBASE2   ERASE
  0446                   1056     1056    PHSPRDT2 ERASE
  0447                   1057     1057    TBASE3   ERASE
  0448                   1060     1060    PHSPRDT3 ERASE
  0449                   1061     1061    TBASE4   ERASE
  0450                   1062     1062    PHSPRDT4 ERASE
  0451                   1063     1063    TBASE5   ERASE
  0452                   1064     1064    PHSPRDT5 ERASE
  0453                   1065     1065    TBASE6   ERASE
  0454                   1066     1066    PHSPRDT6 ERASE

 R0455             UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.                (6D)
 0457                          1067      1067    NVWORD1  ERASE                          B(1)PROBABLY FOR DISPLAY DURING SERVICER
 0458                          1070      1070    EBANKSAV ERASE
 0459                          1071      1071    MARKEBAN ERASE
 0460                          1072      1072    EBANKTEM ERASE
 0461                          1073      1073    MARK2PAC ERASE
 0462                          1074      1074    R1SAVE   ERASE


R0463               IMU COMPENSATIO  UNSWITCHED ERASABLE.                               (1D)

 0465                          1075      1075    1/PIPADT ERASE
A0466

R0467               SINGLE PRECISION SUBROUTINE TEMPORARIES.                            (2D)

 0469                          1076      1076    TEMK     ERASE                          (1)
 0470                          1077      1077    SQ       ERASE                          (1)
A0471

R0472               UNSWITCHED RADAR ERASABLE                                           (13D)

 0474                          1100      1100    SAMPLIM  ERASE
 0475                          1101      1104    SAMPLSUM ERASE  +3
 0476                          1105      1106    TIMEHOLD ERASE  +1
 0477    REF    1              1101              RRTARGET EQUALS SAMPLSUM                HALF U IT VECTOR IN SM OR NB AXES.
 0478                          1107      1110    TANG     ERASE  +1                      DESIRE  TRUNNION AND SHAFT ANGLES.
 0479    REF    1              1107              MODEA    EQUALS TANG
 0480                          1111      1112    MODEB    ERASE  +1                      DODES  LOBBERS TANG +2.
 0481    REF    1              1111              NSAMP    EQUALS MODEB
 0482                          1113      1113    DESRET   ERASE
 0483    REF    1              1113              OLDATAGD EQUALS DESRET                  USED I  DATA READING ROUTINES.
 0484                          1114      1114    DESCOUNT ERASE


R0485               ******    P22    ******                                             (6D)

 0487    REF    1              1101              RSUBC    EQUALS RRTARGET                I(6)S-S  CSM POSITION VECTOR
A0488
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P0489                UNSWITCHED FOR ORBIT INTEGRATION.                                 (21D)

 0491                        1115     1141   TDEC      ERASE   +20D                    I(2)
 0492   REF    1             1117            COLREG    EQUALS TDEC       +2            I(1)
 0493   REF    1             1120            LAT       EQUALS COLREG     +1            I(2)
 0494   REF    1             1122            LONG      EQUALS LAT        +2            I(2)
 0495   REF    1             1124            ALT       EQUALS LONG       +2            I(2)
 0496   REF    1             1126            YV        EQUALS ALT        +2            I(6)
 0497   REF    1             1134            ZV        EQUALS YV         +6            I(6)
A0498

R0499                MISCELLANEOUS UNSWITCHED.                                         (20D)

 0501                        1142     1142   P40/RET   ERASE                           (WILL BE PUT IN E6 WHEN THERE IS ROOM)
 0502                        1143     1143   GENRET    ERASE                           B(1)  R61 RETURN CADR.
 0503                        1144     1144   OPTION1   ERASE                           B(1)   NOUN 06 USES THIS
 0504                        1145     1145   OPTION2   ERASE                           B(1)   NOUN 06 USES THIS
 0505                        1146     1146   OPTION3   ERASE                           B(1)  NOUN 06 USES THIS
 0506                        1147     1150   LONGCADR  ERASE   +1                      B(2)  LONGCALL REGISTER
 0507                        1151     1152   LONGBASE  ERASE   +1
 0508                        1153     1154   LONGTIME  ERASE   +1                      B(2)     LONGCALL REGISTER
 0509                        1155     1155   CDUTEMPX  ERASE                           B(1)TMP
 0510                        1156     1156   CDUTEMPY  ERASE                           B(1)TMP
 0511                        1157     1157   CDUTEMPZ  ERASE                           B(1)TMP
 0512                        1160     1160   PIPATMPX  ERASE                           B(1)TMP
 0513                        1161     1161   PIPATMPY  ERASE                           B(1)TMP
 0514                        1162     1162   PIPATMPZ  ERASE                           B(1)TMP

 0515                        1163     1163   DISPDEX   ERASE                           B(1)
 0516                        1164     1164   TEMPR60   ERASE                           B(1)
 0517                        1165     1165   PRIOTIME  ERASE                           B(1)


R0518   P27  (UPDATE PROGRAM ) STORAGE.                                                (26D)

 0520                        1166     1166   UPVERBSV  ERASE                           B(1) UPDATE VERB ATTEMPTED.
 0521                        1167     1217   UPTEMP    ERASE   +24D                    B(1)TMP SCRATCH
 0522   REF    1             1167            INTWAK1Q  EQUALS UPTEMP                       (BORROWS UPTEMP REGISTERS)
R0523   RETAIN THE ORDER OF COMPNUMB THRU UPBUFF +19D FOR DOWNLINK PURPOSES.
 0524   REF    2  LAST  104  1170            COMPNUMB  EQUALS UPTEMP     +1            B(1)TMP NUMBER OF ITEMS TO BE UPLINKED
 0525   REF    1             1171            UPOLDMOD  EQUALS COMPNUMB   +1            B(1)TMP INTERRUPTED PROGRAM MM
 0526   REF    1             1172            UPVERB    EQUALS UPOLDMOD   +1            B(1)TMP VERB NUMBER
 0527   REF    1             1173            UPCOUNT   EQUALS UPVERB     +1            B(1)TMP UPBUFF INDEX
 0528   REF    1             1174            UPBUFF    EQUALS UPCOUNT    +1            B(20D)
A0529

R0530                SPECIAL DEFINITION FOR SYSTEM TEST ERASABLE PGMS.                 (2D)

 0532   REF    3  LAST  104  1167            EBUF2     EQUALS UPTEMP                   B(2) FOR EXCLUSIVE USE OF SYSTEM TEST
A0533
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R0534          PERM STATE VECTORS FOR BOOST AND DOWNLINK-WHOLE MISSION- (14D)

 0536                        1220    1225  RN       ERASE  +5             B(6)PRM
 0537                        1226    1233  VN       ERASE  +5             B(6)PRM
 0538                        1234    1235  PIPTIME  ERASE           +1    B(2)PRM  (MUST BE FOLLOWED BY GDT/2)


R0539          SERVICER   -MUST FOLLOW PIPTIME-                         (19D)

 0541                        1236    1261  GDT/2    ERASE           +19D  B(6)TMP (MUST FOLLOW PIPTIME)
 0542  REF   1               1244          MASS     EQUALS GDT/2    +6    B(2)
 0543  REF   1               1244          WEIGHT/G =      MASS
 0544  REF   2 LAST 105      1246          ABDELV   EQUALS MASS     +2    ALCMANU STORAGE)
 0546  REF   1               1247          PGUIDE   EQUALS ABDELV   +1    (2)
 0547  REF   1               1251          DVTHRUSH EQUALS PGUIDE   +2    (1)
 0548  REF   1               1252          AVEGEXIT EQUALS DVTHRUSH +1     (2)
 0549  REF   1               1252          AVGEXIT  =      AVEGEXIT
 0550  REF   2 LAST 105      1254          TEMX     EQUALS AVEGEXIT +2     (1)
 0551  REF   1               1255          TEMY     EQUALS TEMX     +1     (1)
 0552  REF   1               1256          TEMZ     EQUALS TEMY     +1     (1)
 0553  REF   1               1257          PIPAGE   EQUALS TEMZ +1        B(1)
 0554  REF   1               1260          OUTROUTE EQUALS PIPAGE   +1    B(1)

A0555


R0556          PERMANENT LEM DAP STORAGE.                               (12D)

 0558                        1262    1262  CH5MASK  ERASE                 B(1)PRM
 0559                        1263    1263  CH6MASK  ERASE                 B(1)PRM JET FAILURE MASK.
 0560                        1264    1271  DTHETASM ERASE  +5              (6)
 0561                        1272    1272  SPNDX    ERASE                 B(1)
 0562                        1273    1273  RCSFLAGS ERASE                 AUTOPILOT FLAG WORD
A0563                                                                     BIT ASSIGNMENTS:
A0564                                                                      1) ALTERYZ SWITCH  (ZEROOR1)
A0565                                                                      2) NEEDLER SWITCH
A0566                                                                      3) NEEDLER SWITCH
A0567                                                                      4) NEEDLER SWITCH
A0568                                                                      5) NEEDLER SWITCH
A0569                                                                      9) JUST-IN-DETENT SWITCH
A0570                                                                     10) PBIT - MANUAL CONTROL SWITCH
A0571                                                                     11) QRBIT - MANUAL CONTROL SWITCH
A0572                                                                     12) PSKIP CONTROL (PJUMPADR)
A0573                                                                     13) 1/ACCJOB CONTROL (ACCSET)
 0574                        1274    1275  T5ADR    ERASE  +1             GENADR OF NEXT LM DAP T5RUPT. * 2CADR *
A0575                                                                     BBCON  OF NEXT LM DAP T5RUPT.   2CADR

R05751 *       ERASABLES FOR P64:  OVERLAY OF DTHETASM, WHICH IS UNUSED (4D)
 05753 *REF   1              1264          ZERLINA  EQUALS DTHETASM       B(1)    P64
 05754 *REF    1               1265            ELVIRA   EQUALS ZERLINA  +1      B(1)     P64
 05755 *REF    1               1266            AZINCR1  EQUALS ELVIRA   +1      B(1)     P64
 05756 *REF    1               1267            ELINCR1  EQUALS AZINCR1  +1      B(1)     P64
A05757 *

R0576              RCS FAILURE MONITOR STORAGE.                                 (1)

 0578                          1276     1276   PVALVEST ERASE                   B(1) PRM

R0579              KALCMANU/DAP INTERFACE.                                      (3D)

 0581                          1277     1277   DELPEROR ERASE                   B(1)PRM COMMAND LAGS.
 0582                          1300     1300   DELQEROR ERASE                   B(1)PRM
 0583                          1301     1301   DELREROR ERASE                   B(1)PRM

R0584              MODE SWITCHING ERASABLE.                                     (9D)

R0586         RETAIN THE ORDER OF IMODES30 AND IMODES33 FOR DOWNLINK PURPOSES.
 0587                          1302     1302   IMODES30 ERASE                   B(1)
 0588                          1303     1303   IMODES33 ERASE
 0589                          1304     1306   MODECADR ERASE  +2               B(3)PRM
 0590    REF   1               1304            IMUCADR  EQUALS MODECADR
 0591    REF   2  LAST   106   1305            OPTCADR  EQUALS MODECADR +1
 0592    REF   3  LAST   106   1306            RADCADR  EQUALS MODECADR +2
 0593                          1307     1311   ATTCADR  ERASE  +2               B(3)PRM
 0594    REF   1               1311            ATTPRIO  =      ATTCADR  +2
 0595                          1312     1312   MARKSTAT ERASE

R0596              T4RUPT ERASABLE.                                             (2D)

 0598                          1313     1313   DSRUPTSW ERASE
 0599                          1314     1314   LGYRO    ERASE                   (1)

R0600              RENDEZVOUS RADAR TASK STORAGE                                (3D)

 0602                          1315     1317   RRRET    ERASE           +2D     B(1)TMP  P20'S, PERHAPS R29 & R12
 0603    REF   1               1316            RDES     EQUALS RRRET    +1      B(1)TMP
 0604    REF   1               1317            RRINDEX  EQUALS RDES     +1      B(1)TMP
A0605

R0606              MEASINC                                                      (4D)

 0608                          1320     1320   WIXA     ERASE                   B(1)
 0609                          1321     1321   WIXB     ERASE                   B(1)
 0610                          1322     1322   ZIXA     ERASE                   B(1)
 0611                          1323     1323   ZIXB     ERASE                   B(1)
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R0612             AGS DUMMY ID WORD.                                        (1D)

 0614                        1324     1324   AGSWORD  ERASE


R0615             SOME MISCELLANEOUS UNSWITCHED.                            (6D)

 0617                        1325     1325   RATEINDX ERASE                  (1)    USED BY KALCMANU
 0618                        1326     1330   DELAYLOC ERASE   +2
 0619                        1331     1331   LEMMASS  ERASE                 KEEP CONTIGUOUS W.  CSMMASS  (1)EACH
 0620                        1332     1332   CSMMASS  ERASE
R0621    LESS IS MORE.

R0622             RENDEZVOUS AND LANDING RADAR DOWNLINK STORAGE.            (7D)

R0624                  (NORMALLY USED DURING P20, BUT MAY ALSO)
R0625                  (BE REQUIRED FOR THE V62 SPURIOUS TEST.)

R0626                               (PLEASE KEEP IN THIS ORDER)

 0627                        1333     1341   DNRRANGE ERASE             +6  B(1) TMP
 0628    REF    1            1334            DNRRDOT  EQUALS DNRRANGE +1    B(1)TMP
 0629    REF    1            1335            DNINDEX  EQUALS DNRRDOT  +1    B(1)TMP
 0630    REF    1            1336            DNLRVELX EQUALS DNINDEX  +1    B(1)TMP
 0631    REF    1            1337            DNLRVELY EQUALS DNLRVELX +1    B(1)TMP
 0632    REF    1            1340            DNLRVELZ EQUALS DNLRVELY +1    B(1)TMP
 0633    REF    1            1341            DNLRALT  EQUALS DNLRVELZ +1    B(1) TMP

R0634             INCORPORATION UNSWITCHED.                                 (2D)

 0636    REF    2  LAST  105  1257           W.IND    EQUALS PIPAGE         B(1)
 0637    REF    1            1260            W.IND1   EQUALS W.IND    +1    I(1)


R0638             SUBROUTINE BALLANGS OF R60.                               (1D)

 0640                        1342     1342   BALLEXIT ERASE                 B(1)SAVE LOCATION FOR BALLINGS SUBR EXIT


R0641             SOME LEM DAP STORAGE.                                     (4D)

 0643                        1343     1343   DAPDATR1 ERASE                 B(1)DSP  DAP CONFIG.
 0644                        1344     1345   TEVENT   ERASE             +1  B(2)DSP
 0645                        1346     1346   DB       ERASE                 B(1)TMP  DEAD BAND.
A0646


R0647             NOUN 87                                                   (2D)

 0649                        1347     1350   AZ       ERASE      +1D        B(1)  AZ AND EL MUST BE CONTIGUOUS
 0650    REF    1                 1350                EL        EQUALS AZ +1D              B(1)
A0651

R0652                P63, P64, P65, P66, AND P67.                                          (1D)
 0654                             1351      1351      WCHPHASE ERASE                       B(1)
A0655

R06552  ERASABLES FOR THE R2 LUNAR POTENTIAL MODEL                                         (2D)

 06556                            1352      1352      E3J22R2M ERASE                       I(1)
 06558                            1353      1353      E32C31RM ERASE                       I(1)
A06559

 065591*                          1354      1355      RADSKAL  ERASE  +1                   LR ALT DOPPLER BIAS : 2T/LAMBDA SCALED
A065592*                                                                                       AT 1/(2(7) M/CS)
 065593*                          1356      1356      SKALSKAL ERASE                       LR ALT SCALE FACTOR RATIO :  .2 NOM

 0656                             1357                END-UE   EQUALS                      NEXT UNUSED UE ADDRESS


R0657                SELF-CHECK ASSIGNMENTS.                                               (17D)

R0659                                         (DO NOT MOVE, S-C IS ADDRESS SENSITIVE)

 0660                             1357      1377      SELFERAS ERASE  1357 - 1377          *** MUST NOT BE MOVED ***
 0661    REF    1                 1357                SFAIL    EQUALS SELFERAS             B(1)
 0662    REF    1                 1360                ERESTORE EQUALS SFAIL     +1         B(1)
 0663    REF    1                 1361                SELFRET  EQUALS ERESTORE +1          B(1)     RETURN
 0664    REF    1                 1362                SMODE    EQUALS SELFRET   +1         B(1)
 0665    REF    1                 1363                ALMCADR  EQUALS SMODE     +1         B(2)    ALARM-ABORT USER'S 2CADR
 0666    REF    1                 1365                ERCOUNT  EQUALS ALMCADR   +2         B(1)
 0667    REF    1                 1366                SCOUNT   EQUALS ERCOUNT   +1         B(3)
 0668    REF    1                 1371                SKEEP1   EQUALS SCOUNT    +3         B(1)
 0669    REF    1                 1372                SKEEP2   EQUALS SKEEP1    +1         B(1)
 0670    REF    1                 1373                SKEEP3   EQUALS SKEEP2    +1         B(1)
 0671    REF    1                 1374                SKEEP4   EQUALS SKEEP3    +1         B(1)
 0672    REF    1                 1375                SKEEP5   EQUALS SKEEP4    +1         B(1)
 0673    REF    1                 1376                SKEEP6   EQUALS SKEEP5    +1         B(1)
 0674    REF    1                 1377                SKEEP7   EQUALS SKEEP6    +1         B(1)
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P0675                     EBANK-3 ASSIGNMENTS

 0676                          E3,1400                     SETLOC 1400

R0677               WAITLIST TASK LISTS.                                        (26D)

 0679                          E3,1400  E3,1407   LST1      ERASE  +7           B(8D)PRM  DELTA T S.
 0680                          E3,1410  E3,1431   LST2      ERASE  +17D         B(18D)PRM TASK 2CADR ADDRESSES.

R0681               RESTART STORAGE.                                            (2D)

 0683                          E3,1432  E3,1433   RSBBQ     ERASE  +1           B(2)PRM SAVE BB AND Q FOR RESTARTS.

R0684               MORE LONGCALL STORAGE.(MUST BE IN LST1 S BANK.              (2D)

 0686                          E3,1434  E3,1435   LONGEXIT ERASE  +1            B(2)TMP MAY BE SELDOM OVERLAYED.

R0687               PHASE-CHANGE LISTS PART II.                                 (12D)

 0689                          E3,1436  E3,1436   PHSNAME1 ERASE                B(1)PRM
 0690                          E3,1437  E3,1437   PHSBB1    ERASE               B(1)PRM
 0691                          E3,1440  E3,1440   PHSNAME2 ERASE                B(1)PRM
 0692                          E3,1441  E3,1441   PHSBB2    ERASE               B(1)PRM
 0693                          E3,1442  E3,1442   PHSNAME3 ERASE                B(1)PRM
 0694                          E3,1443  E3,1443   PHSBB3    ERASE               B(1)PRM
 0695                          E3,1444  E3,1444   PHSNAME4 ERASE                B(1)PRM
 0696                          E3,1445  E3,1445   PHSBB4    ERASE               B(1)PRM
 0697                          E3,1446  E3,1446   PHSNAME5 ERASE                B(1)PRM
 0698                          E3,1447  E3,1447   PHSBB5    ERASE               B(1)PRM
 0699                          E3,1450  E3,1450   PHSNAME6 ERASE                B(1)PRM
 0700                          E3,1451  E3,1451   PHSBB6    ERASE               B(1)PRM

R0701               IMU COMPENSATION PARAMETERS.                                (22D)

 0703                          E3,1452  E3,1452   PBIASX    ERASE               B(1)    PIPA BIAS, PIPA SCALE FACTR TERMS
 0704      REF    1            E3,1452            PIPABIAS  =       PBIASX          INTERMIXED.
 0705                          E3,1453  E3,1453   PIPASCFX  ERASE
 0706      REF    1            E3,1453            PIPASCF   =       PIPASCFX
 0707                          E3,1454  E3,1454   PBIASY    ERASE
 0708                          E3,1455  E3,1455   PIPASCFY  ERASE
 0709                          E3,1456  E3,1456   PBIASZ    ERASE
 0710                          E3,1457  E3,1457   PIPASCFZ  ERASE

 0711                          E3,1460  E3,1460   NBDX      ERASE               GYRO BIAS DRIFTS
 0712                          E3,1461  E3,1461   NBDY      ERASE
 0713                          E3,1462  E3,1462   NBDZ      ERASE
 0714                    E3,1463  E3,1463   ADIAX     ERASE                            ACCELERATION SENSITIVE DRIFT ALONG THE
 0715                    E3,1464  E3,1464   ADIAY     ERASE                                INPUT AXIS
 0716                    E3,1465  E3,1465   ADIAZ     ERASE

 0717                    E3,1466  E3,1466   ADSRAX    ERASE                            ACCELERATION SENSITIVE DRIFT ALONG THE
 0718                    E3,1467  E3,1467   ADSRAY    ERASE                                SPIN REFERENCE AXIS
 0719                    E3,1470  E3,1470   ADSRAZ    ERASE

 0720                    E3,1471  E3,1476   GCOMP     ERASE   +5                       CONTAINS COMPENSATING TORQUES

 0721    REF   1         E3,1471            COMMAND   EQUALS GCOMP
 0722    REF   2  LAST  110  E3,1474        CDUIND    EQUALS GCOMP       +3


 0723                    E3,1477  E3,1477   GCOMPSW   ERASE
A0724

R0725           STATE VECTORS FOR ORBIT INTEGRATION.                                   (44D)

R0727                                  (DIFEQCNT THRU XKEP MUST BE IN SAME
R0728                                   EBANK AS RRECTCSM, RRECTLEM ETC
R0729                                   BECAUSE THE COPY-CYCLES (ATOPCSM,
R0730                                   PTOACSM ETC) ARE EXECUTED IN BASIC.
R0731                                     ALL OTHER REFERENCES TO THIS GROUP
R0732                                   ARE BY INTERPRETIVE INSTRUCTIONS.)

 0733                    E3,1500  E3,1553   DIFEQCNT  ERASE   +43D                     B(1)
R0734                                  (UPSVFLAG...XKEP MUST BE KEPT IN ORDER)

 0735    REF   1         E3,1501            UPSVFLAG  EQUALS DIFEQCNT +1               B(1)
 0736    REF   1         E3,1502            RRECT     EQUALS UPSVFLAG +1               B(6)
 0737    REF   1         E3,1510            VRECT     EQUALS RRECT    +6               B(6)
 0738    REF   1         E3,1516            TET       EQUALS VRECT    +6               B(2)
 0739    REF   1         E3,1520            TDELTAV   EQUALS TET      +2               B(6)
 0740    REF   1         E3,1526            TNUV      EQUALS TDELTAV  +6               B(6)
 0741    REF   1         E3,1534            RCV       EQUALS TNUV     +6               B(6)
 0742    REF   1         E3,1542            VCV       EQUALS RCV      +6               B(6)
 0743    REF   1         E3,1550            TC        EQUALS VCV      +6               B(2)
 0744    REF   1         E3,1552            XKEP      EQUALS TC       +2               B(2)

R0745           PERMANENT STATE VECTORS AND TIMES.                                     (99D)

R0747           (DO NOT OVERLAY WITH ANYTHING AFTER BOOST)

R0748           (RRECTCSM ...XKEPCSM MUST BE KEPT IN THIS ORDER)

 0749                    E3,1554  E3,1561   RRECTCSM  ERASE   +5                       B(6)PRM CSM VARIABLES.
 0750    REF   1         E3,1554            RRECTOTH  =       RRECTCSM
 0751                    E3,1562  E3,1567   VRECTCSM  ERASE   +5                       B(6)PRM
 0752                      E3,1570  E3,1571   TETCSM    ERASE  +1              B(2)PRM
 0753   REF    1           E3,1570            TETOTHER  =      TETCSM
 0754                      E3,1572  E3,1577   DELTACSM  ERASE  +5              B(6)PRM
 0755                      E3,1600  E3,1605   NUVCSM    ERASE  +5              B(6)PRM
 0756                      E3,1606  E3,1613   RCVCSM    ERASE  +5              B(6)PRM
 0757                      E3,1614  E3,1621   VCVCSM    ERASE  +5              B(6)PRM
 0758                      E3,1622  E3,1623   TCCSM     ERASE  +1              B(2)PRM
 0759                      E3,1624  E3,1625   XKEPCSM   ERASE  +1              B(2)PRM

R0760            (RRECTLEM ...XKEPLEM MUST BE KEPT IN THIS ORDER)

 0761                      E3,1626  E3,1633   RRECTLEM  ERASE  +5              B(6)PRM LEM VARIABLES
 0762   REF    1           E3,1626            RRECTHIS  =      RRECTLEM
 0763                      E3,1634  E3,1641   VRECTLEM  ERASE  +5              B(6)PRM
 0764                      E3,1642  E3,1643   TETLEM    ERASE  +1              B(2)PRM
 0765   REF    1           E3,1642            TETTHIS   =      TETLEM
 0766                      E3,1644  E3,1651   DELTALEM  ERASE  +5              B(6)PRM
 0767                      E3,1652  E3,1657   NUVLEM    ERASE  +5              B(6)PRM
 0768                      E3,1660  E3,1665   RCVLEM    ERASE  +5              B(6)PRM
 0769                      E3,1666  E3,1673   VCVLEM    ERASE  +5              B(6)PRM
 0770                      E3,1674  E3,1675   TCLEM     ERASE  +1              B(2)PRM
 0771                      E3,1676  E3,1677   XKEPLEM   ERASE  +1              B(2)PRM

 0772                      E3,1700  E3,1705   X789      ERASE  +5
 0773                      E3,1706  E3,1710   TEPHEM    ERASE  +2
 0774                      E3,1711  E3,1712   AZO       ERASE  +1
 0775                      E3,1713  E3,1714   -AYO      ERASE          +1
 0776                      E3,1715  E3,1716   AXO       ERASE          +1
A0777


R0778            STATE VECTORS FOR DOWNLINK.                           (12D)

 0780                      E3,1717  E3,1724   R-OTHER   ERASE  +5              B(6)PRM POS VECT (OTHER VECH) FOR DNLINK
 0781                      E3,1725  E3,1732   V-OTHER   ERASE  +5              B(6)PRM VEL VECT (OTHER VECH) FOR DNLINK

 0782   REF    2 LAST  111 E3,1570            T-OTHER   =      TETCSM                  TIME (OTHER VECH) FOR DNLINK

R0783            REFSMMAT.                                             (18D)

 0785                      E3,1733  E3,1754   REFSMMAT  ERASE  +17D            I(18D)PRM

R0786            ACTIVE VEHICLE CENTANG. MUST BE DISPLAYED ANYTIME (ALMOST.)  (2D)

 0788                      E3,1755  E3,1756   ACTCENT   ERASE          +1      I(2) S-S CENTRAL ANGLE BETWEEN ACTIVE
A0789                                                                           VEHICLE AT TPI TIG AND TARGET VECTOR.

R0790          **** USED IN CONICSEX (PLAN INERT ORIENT) ****
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 0791    REF   1                E3,1706             TIMSUBO   EQUALS TEPHEM            CSEC B-42 (TRIPLE PRECISION)
A0792

R0793              LPS20.1 STORAGE    -ALL ARE PRM -                                    (9D)

 0795                           E3,1757  E3,1757    LS21X     ERASE                    I(1)
 0796                           E3,1760  E3,1765    LOSVEL    ERASE   +5               I(6)
 0797                           E3,1766  E3,1767    MLOSV     ERASE   +1               I(2) MAGNITUDE OF LOS, METERS B-29
A0798

R0799           ***** P22   *****  (OVERLAYS LPS 20.1 STORAGE)                          (6D)
 0801    REF   1                E3,1760             VSUBC     EQUALS LOSVEL            I(6)S-S  CSM VELOCITY VECTOR
A0802

R0803              PADLOADED ERASABLES FOR P20/P22                                      (6D)

 0805                           E3,1770  E3,1771    RANGEVAR  ERASE   +1               I(2) RR RANGE ERROR VARIANCE
 0806                           E3,1772  E3,1773    RATEVAR   ERASE   +1               I(2) RR RANGE-RATE ERROR VARIANCE
 0807                           E3,1774  E3,1774    RVARMIN   ERASE                    I(1) MINIMUM RANGE ERROR VARIANCE
 0808                           E3,1775  E3,1775    VVARMIN   ERASE                    I(1) MINIMUM RANGE-RATE ERROR VARIANCE
A0809

R0810              P32-P33 STORAGE                                                      (2D)

 0812                           E3,1776  E3,1777    TCDH      ERASE   +1               I(2) T2 CDH TIME IN CS. (ALSO DOWNLINKED

 0814                           E3,1777             END-E3    EQUALS 1777              ** LAST LOCATION USED IN E3 **
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P0815                     EBANK-4 ASSIGNMENTS

 0816                           E4,1400                     SETLOC 2000

R0817    E4 IS, FOR THE MOST PART RESERVED FOR PAD LOADED AND UNSHARABLE ERASE.

 0818                           E4,1400            AMEMORY  EQUALS

R0819           P20 STORAGE. -PAD LOADED-                                               (6D)

 0821                           E4,1400  E4,1400   WRENDPOS ERASE                         B(1)PL                          KM*2(-7)
 0822                           E4,1401  E4,1401   WRENDVEL ERASE                         B(1)PL                    KM(-1/2)*2(11)
 0823                           E4,1402  E4,1402   WSHAFT   ERASE                         B(1)PL                          KM*2(-7)
 0824                           E4,1403  E4,1403   WTRUN    ERASE                         B(1)PL                          KM*2(-7)
 0825                           E4,1404  E4,1404   RMAX     ERASE                         B(1)PL                    METERS*2(-19)
 0826                           E4,1405  E4,1405   VMAX     ERASE                         B(1)PL                     M/CSEC*2(-7)

R0827           LUNAR SURFACE NAVIGATION                                                (2D)

 0829                           E4,1406  E4,1406   WSURFPOS ERASE                         B(1)PL
 0830                           E4,1407  E4,1407   WSURFVEL ERASE                         B(1)PL
A0831

R0832           P22 STORAGE. -PAD LOADED-                                               (2D)

 0834                           E4,1410  E4,1410   SHAFTVAR ERASE                         B(1)PL                      RAD SQ*2(12)
 0835                           E4,1411  E4,1411   TRUNVAR  ERASE                         B(1)PL                      RAD SQ*2(10)

R0836           CONISEX STORAGE.-PAD LOADED-                                            (6D)

 0838                           E4,1412  E4,1417   504LM    ERASE               +5        I(6)MOON LIBRATION VECTOR
A0839

R0840           V47(R47) AGS INITIALIZATION STORAGE. -PAD LOADED-                       (2D)

 0842                           E4,1420  E4,1421   AGSK     ERASE               +1

R0843           LUNAR LANDING STORAGE. -PAD LOADED-                                     (6D)

 0845                           E4,1422  E4,1427   RLS      ERASE               +5        I(6) LANDING SITE VECTOR -MOON REF
A0846

R0847           INTEGRATION STORAGE.                                                    (102D)

 0849                           E4,1430  E4,1575   PBODY    ERASE               +101D     I(1)
 0850   REF   1              E4,1431          ALPHAV    EQUALS PBODY     +1      I(6)
 0851   REF   1              E4,1437          BETAV     EQUALS ALPHAV    +6      I(6)
 0852   REF   1              E4,1445          PHIV      EQUALS BETAV     +6      I(6)
 0853   REF   1              E4,1453          PSIV      EQUALS PHIV      +6      I(6)
 0854   REF   1              E4,1461          FV        EQUALS PSIV      +6      I(6)     PERTURBING ACCELERATIONS
 0855   REF   1              E4,1467          ALPHAM    EQUALS FV        +6      I(2)
 0856   REF   1              E4,1471          BETAM     EQUALS ALPHAM    +2      I(2)
 0857   REF   1              E4,1473          TAU.      EQUALS BETAM     +2      I(2)
 0858   REF   1              E4,1475          DT/2      EQUALS TAU.      +2      I(2)
 0859   REF   1              E4,1477          H         EQUALS DT/2      +2      I(2)
 0860   REF   1              E4,1501          GMODE     EQUALS H         +2      I(1)
 0861   REF   1              E4,1502          IRETURN   EQUALS GMODE     +1      I(1)
 0862   REF   1              E4,1503          NORMGAM   EQUALS IRETURN   +1      I(1)
 0863   REF   1              E4,1504          RPQV      EQUALS NORMGAM   +1
 0864   REF   1              E4,1512          ORIGEX    EQUALS RPQV      +6      I(1)
 0865   REF   1              E4,1512          KEPRTN    EQUALS ORIGEX            I(1)
 0866   REF   2  LAST   114  E4,1513          RQVV      EQUALS ORIGEX    +1      I(6)
 0867   REF   1              E4,1521          RPSV      EQUALS RQVV      +6      I(6)
 0868   REF   1              E4,1527          XKEPNEW   EQUALS RPSV      +6      I(2)
 0869   REF   1              E4,1531          VECTAB    EQUALS XKEPNEW   +2      I(36D)
 0870   REF   1              E4,1574          VECTABND  EQUALS VECTAB    +35D    END MARK
A0871

R0872            THESE PROBABLY CAN SHARE MID-COURSE VARIABLES.                 (6D)

 0874   REF   2  LAST   114  E4,1537          VACX      EQUALS VECTAB    +6      I(2)
 0875   REF   1              E4,1541          VACY      EQUALS VACX      +2      I(2)
 0876   REF   1              E4,1543          VACZ      EQUALS VACY      +2      I(2)

R0877            SERVICER STORAGE  (USED BY ALL POWERED FLIGHT PROGS.)          (18D)

 0879   REF   3  LAST   114  E4,1545          XNBPIP    EQUALS VECTAB    +12D    I(6)
 0880   REF   1              E4,1553          YNBPIP    EQUALS XNBPIP    +6      I(6)
 0881   REF   1              E4,1561          ZNBPIP    EQUALS YNBPIP    +6      I(6)
A0882

R0883            SOME VERB 82 STORAGE                                           (4D)

 0885   REF   2  LAST   114  E4,1517          HAPOX     EQUALS RQVV      +4      I(2)
 0886   REF   1              E4,1521          HPERX     EQUALS HAPOX     +2      I(2)
A0887

R0888            V82 STORAGE                                                    (6D)

 0890   REF   4  LAST   114  E4,1567          VONE'     EQUALS VECTAB    +30D    I(6)TMP  NORMAL VELOCITY VONE /SQRT. MU
A0891

R0892            R31(V83) STORAGE. -SHARES WITH INTEGRATION STORAGE-            (28D)
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 0894    REF   2  LAST  114   E4,1504                BASETHV  EQUALS RQVV            I(6)     BASE VEL VECTOR THIS VEH
A0895

 0896    REF   3  LAST  114   E4,1513                BASETIME EQUALS RQVV            I(2)     TIME ASSOC WITH BASE VECS
 0897    REF   4  LAST  115   E4,1515                ORIG     EQUALS RQVV      +2    I(1)     =0 FOR EARTH =2 FOR MOON
 0898    REF   5  LAST  115   E4,1516                STATEXIT EQUALS RQVV      +3    I(1)     STQ ADDRESS FOR STATEXTP
 0899    REF   6  LAST  115   E4,1517                BASEOTV  EQUALS RQVV      +4    I(6)     BASE VEL VECTOR OTHER VEH
A0900

 0901    REF   5  LAST  114   E4,1537                BASEOTP  EQUALS VECTAB    +6    I(6)     BASE POS VECTOR OTHER VEH
A0902

 0903    REF   6  LAST  115   E4,1567                BASETHP  EQUALS VECTAB    +30D  I(6)     BASE POS VECTOR THIS VEH
A0904

R0905            KEPLER STORAGE. (KEPLER IS CALLED BY PRECISION INTEGRATION AND (2D)
R0907            CONICS)

 0908                         E4,1576  E4,1577   EPSILONT ERASE  +1              I(2)
A0909

R0910            VERB 83 STORAGE.                                                (18D)

 0912                         E4,1600  E4,1621   RANGE    ERASE            +17D  I(2)DSP NOUN 54 DISTANCE TO OPTICAL SUBJ
 0913    REF   1              E4,1602            RRATE    EQUALS RANGE     +2    I(2)DSP NOUN 54 RATE OF APPROACH.
 0914    REF   1              E4,1604            RTHETA   EQUALS RRATE     +2    I(2)DSP NOUN 54.
 0915    REF   1              E4,1606            RONE     EQUALS RTHETA    +2    I(6)TMP VECTOR STORAGE.  (SCRATCH)
 0916    REF   1              E4,1614            VONE     EQUALS RONE      +6    I(6)TMP VECTOR STORAGE.  (SCRATCH)

R09165           VERB 67 STORAGE

 0917    REF   2  LAST  115   E4,1600            WWPOS    =      RANGE           NOUN 99 (V67)
 0918    REF   2  LAST  115   E4,1602            WWVEL    =      RRATE           NOUN 99 (V67)
 09185   REF   2  LAST  115   E4,1604            WWBIAS   =      RTHETA          NOUN 99 (V67)
R0919            V82 STORAGE. (CANNOT OVERLAY RONE OR VONE)                      (11D) TWO SEPARATE LOCATIONS

 0921    REF   7  LAST  115   E4,1537            V82FLAGS EQUALS VECTAB    +6     (1) FOR V82 BITS.
 0922    REF   1              E4,1540            TFF      EQUALS V82FLAGS  +1    I(2)
 0923    REF   1              E4,1542            -TPER    EQUALS TFF       +2    I(2)
A0924

 0925    REF   3  LAST  115   E4,1600            HPERMIN  EQUALS RANGE           I(2) SET TO 300KFT OR 35KFT FOR SR30.1
 0926    REF   1              E4,1602            RPADTEM  EQUALS HPERMIN   +2    I(2) PAD OR LANDING RADIUS FOR SR30.1
 0927    REF   1              E4,1604            TSTART82 EQUALS RPADTEM   +2    I(2) TEMP TIME STORAGE FOR V82.
A0928

R0929            VARIOUS DISPLAY REGISTERS                                       (6D)     NCUN 84; P76
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 0931                      E4,1622  E4,1627   DELVOV    ERASE              +5D      (6)
A0932


R0933               ALIGNMENT PLANETARY-INERTIAL TRANSFORMATION STORAGE.           (18D)

R0935                         UNSHARED WHILE LM ON LUNAR SURFACE.

 0936                      E4,1630  E4,1651   GSAV      ERASE              +17D    I(6)
 0937     REF   1          E4,1636            YNBSAV    EQUALS GSAV        +6      I(6)
 0938     REF   1          E4,1644            ZNBSAV    EQUALS YNBSAV      +6      I(6)
A0939


R0940               KALCMANU STORAGE. CAN OVERLAY GSAV.                            (18D)

 0942     REF   2 LAST  116 E4,1630          MFS       EQUALS GSAV                I(18)
 0943     REF   1          E4,1630           MFI       EQUALS MFS                 I
 0944     REF   2 LAST  116 E4,1630          KEL       EQUALS MFS                 I(18)
 0945     REF   3 LAST  116 E4,1630          E01       EQUALS MFS                 I(6)
 0946     REF   1          E4,1636           E02       EQUALS E01          +6     I(6)


R0947               LR VEL BEAM VECTORS.                                           (26D)
A0949
R0950               CAN OVERLAY GSAV WITH CARE, USED DURING POWERED DESCENT ONLY.

 0951     REF   3 LAST  116 E4,1630           VZBEAMNB EQUALS GSAV                I(6) LR VELOCITY BEAMS IN NB COORDS.
 0952     REF   1          E4,1636            VYBEAMNB EQUALS VZBEAMNB +6         I(6)
 0953     REF   1          E4,1644            VXBEAMNB EQUALS VYBEAMNB +6         I(6) PRESERVE Z,Y,X ORDER.


 0954     REF   1          E4,1652           LRVTIME   =       VXBEAMNB +6        B(2)      LR
 0955     REF   1          E4,1654           LRXCDU    =       LRVTIME  +2        B(1)      LR
 0956     REF   1          E4,1655           LRYCDU    =       LRXCDU   +1        B(1)      LR
 0957     REF   1          E4,1656           LRZCDU    =       LRYCDU   +1        B(1)      LR
 0958     REF   1          E4,1657           PIPTEM    =       LRZCDU   +1        B(3)      LR
A0959


R0960               P32-P35, P72-P75 STORAGE.                                      (40D)

 0962                      E4,1652  E4,1653   T1TOT2    ERASE              +1       (2)      TIME FROM CSI TO CDH
 0963                      E4,1654  E4,1655   T2TOT3    ERASE              +1       (2)
 0964                      E4,1656  E4,1657   ELEV      ERASE              +1       (2)
 0965                      E4,1660  E4,1665   UP1       ERASE              +5       (6)
 0966                      E4,1666  E4,1673   DELVEET1  ERASE              +5      I(6)      DV CSI IN REF
 0967                      E4,1674  E4,1701   DELVEET2  ERASE              +5      I(6)      DV CSH IN REF
 0968                      E4,1702  E4,1707   RACT1     ERASE              +5       (6)      POS VEC OF ACTIVE AT CSI TIME
 0969                      E4,1710  E4,1715   RACT2     ERASE              +5       (6)      POS VEC OF ACTIVE AT CDH TIME
 0970                      E4,1716  E4,1717  RTSR1/MU ERASE          +1      (2)      SQ ROOT 1/MU STORAGE
 0971                      E4,1720  E4,1721  RTMU     ERASE          +1      (2)      MU STORAGE
R0972

R0973          (THE FOLLOWING ERASABLES OVERLAY PORTIONS OF THE PREVIOUS SECTION)

 0975   REF   1            E4,1652           +MGA     EQUALS T1TOT2           (2) S-S + MID GIM ANGL TO DELVEET3
A0976

 0977   REF   1            E4,1660           UNRM     EQUALS UP1             I(6) S-S
A0978

 0979   REF   1            E4,1702           DVLOS    EQUALS RACT1           I(6) S-S DELTA VELOCITY,LOS COORD-DISPLA
 0980   REF   1            E4,1710           ULOS     EQUALS RACT2           I(6) S-S UNIT LINE OF SIGHT VECTOR
A0981

 0982   REF   1            E4,1716           NOMTPI   EQUALS RTSR1/MU         (2) S-S NOMINAL TPI TIME FOR RECYCLE

R0983           SOME P30 STORAGE.                                            (4D)

 0985   REF   2  LAST  117 E4,1716           HAPO     EQUALS RTSR1/MU        I(2)
 0986   REF   1            E4,1720           HPER     EQUALS HAPO      +2    I(2)
A0987


R0988           SOME P38-P39,P78-79 STORAGE.                                 (6D)

 0990   REF   1            E4,1702           DELTAR   EQUALS DVLOS           I(2)
 0991   REF   1            E4,1704           DELTTIME EQUALS DELTAR    +2    I(2) TIME REPRESENTATION OF DELTAR
 0992   REF   1            E4,1706           TARGTIME EQUALS DELTTIME  +2    I(2) TINT MINUS DELTTIME
A0993
 0994   REF   2  LAST  117 E4,1702           TINTSOI  EQUALS DELTAR          I(2) TIME OF INTERCEPT FOR SOI PHASE
A0995


R0996           THE FOLLOWING ARE ERASABLE LOADS DURING A PERFORMANCE TEST.

 0997   REF   1            E4,1400           TRANSM1    =       WRENDPOS          E4,1400
 0998   REF   1            E4,1422           ALFDK      =       TRANSM1 +18D

R0999   ******* THE FOLLOWING SECTIONS OVERLAY V83 AND DISPLAY STORAGE *******

R1000           V47(R47)AGS INITIALIZATION PROGRAM STORAGE. (OVERLAYS V83)       (14D)

 1002   REF   4  LAST  115 E4,1600           AGSBUFF  EQUALS RANGE           B(14D)
 1003   REF   1            E4,1615           AGSBUFFE EQUALS AGSBUFF   +13D  ENDMARK
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R1004             P36 OUT-OF-PLANE RENDEZVOUS DISPLAY STORAGE. (OVERLAYS V83)     (12D)

 1006   REF    2  LAST  115   E4,1606           RPASS36  EQUALS RONE              I(6) S-S
 1007   REF    1              E4,1614           UNP36    EQUALS RPASS36  +6       I(6) S-S


R1008             S-BAND ANTENNA GIMBAL ANGLES. DISPLAYED BY R05(V64).(OVERLAYS V83)  (10D)
R1010                   (OPERATES DURING P00 ONLY)

 1011   REF    5  LAST  117   E4,1600           ALPHASB  EQUALS RANGE             B(2) DSP NOUN 51. PITCH ANGLE.
 1012   REF    1              E4,1602           BETASB   EQUALS ALPHASB  +2       B(2) DSP NOUN 51. YAW ANGLE.
 1013   REF    1              E4,1604           RLM      EQUALS BETASB   +2       I(6) S    S/C POSITION VECTOR.

R1014             **** USED IN S-BAND ANTENNA FOR LM ****

 1015   REF    2  LAST  118   E4,1602           YAWANG   EQUALS BETASB
 1016   REF    2  LAST  118   E4,1600           PITCHANG EQUALS ALPHASB


R1017    NOUN 56 DATA - COMPUTED AND DISPLAYED BY VERB 85.                        (4)

 1019   REF    1              E4,1600           RR-AZ    EQUALS PITCHANG          I(2) ANGLE BETWEEN LOS AND X-Z PLANE.
 1020   REF    1              E4,1602           RR-ELEV  EQUALS RR-AZ    +2       I(2) ANGLE BETWEEN LOS AND Y-Z PLANE.

R1021             R04(V62) RADAR TEST STORAGE.                                    (8D)
R1023             R04 IS RESTRICTED TO P00.

 1024   REF    6  LAST  118   E4,1600           RSTACK   EQUALS RANGE             B(8)  BUFFER FOR R04 NOUNS.
A1025


R1026             INITVEL STORAGE.  ALSO USED BY P31,P34,P35,P74,P75,P10,P11,MIDGIM,S40.1 AND S40.9. (18D)

R1028                     (POSSIBLY RINIT & VINIT CAN OVERLAY DELVEET1 & 2 ABOVE)
 1029                         E4,1722  E4,1727  RINIT    ERASE           +5       I(6) ACTIVE VEHICLE POSITION
 1030                         E4,1730  E4,1735  VINIT    ERASE           +5       I(6) ACTIVE VEHICLE VELOCITY
 1031                         E4,1736  E4,1743  VIPRIME  ERASE           +5       I(6) NEW VEL REQUIRED AT INITIAL RADIUS.

R1032             VARIOUS DISPLAY REGISTERS.  BALLANGS                            (3D)

 1034                         E4,1744  E4,1744  FDAIX    ERASE                    I(1)
 1035                         E4,1745  E4,1745  FDAIY    ERASE                    I(1)
 1036                         E4,1746  E4,1746  FDAIZ    ERASE                    I(1)
A1037

R1038             P34-P35 STORAGE.  DOWNLINKED.                                   (2D)

 1040                         E4,1747  E4,1750  DELVTPF  ERASE           +1       I(2) DELTA V FOR TPF
A1041
R1042             SOME R04(V62)-R77 RADAR TEST STORAGE                            (6D)
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  1044                         E4,1751  E4,1751   RTSTDEX  ERASE                      (1)
  1045                         E4,1752  E4,1752   RTSTMAX  ERASE                      (1)
  1046                         E4,1753  E4,1753   RTSTBASE ERASE                      (1)
  1047                         E4,1754  E4,1754   RTSTLOC  ERASE                      (1)
  1048    REF   1              E4,1754            RSTKLOC  =        RTSTLOC
  1049                         E4,1755  E4,1755   RSAMPDT  ERASE                      (1)
  1050                         E4,1756  E4,1756   RFAILCNT ERASE                      (1)
 R1051

 R1052           LPS20.1 STORAGE                                                  (12D)

  1054    REF   1              E4,1751            LMPOS    EQUALS RTSTDEX             I(6) TEMP. STORAGE FOR LM POS. VECTOR.
  1055    REF   1              E4,1757            LMVEL    EQUALS LMPOS     +6        I(6) TEMP. STORAGE FOR LM VEL. VECTOR.
 A1056
 R1057    INITVEL STORAGE.  ALSO USED BY P31,34,35,74,75,S40.1 AND DOWNLINKED.    (6D)

  1059    REF   1              E4,1765            DELVEET3 EQUALS LMVEL     +6        I(6) DELTA V IN INERTIAL COORDINATES.
 A1060

  1061                         E4,1757            END-E4   EQUALS                     FIRST UNUSED LOCATION IN E4

 R1062           SECOND DPS GUIDANCE (LUNAR LANDING)  (OVERLAY P32-35,INITVEL)    (14D)

  1064    REF   1              E4,1662            VHORIZ   EQUALS PIPTEM    +3        I(2) DISPLAY
  1065    REF   1              E4,1664            ANGTERM  EQUALS VHORIZ    +2        I(6) GUIDANCE
  1066    REF   1              E4,1672            HBEAMNB  EQUALS ANGTERM   +6        I(6) LANDING RADAR
 A1067

 R1068           R12 DOWNLINK QUANTITIES                                          (5D)

  1070    REF   1              E4,1734            LRXCDUDL EQUALS /LAND/    +2        B(1) LANDING RADAR DOWNLINK
  1071    REF   1              E4,1735            LRYCDUDL EQUALS LRXCDUDL  +1        B(1) LANDING RADAR DOWNLINK
  1072    REF   1              E4,1736            LRZCDUDL EQUALS LRYCDUDL  +1        B(1) LANDING RADAR DOWNLINK
  1073    REF   1              E4,1737            LRVTIMDL EQUALS LRZCDUDL  +1        B(2) LANDING RADAR DOWNLINK


 A1074

 R1075           ASCENT GUIDANCE FOR LUNAR LANDING                                (54D)

  1077    REF   2  LAST  119   E4,1662            AT       EQUALS PIPTEM    +3        I(2)TMP  ENGINE DATA -- THRUST ACC*2(9)
  1078    REF   1              E4,1664            VE       EQUALS AT        +2        I(2)TMP  EXHAUST VELOCITY * 2(7)M/CS.
  1079    REF   1              E4,1666            TTO      EQUALS VE        +2        I(2)TMP  TAILOFF TIME * 2(17)CS.
  1080    REF   1              E4,1670            TBUP     EQUALS TTO       +2        I(2)TMP  (M/MDOT) * 2(17)CS.
  1081    REF   1              E4,1672            RDOTD    EQUALS TBUP      +2        I(2)TMP  TARGET VELOCITY COMPONENTS
  1082    REF   1              E4,1674            YDOTD    EQUALS RDOTD     +2        I(2)TMP SCALING IS 2(7)M/CS.
  1083    REF   1              E4,1676            ZDOTD    EQUALS YDOTD     +2        I(2)TMP

  1084    REF   1              E4,1700            /R/MAG   EQUALS ZDOTD     +2        I(2)TMP
  1085    REF   1              E4,1702            LAXIS    EQUALS /R/MAG    +2        I(6)TMP
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L         ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO.  31       EO S4

 1086    REF    1                E7,1725             ZAXIS1    =       UHZP
 1087    REF    1                E7,1473             RDOT      =       HDOTDISP
 1088    REF    1                E4,1710             YDOT      =       LAXIS      +6     I(2)TMP VEL. NORMAL TO REF. PLANE*2(-7)
 1089    REF    1                E4,1712             ZDOT      EQUALS YDOT       +2     I(2)TMP  DOWN RANGE VEL *2(-7).
 1090    REF    1                E4,1714             GEFF      EQUALS ZDOT       +2     I(2)TMP  EFFECTIVE GRAVITY

R1091        THESE TWO GROUPS OF ASCENT GUIDANCE ARE SPLIT BY THE ASCENT-DESCENT  SERVICER SECTION FOLLOWING THIS SECTION

 1093    REF    2  LAST   119    E4,1734             Y         EQUALS /LAND/     +2     I(2)TMP  OUT-OF-PLANE DIST *2(24)M
 1094    REF    1                E4,1736             DRDOT     EQUALS Y          +2     I(2)TMP  RDOTD - RDOT
 1095    REF    1                E4,1740             DYDOT     EQUALS DRDOT      +2     I(2)TMP  YDOTD - YDOT
 1096    REF    1                E4,1742             DZDOT     EQUALS DYDOT      +2     I(2)TMP  ZDOTD - ZDOT
 1097    REF    1                E4,1744             PCONS     EQUALS DZDOT      +2     I(2)TMP  CONSTANT IN ATR EQUATION
 1098    REF    1                E4,1746             YCONS     EQUALS PCONS      +2     I(2)TMP  CONSTANT IN ATY EQUATION
 1099    REF    1                E4,1750             PRATE     EQUALS YCONS      +2     I(2)TMP  RATE COEFF. IN ATR EQUATION
 1100    REF    1                E4,1752             YRATE     EQUALS PRATE      +2     I(2)TMP  RATE COEFF. IN ATY EQUATION
 1101    REF    1                E4,1754             ATY       EQUALS YRATE      +2     I(2)TMP  OUT-OF-PLANE THRUST COMP.*2(9)
 1102    REF    1                E4,1756             ATR       EQUALS ATY        +2     I(2)TMP  RADIAL THRUST COMP.*2(9)
 1103    REF    1                E4,1760             ATP       EQUALS ATR        +2     I(2)TMP  DOWN-RANGE THRUST COMP
 1104    REF    1                E4,1762             YAW       EQUALS ATP        +2     I(2)TMP
 1105    REF    1                E4,1764             PITCH     EQUALS YAW        +2     I(2)RMP
A1106

R1107               SERVICER FOR LUNAR ASCENT AND DESCENT                                 (14D)

 1109    REF    1                E4,1716             G(CSM)    EQUALS GEFF       +2     I(6) FOR UPDATE OF COMMAND MODULE STATE
 1110    REF    1                E3,1717             R(CSM)    EQUALS R-OTHER                 VECTORS BY LEM; ANALOGS OF GDT/2,
 1111    REF    1                E3,1725             V(CSM)    EQUALS V-OTHER                 R, AND V, RESPECTIVELY OF THE CSM
 1112    REF    1                E4,1724             WM        EQUALS G(CSM)     +6     I(6) TMP - LUNAR ROTATION VECTOR (SM)
 1113    REF    1                E4,1732             /LAND/    EQUALS WM         +6     B(2) LUNAR RADIUS AT LANDING SITE
A1114
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P1115          EBANK-5 ASSIGNMENTS

 1116                    E5,1400                   SETLOC 2400

R1117          W-MATRIX. ESSENTIALLY UNSHARABLE.                        (162D)

 1119                    E5,1400 E5,1641  W        ERASE           +161D
 1120  REF  1            E5,1642          ENDW     EQUALS W        +162D

A1121


R1122  *******  OVERLAY NUMBER 1 IN EBANK 5  *******


R1123          W-MATRIX PADLOADS                                        (128D)

R1125   PLEASE RETAIN THE ORDER OF TLAND THRU JAPFG

 1126  REF  2 LAST  121  E5,1400          TLAND    EQUALS W                I(2)  NOMINAL TIME OF LANDING
 1127  REF  1            E5,1402          RBRFG    EQUALS TLAND    +2   I(6) BRAKING
 1128  REF  1            E5,1410          VBRFG    EQUALS RBRFG    +6   I(6)      PHASE
 1129  REF  1            E5,1416          ABRFG    EQUALS VBRFG    +6   I(6)         TARGET
 1130  REF  1            E5,1424          VBRFG*   EQUALS ABRFG    +6   I(2)            PARAMETERS:
 1131  REF  1            E5,1426          ABRFG*   EQUALS VBRFG*   +2   I(2)               HIGH
 1132  REF  1            E5,1430          JBRFG*   EQUALS ABRFG*   +2   I(2)                  GATE
11321  REF  1            E5,1432          GAINBRAK EQUALS JBRFG*   +2   B(2)
 1133  REF  1            E5,1434          TCGFBRAK EQUALS GAINBRAK +2   B(1)
 1134  REF  1            E5,1435          TCGIBRAK EQUALS TCGFBRAK +1   B(1)
 1135  REF  1            E5,1436          RAPFG    EQUALS TCGIBRAK +1   I(6) APPROACH
 1136  REF  1            E5,1444          VAPFG    EQUALS RAPFG    +6   I(6)      PHASE
 1137  REF  1            E5,1452          AAPFG    EQUALS VAPFG    +6   I(6)         TARGET
 1138  REF  1            E5,1460          VAPFG*   EQUALS AAPFG    +6   I(2)            PARAMETERS:
 1139  REF  1            E5,1462          AAPFG*   EQUALS VAPFG*   +2   I(2)               LOW
 1140  REF  1            E5,1464          JAPFG*   EQUALS AAPFG*   +2   I(2)                  GATE
11401  REF  1            E5,1466          GAINAPPR EQUALS JAPFG*   +2   B(2)
 1141  REF  1            E5,1470          TCGFAPPR EQUALS GAINAPPR +2   B(1)
 1142  REF  1            E5,1471          TCGIAPPR EQUALS TCGFAPPR +1   B(1)
 1143  REF  1            E5,1472          VIGN     EQUALS TCGIAPPR +1   I(2)  DESIRED SPEED FOR IGNITION
 1144  REF  1            E5,1474          RIGNX    EQUALS VIGN     +2   I(2)  DESIRED 'ALTITUDE' FOR IGNITION
 1145  REF  1            E5,1476          RIGNZ    EQUALS RIGNX    +2   I(2)  DESIRED GROUND RANGE FOR IGNITION
 1146  REF  1            E5,1500          KIGNX/B4 EQUALS RIGNZ    +2   I(2)
 1147  REF  1            E5,1502          KIGNY/B8 EQUALS KIGNX/B4 +2   I(2)
 1148  REF  1            E5,1504          KIGNV/B4 EQUALS KIGNY/B8 +2   I(2)
 1149  REF  1            E5,1506          LOWCRIT  EQUALS KIGNV/B4 +2   B(1) (HIGHCRIT MUST FOLLOW LOWCRIT)
 1150  REF  1            E5,1507          HIGHCRIT EQUALS LOWCRIT  +1   B(1)
 1151  REF  1            E5,1510          V2FG     EQUALS HIGHCRIT +1   I(6) DESIRED VELOCITY FOR P65.
 1152  REF  1            E5,1516          TAUVERT  EQUALS V2FG     +6   I(2) TIME CONSTANT FOR P65 VEL. NULLING.
 1153  REF  1            E5,1520          DELQFIX  EQUALS TAUVERT  +2   I(2) LR ALTITUDE DATA REASONABLE PARM.
 1154  REF  1            E5,1522          LRALPHA  EQUALS DELQFIX  +2   B(1)   POS1 X ROTATION      * MUST *
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  1155   REF    1                E5,1523          LRBETA1  EQUALS LRALPHA  +1      B(1)   POS1 Y ROTATION      *  BE  *
  1156   REF    1                E5,1524          LRALPHA2 EQUALS LRBETA1  +1      B(1)   POS2 X ROTATION      *  IN  *
  1157   REF    1                E5,1525          LRBETA2  EQUALS LRALPHA2 +1      B(1)   POS2 Y ROTATION      *ORDER*
  11571  REF    1                E5,1526          LRVMAX   EQUALS LRBETA2  +1      B(1)   LR VEL WEIGHTING FUNCTIONS
  11572  REF    1                E5,1527          LRVF     EQUALS LRVMAX   +1      B(1)   LR VEL WEIGHTING FUNCTIONS
  11573  REF    1                E5,1530          LRWVZ    EQUALS LRVF     +1      B(1)   LR VEL WEIGH ING FUNCTIONS
  11574  REF    1                E5,1531          LRWVY    EQUALS LRWVZ    +1      B(1)   LR VEL WEIGH ING FUNCTIONS
  11575  REF    1                E5,1532          LRWVX    EQUALS LRWVY    +1      B(1)   LR VEL WEIGH ING FUNCTIONS
  11576  REF    1                E5,1533          LRWVFZ   EQUALS LRWVX    +1      B(1)   LR VEL WEIGH ING FUNCTIONS
  11577  REF    1                E5,1534          LRWVFY   EQUALS LRWVFZ   +1      B(1)   LR VEL WEIG  ING FUNC IONS
  11578  REF    1                E5,1535          LRWVFX   EQUALS LRWVFY   +1      B(1)   LR VEL WEIG  ING FUNC IONS
  11579  REF    1                E5,1536          LRWVFF   EQUALS LRWVFX   +1      B(1)   LR VEL WEIG  ING FUNC IONS

  115791 REF    5  LAST   98      0130          ABVEL*   EQUALS BUF              B(1)   LR TEMP
  115792 REF    [illegible]  LAST  122      0131          VSELECT* EQUALS BUF +1           B(1)   LR TEMP

  1158   REF    1                E5,1537          RODSCALE EQUALS LRWVFF   +1      I(1) CLICK SCALE FACTOR FOR ROD
  1159   REF    1                E5,1540          TAUROD   EQUALS RODSCALE +1      I(2) TIME CONSTANT FOR R.O.D.
  11595  REF    1                E5,1542          LAG/TAU  EQUALS TAUROD   +2      I(2) LAG TIME DIVIDED BY TAUROD (P66)
  11596  REF    1                E5,1544          MINFORCE EQUALS LAG/TAU  +2      I(2) MINIMUM FORCE P66 WILL COMMAND.
  11597  REF    1                E5,1546          MAXFORCE EQUALS MINFORCE +2      I(2) MAXIMUM FORCE P66 WILL COMMAND.
  1160   REF    1                E5,1550          ABTCOF   EQUALS MAXFORCE +2      I(16) COEFFICIENTS FOR ABORT TFI POLYS.
  1161   REF    1                E5,1570          VMIN     EQUALS ABTCOF   +16D    I(2) MINIMUM VELOCITY FOR ABORT INJ.
  1162   REF    1                E5,1572          YLIM     EQUALS VMIN     +2      I(2) MAXIMUM CROSS-RANGE DIST IN ABORTS.
  1163   REF    1                E5,1574          ABTRDOT  EQUALS YLIM     +2      I(2) DESIRED RADIAL VEL. FOR ABORTS.
  1164   REF    1                E5,1576          COSTHET1 EQUALS ABTRDOT  +2      I(2) COS OF CONE 1 ANGLE FOR ABORTS
  1165   REF    1                E5,1600          COSTHET2 EQUALS COSTHET1 +2      I(2) COS OF CONE 2 ANGLE FOR ABORTS.
 A1166

 R1167              SOME VARIABLES FOR SECOND DPS GUIDANCE                      (34D)

  1169   REF    1                E5,1602          CG       EQUALS COSTHET2 +2      I(18D) GUIDANCE
  1170   REF    1                E5,1624          RANGEDSP =      CG       +18D    B(2)      DISPLAY
  1171   REF    1                E5,1626          OUTOFPLN =      RANGEDSP +2      B(2)     DISPLAY
  1172   REF    1                E5,1630          R60VSAVE EQUALS OUTOFPLN +2      I(6)TMP SAVES VALUE OF POINTVSM THRU R51
  1173   REF    1                E5,1636          RGU      EQUALS R60VSAVE +6      I(6) UNSHARED FOR DOWNLINK
  1174   REF    2  LAST  122     E5,1630          VBIAS    EQUALS R60VSAVE         I(6) PIPA BIAS EQUIV. VELOCITY VECTOR.
  1175   REF    7  LAST  122      0130          L*WCR*T  =      BUF
  1176   REF    8  LAST  122      0131          H*GHCR*T =      BUF +1
 A1177

 R1178              ALIGNMENT/SYSTEST/CALCSMSC COMMON STORAGE.                  (36D)

  1180   REF    1                E5,1642          XSM      EQUALS ENDW             B(6)
  1181   REF    1                E5,1650          YSM      EQUALS XSM      +6      B(6)
  1182   REF    1                E5,1656          ZSM      EQUALS YSM      +6      B(6)

  1183   REF    1                E5,1664          XDC      EQUALS ZSM      +6      B(6)
  1184   REF    1                E5,1672          YDC      EQUALS XDC      +6      B(6)
  1185   REF    1                E5,1700          ZDC      EQUALS YDC      +6      B(6)
 1186    REF    2  LAST  122    E5,1664             XNB        =       XDC
 1187    REF    2  LAST  122    E5,1672             YNB        =       YDC
 1188    REF    1               E5,1700             ZNB        =       ZDC


R1189                OVERLAYS WITHIN ALIGNMENT/SYSTEST/CALCSMSC COMMON STORAGE.      (4D)

 1191    REF    2  LAST  122    E5,1644             -COSB      EQUALS XSM        +2       (2)TMP
 1192    REF    1               E5,1646             SINB       EQUALS -COSB      +2       (2)TMP


R1193                MORE OVERLAYS TO ALIGNMENT /SYSTEST  (THESE ARE P52)            (6D)

 1195    REF    1               E5,1706             LANDLAT  EQUALS STARAD             (2) LATITUDE, LONGITUDE
 1196    REF    1               E5,1710             LANDLONG EQUALS LANDLAT  +2        (2)     AND ALTITUDE
 1197    REF    1               E5,1712             LANDALT  EQUALS LANDLONG +2        (2)     OF LANDING SITE
A1198

R1199                ALIGNMENT/SYSTEST COMMON STORAGE.                               (31D)

 1201    REF    2  LAST  123    E5,1706             STARAD     EQUALS ZDC        +6       I(18D)TMP
 1202    REF    2  LAST  123    E5,1730             STAR       EQUALS STARAD     +18D     I(6)
 1203    REF    1               E5,1736             GCTR       EQUALS STAR       +6       B(1)
 1204    REF    1               E5,1737             OGC        EQUALS GCTR       +1       I(2)
 1205    REF    1               E5,1741             IGC        EQUALS OGC        +2       I(2)
 1206    REF    1               E5,1743             MGC        EQUALS IGC        +2       I(2)

R1207                P57 ALIGNMENT (OVERLAY OF ALIGNMENT/SYSTEST COMMON STORAGE)     (12D)

 1209    REF    3  LAST  123    E5,1706             GACC       =       STARAD             (6) SS
 1210    REF    4  LAST  123    E5,1714             GOUT       =       STARAD    +6       (6) SS
A1211

R1212                OVERLAYS WITHIN ALIGNMENT/SYSTEST COMMON STORAGE                (24D)

 1214    REF    5  LAST  123    E5,1706             VEARTH     EQUALS STARAD               (6)TMP
 1215    REF    1               E5,1714             VSUN       EQUALS VEARTH     +6        (6)TMP
 1216    REF    1               E5,1722             VMOON      EQUALS VSUN       +6        (6)TMP
 1217    REF    1               E5,1730             SAX        EQUALS VMOON      +6        (6)TMP


R1218                P50'S,R50'S Q STORES.                                           (2D)

 1220    REF    1               E5,1745             QMIN       EQUALS MGC        +2       B(1)TMP
 1221    REF    1               E5,1746             QMAJ       EQUALS QMIN       +1       B(1)TMP
R1222

R1223             **** USED IN P50S ****   (SCATTERED OVERLAYS)
 1224    REF    6  LAST  123    E5,1706             XSCI       EQUALS STARAD
 1225    REF    1               E5,1714             YSCI       EQUALS XSCI +6
 1226   REF   1                E5,1714          ZSCI     EQUALS YSCI
 1227   REF   2  LAST   123    E5,1706          CULTRIX  EQUALS VEARTH             VEARTH, VSUN, VMOON
 1228   REF   7  LAST   123    E5,1722          VEC1     EQUALS STARAD +12D
 1229   REF   2  LAST   123    E5,1730          VEC2     EQUALS STAR
A1230


R1231               ALIGNMENT STORAGE.                                            (23D)

 1233   REF   1                E5,1747          OGCT     EQUALS QMAJ      +1       I(6)
 1234   REF   1                E5,1755          BESTI    EQUALS OGCT      +6       I(1)
 1235   REF   1                E5,1756          BESTJ    EQUALS BESTI +1
 1236   REF   1                E5,1757          STARIND  EQUALS BESTJ +1
R1237        RETAIN THE ORDER OF STARSAV1 TO STARSAV2 +5 FOR DOWNLINK PURPOSES.
 1238   REF   1                E5,1760          STARSAV1 EQUALS STARIND   +1       I(6)
 1239   REF   1                E5,1766          STARSAV2 EQUALS STARSAV1 +6        I(6)
 1240   REF   1                E5,1774          TALIGN   EQUALS STARSAV2 +6        B(2) TIME OF IMU ALIGNMENT  (DOWNLINKED)
A1241

R1242               P32-35 + SERVICER                                             (2D)

 1244   REF   1                E5,1776          RTX1     EQUALS TALIGN    +2       I(1) X1  -2 EARTH, -10 MOON
 1245   REF   1                E5,1777          RTX2     EQUALS RTX1      +1       I(1) X2  0 EARTH, 2 MOON
A1246

 1247                             0026          ZPRIME   =       22D
 1248                             0026          PDA      =       22D
 1249                             0020          COSTH    =       16D
 1250                             0022          SINTH    =       18D
 1251                             0024          THETA    =       20D
 1252                             0040          STARM    =       32D
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P1253    *******  OVERLAY NUMBER 2 IN EBANK 5  *******

R1254              CONICS ROUTINE STORAGE.                                            (85D)

 1256   REF   2  LAST  122   E5,1642           DELX      EQUALS ENDW                  I(2)TMP
 1257   REF   1              E5,1644           DELT      EQUALS DELX       +2         I(2)TMP
 1258   REF   1              E5,1646           URRECT    EQUALS DELT       +2         I(6)TMP
 1259                          0042            RCNORM    EQUALS 34D                   I(2) TMP
 1260   REF   1              E3,1552           XPREV     EQUALS XKEP                  I(2)TMP
 1261   REF   1              E5,1654           R1VEC     EQUALS URRECT    +6          I(6) TMP
 1262   REF   1              E5,1662           R2VEC     EQUALS R1VEC      +6         I(6)TMP
 1263   REF   1              E5,1670           TDESIRED  EQUALS R2VEC      +6         I(2)TMP
 1264   REF   1              E5,1672           GEOMSGN   EQUALS TDESIRED +2          I(1)TMP
 1265   REF   1              E5,1673           UN        EQUALS GEOMSGN    +1         I(6)TMP
 1266   REF   1              E5,1701           VTARGTAG  EQUALS UN         +6         I(1)TMP
 1267   REF   1              E5,1702           VTARGET   EQUALS VTARGTAG  +1         I(6)TMP
 1268   REF   1              E5,1710           RTNLAMB   EQUALS VTARGET    +6         I(1)TMP
 1269   REF   1              E5,1711           U2        EQUALS RTNLAMB    +1         I(6)TMP
 1270   REF   1              E5,1717           MAGVEC2   EQUALS U2         +6         I(2)TMP
 1271   REF   1              E5,1721           UR1       EQUALS MAGVEC2    +2         I(6)TMP
 1272   REF   1              E5,1727           SNTH      EQUALS UR1        +6         I(2)TMP
 1273   REF   1              E5,1731           CSTH      EQUALS SNTH       +2         I(2)TMP
 1274   REF   1              E5,1733           1-CSTH    EQUALS CSTH       +2         I(2)TMP
 1275   REF   1              E5,1735           CSTH-RHO  EQUALS 1-CSTH     +2         I(2)TMP
 1276   REF   1              E5,1737           P         EQUALS CSTH-RHO  +2          I(2)TMP
 1277   REF   1              E5,1741           R1A       EQUALS P          +2         I(2)TMP
 1278   REF   2  LAST  125   E5,1654           RVEC      EQUALS R1VEC                 I(6)TMP
 1279   REF   1              E5,1743           VVEC      EQUALS R1A        +2         I(6)TMP
 1280   REF   2  LAST  125   E5,1710           RTNTT     EQUALS RTNLAMB               I(1)TMP
 1281   REF   1              E5,1751           ECC       EQUALS VVEC       +6         I(2)TMP
 1282   REF   3  LAST  125   E5,1710           RTNTR     EQUALS RTNLAMB               I(1)TMP
 1283   REF   4  LAST  125   E5,1710           RTNAPSE   EQUALS RTNLAMB               I(1)TMP
 1284   REF   2  LAST  125   E5,1717           R2        EQUALS MAGVEC2               I(2)TMP
 1285   REF   1              E5,1753           RTNPRM    EQUALS ECC        +2         I(1)TMP
 1286   REF   1              E5,1754           SGNRDOT   EQUALS RTNPRM     +1         I(1)TMP
 1287   REF   1              E5,1755           RDESIRED  EQUALS SGNRDOT    +1         I(2)TMP
 1288   REF   1              E5,1757           DELDEP    EQUALS RDESIRED +2          I(2)TMP
 1289   REF   1              E5,1761           DEPREV    EQUALS DELDEP     +2         I(2)TMP
 1290   REF   2  LAST  125   E5,1757           TERRLAMB  EQUALS DELDEP                I(2)TMP
 1291   REF   1              E5,1761           TPREV     EQUALS DEPREV                I(2)TMP
 1292   REF   2  LAST  125   E5,1763           EPSILONL  EQUALS DEPREV     +2         I(2)TMP
 1293   REF   1              E5,1765           COGA      EQUALS EPSILONL +2          I(2) COTAN OF INITIAL FLIGHT PATH ANGLE.
 1294   REF   1              E5,1765           INDEP     EQUALS COGA                       USED BY SUBROUTINE'ITERATOR'.
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P1295     *******  OVERLAY NUMBER 3 IN EBANK 5  *******

R1296               INCORP STORAGE.                                                  (18D)

 1298   REF    3  LAST  125   E5,1642          ZI        EQUALS ENDW               I(18)TMP

R1299               INCORP/LSR22.3 STORAGE.                                          (21D)

 1301   REF    1              E5,1664          DELTAX    EQUALS ZI          +18D   I(18)
 1302   REF    1              E5,1706          VARIANCE EQUALS DELTAX      +18D   I(3)

R1303               MEASUREMENT INCORPORATION -R22- STORAGE.                         (49D)

 1305   REF    1              E5,1711          GRP2SVQ   EQUALS VARIANCE +3     I(1)TMP QSAVE FOR RESTARTS
 1306   REF    1              E5,1712          OMEGAM1   EQUALS GRP2SVQ   +1     I(6)
 1307   REF    1              E5,1720          OMEGAM2   EQUALS OMEGAM1   +6     I(6)
 1308   REF    1              E5,1726          OMEGAM3   EQUALS OMEGAM2   +6     I(6)
 1309   REF    1              E5,1734          HOLDW     EQUALS OMEGAM3   +6     I(18)
 1310   REF    1              E5,1756          TDPOS     EQUALS HOLDW     +18D   I(6)
 1311   REF    1              E5,1764          TDVEL     EQUALS TDPOS     +6     I(6)
A1312

 1313   REF    2  LAST  126   E5,1664          TRIPA     EQUALS DELTAX             I(3)TMP
 1314   REF    1              E5,1667          TEMPVAR   EQUALS TRIPA     +3     I(3)TMP

A1315


R1316               INCORPORATION/INTEGRATION Q STORAGE.                             (1D)

 1318   REF    1              E5,1772          EGRESS    EQUALS TDVEL     +6     I(1)
A1319


R1320               P30/P31 STORAGE.                                                 (1D) AND ONE OVERLAY

 1322   REF    1              E5,1773          P30EXIT   EQUALS EGRESS    +1     B(1)TMP
A1323

 1324   REF    1              E5,1773          ORIGIN    EQUALS P30EXIT          I(1)TMP  INDEX DURING INITVEL
A1325
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P1326              SYSTEM TEST ERASABLES.  CAN OVERLAY W MATRIX.                   (127D)

R1328    *******  OVERLAY NUMBER 0 IN EBANK 5  *******


 1329    REF    3  LAST  121    E5,1400                 AZIMUTH  EQUALS W                2
 1330    REF    1               E5,1402                 LATITUDE EQUALS AZIMUTH  +2      2
 1331    REF    1               E5,1404                 ERVECTOR EQUALS LATITUDE +2      6
 1332    REF    1               E5,1412                 LENGTHOT EQUALS ERVECTOR +6      1
 1333    REF    1               E5,1413                 LOSVEC   EQUALS LENGTHOT +1      6
 1334    REF    1               E5,1414                 NDXCTR   EQUALS LOSVEC   +1      1
 1335    REF    1               E5,1415                 PIPINDEX EQUALS NDXCTR   +1      1
 1336    REF    1               E5,1416                 POSITON  EQUALS PIPINDEX +1      1
 1337    REF    1               E5,1417                 QPLACE   EQUALS POSITON  +1      1
 1338    REF    1               E5,1420                 QPLACES  EQUALS QPLACE   +1      1
 1339    REF    1               E5,1421                 SOUTHDR  EQUALS QPLACES  +1      7
 1340    REF    1               E5,1430                 TEMPTIME EQUALS SOUTHDR  +7      2
 1341    REF    1               E5,1432                 TMARK    EQUALS TEMPTIME +2      2
 1342    REF    1               E5,1434                 GENPL    EQUALS TMARK    +2
 1343    REF    1               E5,1434                 CDUTIMEI =      GENPL
 1344    REF    2  LAST  127    E5,1436                 CDUTIMEF =      GENPL +2
 1345    REF    3  LAST  127    E5,1440                 CDUDANG  =      GENPL +4
 1346    REF    4  LAST  127    E5,1441                 CDUREADF =      GENPL +5
 1347    REF    5  LAST  127    E5,1442                 CDUREADI =      GENPL +6
 1348    REF    6  LAST  127    E5,1443                 CDULIMIT =      GENPL +7

 1349    REF    7  LAST  127    E5,1440                 TEMPADD  =      GENPL +4
 1350    REF    8  LAST  127    E5,1441                 TEMP     =      GENPL +5
 1351    REF    9  LAST  127    E5,1442                 NOBITS   =      GENPL +6
 1352    REF   10  LAST  127    E5,1443                 CHAN     =      GENPL +7

 1353    REF   11  LAST  127    E5,1444                 LOS1     =      GENPL +8D
 1354    REF   12  LAST  127    E5,1452                 LOS2     =      GENPL +14D

 1355    REF   13  LAST  127    E5,1460                 CALCDIR  EQUALS GENPL +20D
 1356    REF   14  LAST  127    E5,1461                 CDUFLAG  EQUALS GENPL +21D
 1357    REF   15  LAST  127    E5,1462                 GYTCBETQ EQUALS GENPL +22D
 1358    REF   16  LAST  127    E5,1463                 OPTNREG  EQUALS GENPL +23D
 1359    REF   17  LAST  127    E5,1464                 SAVE     EQUALS GENPL +24D       THREE  ONSEC LOC
 1360    REF   18  LAST  127    E5,1467                 SFCONST1 EQUALS GENPL +27D
 1361    REF   19  LAST  127    E5,1470                 TIMER    EQUALS GENPL +28D

 1362    REF   20  LAST  127    E5,1472                 DATAPL   EQUALS GENPL +30D
 1363    REF   21  LAST  127    E5,1434                 RDSP     EQUALS GENPL            FIX LATER   POSSIBLY KEEP1
 1364    REF   22  LAST  127    E5,1534                 MASKREG  EQUALS GENPL +64D
 1365    REF   23  LAST  127    E5,1536                 CDUNDX   EQUALS GENPL +66D
 1366    REF   24  LAST  127    E5,1537                 RESULTCT EQUALS GENPL +67D
 1367    REF   25  LAST  127    E5,1542                 COUNTPL  EQUALS GENPL +70D

 1368    REF   26  LAST  127    E5,1543                 CDUANG   EQUALS GENPL +71D
 1369   REF  27  LAST  127   E5,1434             AINLA     =       GENPL          110 DE  OR 156 OCT LOCATIONS

 1370   REF   1              E5,1434             WANGO     EQUALS AINLA           VERT E ATE
 1371   REF   2  LAST  128   E5,1436             WANGI     EQUALS AINLA +2D       HORIZO TAL ERATE
 1372   REF   3  LAST  128   E5,1440             WANGT     EQUALS AINLA +4D       T
 1373   REF   1              E5,1440             TORQNDX   =      WANGT
 1374   REF   4  LAST  128   E5,1442             DRIFTT    EQUALS AINLA +6D
 1375   REF   5  LAST  128   E5,1444             ALX1S     EQUALS AINLA +8D
 1376   REF   6  LAST  128   E5,1445             CMPX1     EQUALS AINLA +9D       IND
 1377   REF   7  LAST  128   E5,1446             ALK       EQUALS AINLA +10D      GAINS
 1378   REF   8  LAST  128   E5,1462             VLAUNS    EQUALS AINLA +22D
 1379   REF   9  LAST  128   E5,1464             WPLATO    EQUALS AINLA +24D
 1380   REF  10  LAST  128   E5,1470             INTY      EQUALS AINLA +28D      SOUTH  IP INTE
 1381   REF  11  LAST  128   E5,1472             ANGZ      EQUALS AINLA +30D      EAST A IS
 1382   REF  12  LAST  128   E5,1474             INTZ      EQUALS AINLA +32D      EAST P P I
 1383   REF  13  LAST  128   E5,1476             ANGY      EQUALS AINLA +34D      SOUTH
 1384   REF  14  LAST  128   E5,1500             ANGX      EQUALS AINLA +36D      VE
 1385   REF  15  LAST  128   E5,1502             DRIFTO    EQUALS AINLA +38D      VERT
 1386   REF  16  LAST  128   E5,1504             DRIFTI    EQUALS AINLA +40D      SOU
 1387   REF  17  LAST  128   E5,1510             VLAUN     EQUALS AINLA +44D
 1388   REF  18  LAST  128   E5,1512             ACCWD     EQUALS AINLA +46D
 1389   REF  19  LAST  128   E5,1520             POSNV     EQUALS AINLA +52D
 1390   REF  20  LAST  128   E5,1522             DPIPAY    EQUALS AINLA +54D      SOUTH
 1391   REF  21  LAST  128   E5,1526             DPIPAZ    EQUALS AINLA +58D      NORTH  IP INCREMENT
 1392   REF  22  LAST  128   E5,1530             ALTIM     EQUALS AINLA +60D
 1393   REF  23  LAST  128   E5,1531             ALTIMS    EQUALS AINLA +61D       INDEX
 1394   REF  24  LAST  128   E5,1532             ALDK      EQUALS AINLA +62D       TIME  ONSTAN
 1395   REF  25  LAST  128   E5,1550             DELM      EQUALS AINLA +76D
 1396   REF  26  LAST  128   E5,1560             WPLATI    EQUALS AINLA +84D
 1397   REF  27  LAST  128   E5,1562             GEOCOMPS  EQUALS AINLA +86D
 1398   REF  28  LAST  128   E5,1563             ERCOMP    EQUALS AINLA +87D
 1399   REF  29  LAST  128   E5,1571             ZERONDX   EQUALS AINLA +93D


 1400   REF   1              E5,1452             THETAN    =      ALK +4
 1401   REF   1              E5,1460             FILDELV   EQUALS THETAN    +6     AGS ALIGNMENT STORAGE
 1402   REF   1              E5,1462             INTVEC    EQUALS FILDELV  +2
 1403   REF  30  LAST  128   E5,1572             1SECXT    =      AINLA +94D
 1404   REF  31  LAST  128   E5,1573             ASECXT    =      AINLA +95D
 1405   REF  32  LAST  128   E5,1574             PERFDLAY  EQUALS AINLA     +96D  B(2) DELAY TIME BEF. START DRIFT MEASURE
 1406   REF  33  LAST  128   E5,1576             OVFLOWCK  EQUALS AINLA     +98D  (1) SET MEANS OVERFLOW IN IMU PERF TEST
A1407                                                                                   AND CAUSES TERMINATION
A1408

 1409   REF   2  LAST  124   E5,1774             END-E5    EQUALS STARSAV2 +6     *** FIRST FREE LOCATION IN E5***
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P1410            EBANK-6 ASSIGNMENTS.

 1411                           E6,1400                    SETLOC 3000

R1412            DAP   PAD-LOADED   DATA.                                       (10D)

R1414     ALL OF THE FOLLOWING EXCEPT PITTIME AND ROLLTIME ARE INITIALIZED IN FRESH START TO PERMIT IMMEDIATE USE OF DAP

 1416                           E6,1400  E6,1400   HIASCENT ERASE               (1) MASS AFTER STAGING, SCALE AT B16 KG.
 1417                           E6,1401  E6,1401   ROLLTIME ERASE               (1) TIME TO TRIM Z GIMBAL IN R03, CSEC.
 1418                           E6,1402  E6,1402   PITTIME  ERASE               (1) TIME TO TRIM Y GIMBAL IN R03, CSEC.
 1419                           E6,1403  E6,1403   DKTRAP   ERASE               (1) DAP STATE          (POSSIBLE 77001
 1420                           E6,1404  E6,1404   DKOMEGAN ERASE               (1)   ESTIMATOR PARA-      (VALUES 00012
 1421                           E6,1405  E6,1405   DKKAOSN  ERASE               (1)      METERS FOR THE          00074
 1422                           E6,1406  E6,1406   LMTRAP   ERASE               (1)         DOCKED AND           77001
 1423                           E6,1407  E6,1407   LMOMEGAN ERASE               (1)            LEM-ALONE CASES   00000
 1424                           E6,1410  E6,1410   LMKAOSN  ERASE               (1)               RESPECTIVELY   00074
 1425                           E6,1411  E6,1411   DKDB     ERASE               (1) WIDTH OF DEADBAND FOR DOCKED RCS
A1426                                                                               AUTOPILOT (DB=1.4DEG IN FRESH START)
A1427                                                                               DEADBAND = PI/DKDB RAD.

R1428     PADLOADS FOR INITIALIZATION OF DAP BIAS ACCELERATION (AT P12 IGNITION)  (2D)

 1430                           E6,1412  E6,1412   IGNAOSQ  ERASE               B(1)PL
 1431                           E6,1413  E6,1413   IGNAOSR  ERASE               B(1)PL
A1432

R1433     AXIS TRANSFORMATION MATRIX - GIMBAL TO PILOT AXES:                    (5D)

 1435                           E6,1414  E6,1414   M11      ERASE               SCALED AT 1
 1436                           E6,1415  E6,1415   M21      ERASE               SCALED AT 1
 1437                           E6,1416  E6,1416   M31      ERASE
 1438                           E6,1417  E6,1417   M22      ERASE               SCALED AT 1.
 1439                           E6,1420  E6,1420   M32      ERASE               SCALED AT 1.

R1440     ANGLE MEASUREMENTS.                                                   (31D)

 1442                           E6,1421  E6,1425   OMEGAP   ERASE   +4          BODY-AXIS RCT. RATES SCALED AT PI/4 AND
 1443     REF   1               E6,1422            OMEGAQ   EQUALS OMEGAP +1    BODY-AXIS ACCELERATIONS SCALED AT PI/8
 1444     REF   2  LAST  129    E6,1423            OMEGAR   EQUALS OMEGAP +2
R1445         RETAIN THE ORDER OF ALPHAQ AND ALPHAR FOR DOWNLINK PURPOSES.
 1446     REF   3  LAST  129    E6,1424            ALPHAQ   EQUALS OMEGAP +3
 1447     REF   4  LAST  129    E6,1425            ALPHAR   EQUALS OMEGAP +4
 1448                           E6,1426  E6,1427   OMEGAU   ERASE  +1
 1449     REF   1               E6,1427            OMEGAV   =      OMEGAU +1

 1450                           E6,1430  E6,1435   TRAPEDP  ERASE  +5
 1451     REF   1               E6,1431            TRAPEDQ  =      TRAPEDP +1
 1452     REF   2  LAST  129    E6,1432            TRAPEDR  =      TRAPEDP +2
 1453     REF   3  LAST  129    E6,1433            NPTRAPS  =      TRAPEDP +3
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L        ERASABLE ASSIGNMENTS                                                                         USER'S PAGE NO.  41       EO S4

 1454    REF    4  LAST  129   E6,1434              NQTRAPS  =        TRAPEDP +4
 1455    REF    5  LAST  130   E6,1435              NRTRAPS  =        TRAPEDP +5
 1456    REF    1              E6,1427              EDOTP    =        EDOT
 1457                          E6,1436   E6,1437    EDOTQ    ERASE    +1
 1458    REF    1              E6,1437              EDOTR    =        EDOTQ +1           MANY SHARING NAMES
 1459    REF    2  LAST  130   E6,1436              QRATEDIF EQUALS EDOTQ              ALTERNATIVE NAMES:
 1460    REF    1              E6,1437              RRATEDIF EQUALS EDOTR              DELETE WHEN NO. OF REFERENCES = 0

 1461    REF    2  LAST  129   E6,1426              URATEDIF EQUALS OMEGAU
 1462    REF    1              E6,1427              VRATEDIF EQUALS OMEGAV
 1463                          E6,1440   E6,1442    OLDXFORP ERASE               +2    STORED CDU READINGS FOR STATE
 1464    REF    1              E6,1441              OLDYFORP EQUALS OLDXFORP +1        DERIVATIONS: SCALED AT PI RADIANS (2'S)
 1465    REF    2  LAST  130   E6,1442              OLDZFORQ EQUALS OLDXFORP +2
R1466    RATE-COMMAND AND MINIMUM IMPULSE MODES

 1467                          E6,1443   E6,1443    CH31TEMP ERASE
 1468                          E6,1444   E6,1444    STIKSENS ERASE
 1469                          E6,1445   E6,1445    TCP      ERASE
 1470                          E6,1446   E6,1453    DXERROR  ERASE  +5
 1471    REF    1              E6,1450              DYERROR  EQUALS DXERROR +2
 1472    REF    2  LAST  130   E6,1452              DZERROR  EQUALS DXERROR +4
 1473                          E6,1454   E6,1454    PLAST    ERASE
 1474                          E6,1455   E6,1455    QLAST    ERASE
 1475                          E6,1456   E6,1456    RLAST    ERASE
 1476                          E6,1457   E6,1457    TCQR     ERASE
R1477    OTHER VARIABLES.                                                                      (5D)

 1479                          E6,1460   E6,1460    OLDPMIN  ERASE                             THESE THREE USED IN MIN IMPULSE MODE.
 1480                          E6,1461   E6,1461    OLDQRMIN ERASE
 1481    REF    1              E6,1737              TEMP31   EQUALS DAPTEMP1

 1482                          E6,1462   E6,1463    SAVEHAND ERASE  +1
 1483                          E6,1464   E6,1464    PERROR   ERASE
 1484    REF    1              E6,1450              QERROR   EQUALS DYERROR
 1485    REF    1              E6,1452              RERROR   EQUALS DZERROR
R1486    JET STATE CHANGE VARIABLES- TIME (TOFJTCHG),JET BITS WRITTEN NOW                      (10D)
R1488      (JTSONNOW), AND JET BITS WRITTEN AT T6 RUPT (JTSATCHG).

 1489                          E6,1465   E6,1465    NXT6ADR  ERASE
 1490                          E6,1466   E6,1467    T6NEXT   ERASE  +1
 1491                          E6,1470   E6,1471    T6FURTHA ERASE  +1
 1492                          E6,1472   E6,1474    NEXTP    ERASE  +2
 1493    REF    1              E6,1473              NEXTU    =        NEXTP +1
 1494    REF    2  LAST  130   E6,1474              NEXTV    =        NEXTP +2
 1495                          E6,1475   E6,1476    -2JETLIM ERASE   +1                    RATE COMMAND 4-JET RATE DIFFERENCE LIMIT
 1496    REF    1              E6,1476              -RATEDB  EQUALS -2JETLIM +1            AND RATE DEADBAND FOR ASCENT OR DESCENT

 1497    REF    1              E6,1476              TARGETDB EQUALS -RATEDB                MAN. CONTROL TARGET DB COMPLEMENT.

R1498         *** Q,R AXIS ERASABLES ***                                                       (3)
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  1500    REF  13  LAST   87       4742              PBIT      EQUALS BIT10
  1501    REF  13  LAST   87       4741              QFBIT     EQUALS BIT11
  1502    REF   1              E6,1751               UERROR    EQUALS DAPTREG5         U,V-AXES ATT ERROR FOR RCS CONTROL LAWS
  1503    REF   1              E6,1752               VERROR    =      UERROR +1
  1504                         E6,1477  E6,1477      RETJADR   ERASE
  1505    REF   1              E6,1742               TEMPNUM   EQUALS DAPTEMP4
  1506    REF   1              E6,1743               NUMBERT   EQUALS DAPTEMP5
  1507    REF   1              E6,1744               ROTINDEX  EQUALS DAPTEMP6
  1508    REF   2  LAST  130   E6,1737               ROTEMP1   EQUALS DAPTEMP1
  1509    REF   1              E6,1740               ROTEMP2   EQUALS DAPTEMP2
  1511    REF   1              E6,1741               POLYTEMP  EQUALS DAPTEMP3
  1512                         E6,1500  E6,1500      SENSETYP  ERASE
  1513    REF   3  LAST  131   E6,1737               ABSTJ     EQUALS DAPTEMP1         ABS VALUE OF JET-FIRING TIME
  1514    REF   4  LAST  131   E6,1737               ABSEDOTP  EQUALS DAPTEMP1

  1515    REF   1              E6,1750               DPSBURN   EQUALS DAPTREG4         USED WITH SNUFFBIT. VERY TEMPORARY.
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L         ERASABLE ASSIGNMENTS                                                                    USER'S PAGE NO.  43       EO S4

P1516     TRIM GIMBAL CONTROL LAW ERASABLES:                                              (11D)

 1518     REF   5  LAST  131   E6,1737               GTSTEMPS EQUALS DAPTEMP1            GTS IS PART OF THE JASK.
 1519     REF   1              E6,1741               SHFTFLAG EQUALS GTSTEMPS +2         COUNT BITS FOR GTSQRT SHIFTING.
 1520     REF   2  LAST  132   E6,1744               ININDEX  EQUALS GTSTEMPS +5         INDEX FOR SHIFT LOOP IN GTSQRT.

 1521     REF   1              E6,1505               SAVESR   EQUALS AXISCTR             CANNOT BE A DAPTEMP - GTS USES THEM ALL.

 1522     REF   3  LAST  132   E6,1746               SCRATCH  EQUALS GTSTEMPS +7         ROOTCYCL ERASABLE
 1523     REF   4  LAST  132   E6,1747               HALFARG  EQUALS GTSTEMPS +8D        ROOTCYCL ERASABLE.

 1524     REF   5  LAST  132   E6,1737               K2THETA  EQUALS GTSTEMPS            D.P., K*ERROR,  NEGUSUM
 1525     REF   6  LAST  132   E6,1741               KCENTRAL EQUALS GTSTEMPS +2         S.P., K FROM KQ OR KRDAP, AT PI/2(8)
 1526     REF   7  LAST  132   E6,1742               K2CNTRAL EQUALS GTSTEMPS +3         D.P., GTS SCRATCH CELLS.
 1527     REF   8  LAST  132   E6,1743               WCENTRAL EQUALS GTSTEMPS +4         S.P., OMEGA, AT PI/4 RAD/SEC
 1528     REF   9  LAST  132   E6,1744               ACENTRAL EQUALS GTSTEMPS +5         S.P., ALPHA, AT PI/4 RAD/SEC(2)
 1529     REF  10  LAST  132   E6,1745               DEL      EQUALS GTSTEMPS +6         S.P., SGN FUNCTION VALUE.
 1530     REF  11  LAST  132   E6,1746               A2CNTRAL EQUALS GTSTEMPS +7         D.P., GTS SCRATCH CELLS.
 1531     REF  12  LAST  132   E6,1750               QRCNTR   EQUALS GTSTEMPS +9D        S.P.,INDEX FOR GTS LOOP THROUGH Q,R AXES
 1532     REF  13  LAST  132   E6,1751               FUNCTION EQUALS GTSTEMPS +10D       D.P.,ARGUMENT FOR GRSQRT,SCRATCH FOR GTS

 1534                          E6,1501  E6,1503      NEGUQ    ERASE   +2                 NEGATIVE OF Q-AXIS GIMBAL DRIVE
A1535                                                                NEGUQ +1              DEFINED AND USED ELSEWHERE
 1536     REF   1              E6,1503               NEGUR    EQUALS NEGUQ +2            NEGATIVE OF R-AXIS GIMBAL DRIVE

 1537                          E6,1504  E6,1506      KQ       ERASE   +2                 S.P.,JERK TERM FOR GTS, AT PI/2(8)
 1538     REF   1              E6,1505               AXISCTR  EQUALS KQ          +1
 1540     REF   2  LAST  132   E6,1506               KRDAP    EQUALS KQ          +2      .3 ACCDOTR SCALED AT PI/2(8)

 1541                          E6,1507  E6,1512      ACCDOTQ  ERASE   +3                 Q-JERK SCALED AT PI/2(7) UNSIGNED
 1542     REF   1              E6,1510               QACCDOT  EQUALS ACCDOTQ +1          Q-JERK SCALED AT PI/2(7) SIGNED
 1543     REF   2  LAST  132   E6,1511               ACCDOTR  EQUALS ACCDOTQ +2          R-JERK SCALED AT PI/2(7) UNSIGNED
 1544     REF   3  LAST  132   E6,1512               RACCDOT  EQUALS ACCDOTQ +3          R-JERK SCALED AT PI/2(7) SIGNED

 1545     REF   1              E6,1450               QDIFF    EQUALS QERROR              ATTITUDE ERRORS:
 1546     REF   1              E6,1452               RDIFF    EQUALS RERROR              SCALED AT PI RADIANS

A1547


R1548     TORQUE VECTOR RECONSTRUCTION VARIABLES:                                         (18D)

 1550     REF   1              E6,1745               JETRATE  EQUALS DAPTREG1
 1551     REF   1              E6,1746               JETRATEQ EQUALS JETRATE +1          THE LAST CONTROL SAMPLE PERIOD OF 100 MS
 1552     REF   2  LAST  132   E6,1747               JETRATER EQUALS JETRATE +2          SCALED AT PI/4 RADIANS/SECOND

 1553                          E6,1513  E6,1520      DOWNTORK ERASE   +5                 ACCUMULATED JET TORQUE COMMANDED ABOUT
 1554     REF   1              E6,1513               POSTORKP EQUALS DOWNTORK              +,-P, +,-U, +,-V RESPECTIVELY.
 1555     REF   2  LAST  132   E6,1514               NEGTORKP EQUALS DOWNTORK +1           EMPLOYED EXCLUSIVELY FOR DOWNLIST.
 1556     REF   3  LAST  132   E6,1515               POSTORKU EQUALS DOWNTORK +2           NOT INITIALIZED; PERMITTED TO OVERFLOW
 1557    REF   4  LAST  132    E6,1516              NEGTORKU EQUALS DOWNTORK +3     SCALED AT 32 JET-SEC, OR ABOUT 2.0 JET-
 1558    REF   5  LAST  133    E6,1517              POSTORKV EQUALS DOWNTORK +4         MSEC PER BIT.
 1559    REF   6  LAST  133    E6,1520              NEGTORKV EQUALS DOWNTORK +5

 1560                          E6,1521  E6,1523     NO.PJETS ERASE  +2
 1561    REF   1               E6,1522              NO.UJETS =      NO.PJETS +1
 1562    REF   1               E6,1523              NO.VJETS =      NO.UJETS +1
 1563                          E6,1524  E6,1526     TJP      ERASE  +2
 1564    REF   1               E6,1525              TJU      =      TJP +1
 1565    REF   2  LAST  133    E6,1526              TJV      =      TJP +2

 1566                          E6,1527  E6,1527     L,PVT-CG ERASE
 1567                          E6,1530  E6,1534     1JACC    ERASE   +4             ACCELERATIONS DUE TO 1 JET TORQUING
 1568    REF   1               E6,1531              1JACCQ   EQUALS 1JACC +1        SCALED AT PI/4 RADIANS/SECOND
 1569    REF   2  LAST  133    E6,1532              1JACCR   EQUALS 1JACC +2
 1570    REF   3  LAST  133    E6,1533              1JACCU   EQUALS 1JACC +3        FOR U,V-AXES THE SCALE FACTOR IS  DIFF:
 1571    REF   4  LAST  133    E6,1534              1JACCV   EQUALS 1JACC +4        SCALED AT PI/2 RADIANS/SECOND (FOR ASC)

R1572    ASCENT VARIABLES:                                                          (10D)

A1574
 1575                          E6,1535  E6,1536     SKIPU    ERASE  +1
 1576    REF   1               E6,1536              SKIPV    =      SKIPU +1
R1577    THE FOLLOWING LM DAP ERASABLES ARE ZEROED IN THE STARTDAP SECTION OF THE DAPIDLER PROGRAM AND THE COASTASC
R1579    SECTION OF THE AOSTASK.  THE ORDER MUST BE PRESERVED FOR THE INDEXING METHODS WHICH ARE EMPLOYED IN THOSE
R1581    SECTIONS AND ELSEWHERE.

 1582                          E6,1537  E6,1544     AOSQ     ERASE  +5              OFFSET ACC. ESTIMATES, UPDATED IN D.P.,
 1583    REF   1               E6,1541              AOSR     EQUALS AOSQ +2         AND SCALED AT PI/2.
 1584    REF   2  LAST  133    E6,1543              AOSU     EQUALS AOSQ +4         UV-AXES OFFSET ACC. FROMED BY VECTOR
 1585    REF   3  LAST  133    E6,1544              AOSV     EQUALS AOSQ +5         ADDITION OF Q,R.  AT PI/2 RAD/SEC(2).

 1586                          E6,1545  E6,1546     AOSQTERM ERASE   +1             (.1-.05K)AOS
 1587    REF   1               E6,1546              AOSRTERM EQUALS AOSQTERM +1     SCALED AT PI/4 RADIANS/SECOND.

R1588    FOR TJET LAW SUBROUTINE:                                                   (TEMPS ONLY)

A1590                                               NUMBERT  EQUALS DAPTEMP5        DEFINED IN QRAXIS.
 1591    REF   6  LAST  132    E6,1737              EDOTSQ   EQUALS DAPTEMP1
 1592    REF   2  LAST  131    E6,1740              ROTSENSE EQUALS DAPTEMP2
 1593    REF   2  LAST  131    E6,1741              FIREFCT  EQUALS DAPTEMP3        LOOKED AT BY PAXIS.
 1594    REF   2  LAST  131    E6,1742              TTOAXIS  EQUALS DAPTEMP4
 1595    REF   2  LAST  131    E6,1744              ADRSDIF2 EQUALS DAPTEMP6
 1596    REF   2  LAST  132    E6,1745              HOLDQ    EQUALS DAPTREG1
 1597    REF   1               E6,1746              ADRSDIF1 EQUALS DAPTREG2
 1598    REF   1               E6,1747              HH       EQUALS DAPTREG3        DOUBLE PRECISION
A1599                                               HH  +1   EQUALS DAPTREG4
 1600    REF   1               E6,1752              E        EQUALS DAPTREG6        TIME SHARE WITH VERROR
 1601    REF   2  LAST  130    E6,1427              EDOT     EQUALS OMEGAV
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R1602   INPUT TO TJET LAW (PERMANENT ERASABLES).                                   (48D)

 1604   REF    1                E6,1525             TJETU    =       TJU            EQUATE NAMES.  INDEXED BY -1, 0, +1.
 1605                           E6,1547   E6,1626   BLOCKTOP ERASE   +47D
 1606   REF    1                E6,1567             1/ANET1  =       BLOCKTOP +16D  THESE 8 PARAMETERS ARE SET UP BY 1/ACCS
 1607   REF    1                E6,1570             1/ANET2  =       1/ANET1 +1     FOR MINIMUM JETS ABOUT THE U-AXIS WHEN
 1608   REF    2  LAST   134    E6,1573             1/ACOAST =       1/ANET1 +4     EDOT IS POSITIVE.  TJETLAW INDEXES BY
 1609   REF    3  LAST   134    E6,1575             ACCFCTZ1 =       1/ANET1 +6     ADRSDIFF FROM THESE REGISTERS TO PICK UP
 1610   REF    4  LAST   134    E6,1576             ACCFCTZ5 =       1/ANET1 +7     PARAMETERS FOR THE PROPER AXIS, NUMBER
 1611   REF    5  LAST   134    E6,1601             FIREDB   =       1/ANET1 +10D   OF JETS AND SIGN OF EDOT.  THERE ARE 48
 1612   REF    6  LAST   134    E6,1603             COASTDB  =       1/ANET1 +12D   REGISTERS IN ALL IN THIS BLOCK.
 1613   REF    7  LAST   134    E6,1605             AXISDIST =       1/ANET1 +14D   FOUR NOT REFERENCED (P-AXIS) ARE FILLED
A1614                                                                                 IN BY THE FOLLOWING:
 1615   REF    2  LAST   134    E6,1547             ACCSWU   =       BLOCKTOP       SET BY 1/ACCS TO SHOW WHETHER MAXIMUM
 1616   REF    1                E6,1550             ACCSWV   =       ACCSWU +1      JETS ARE REQUIRED BECAUSE OF AOS.
 1617   REF    3  LAST   134    E6,1555             FLAT     =       BLOCKTOP +6    WIDTH OF MINIMUM IMPULSE ZONE.
 1618   REF    4  LAST   134    E6,1556             ZONE3LIM =       BLOCKTOP +7    HEIGHT OF MINIMUM IMPULSE ZONE(AT 4 SEC)

 16181                          E6,1627   E6,1630   COEFFQ   ERASE   +1             COEFFQ AND COEFFR ARE USED IN ROT-TOUV
 16182  REF    1                E6,1630             COEFFR   EQUALS COEFFQ +1       TO RESOLVE Q,R COMPONENTS INTO U,V COMP.
A1619

R1620   VARIABLES FOR GTS-QRAXIS CONTROL EXCHANGE.                                 (4)

 1622   REF    2  LAST   132    E6,1502             ALLOWGTS EQUALS NEGUQ +1        INSERT INTO UNUSED LOCATION
 1623                           E6,1631   E6,1631   COTROLER ERASE                  INDICATES WHICH CONTROL SYSTEM TO USE.
 1624                           E6,1632   E6,1634   QGIMTIMR ERASE              +2  Q-GIMBAL DRIVE TIMER, DECISECONDS.
 1625   REF    1                E6,1633             INGTS    EQUALS QGIMTIMR +1     INDICATOR OF CURRENT GTS CONTROL.
 1626   REF    2  LAST   134    E6,1634             RGIMTIMR EQUALS QGIMTIMR +2     R-GIMBAL DRIVE TIMER, DECISECONDS.

R1627   PLEASE RETAIN THE ORDER OF CDUXD THRU CDUZD FOR DOWNLINK PURPOSES.

R1628             KALCMANU:DAP INTERFACE.                                           (9D)

 1630                           E6,1635   E6,1637   CDUXD    ERASE    +2            CDU DESIRED REGISTERS:
 1631   REF    1                E6,1636             CDUYD    EQUALS CDUXD +1        SCALED AT PI RADIANS (180 DEGREES)
 1632   REF    2  LAST   134    E6,1637             CDUZD    EQUALS CDUXD +2        (STORE IN 2S COMPLEMENT)

 1633                           E6,1640   E6,1642   DELCDUX  ERASE    +2            NEGATIVE OF DESIRED 100MS CDU INCREMENT:
 1634   REF    1                E6,1641             DELCDUY  EQUALS DELCDUX +1      SCALED AT PI RADIANS (180 DEGREES)
 1635   REF    2  LAST   134    E6,1642             DELCDUZ  EQUALS DELCDUX +2      (STORE IN 2S COMPLEMENT)

R1636       RETAIN THE ORDER OF OMEGAPD TO OMEGARD FOR DOWNLINK PURPOSES.
 1637                           E6,1643   E6,1645   OMEGAPD  ERASE   +2             ATTITUDE MANEUVER DESIRED RATES:
 1638   REF    1                E6,1644             OMEGAQD  EQUALS OMEGAPD +1      (NOT EXPLICITLY REFERENCED IN GTS CNTRL)
 1639   REF    2  LAST   134    E6,1645             OMEGARD  EQUALS OMEGAPD +2      SCALED AT PI/4 RADIANS/SECOND

R1640             KALCMANU STORAGE.                                                 (24D)

 1642                           E6,1646   E6,1675   MIS      ERASE            +23D  I(18D)
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  1643   REF  1                E6,1670            COF      EQUALS MIS       +18D   I(6)

R1644              KALCMANU STORAGE.                                              (33D)

  1646                         E6,1676  E6,1734   BCDU     ERASE            +30D   B(3)
  1647   REF  1                E6,1701            KSPNDX   EQUALS BCDU      +3     B(1)
  1648   REF  1                E6,1702            KDPNDX   EQUALS KSPNDX    +1     B(1)

  1649   REF  1                E6,1703            TMIS     EQUALS KDPNDX    +1     I(18) MUST BE IN SAME BANK AS RCS DAP
  1650   REF  1                E6,1725            COFSKEW  EQUALS TMIS      +18D   I(6)  MUST BE IN SAME BANK AS RCS DAP
  1651   REF  1                E6,1733            CAM      EQUALS COFSKEW   +6     I(2)  MUST BE IN SAME BANK AS RCS DAP


  1652                         E6,1735  E6,1736   AM       ERASE            +1     I(2) THIS WAS ONCE IN E5 OVERLAYING OGC
A1653

R1654    FIRST-ORDER OVERLAYS IN KALCMANU                                         (25D)

  1656   REF  2  LAST  135     E6,1703            KV1      EQUALS TMIS             I(6)
  1657   REF  3  LAST  135     E6,1703            MFISYM   EQUALS TMIS             I
  1658   REF  4  LAST  135     E6,1703            TMFI     EQUALS TMIS             I
  1659   REF  5  LAST  135     E6,1703            NCDU     EQUALS TMIS             B
  1660   REF  6  LAST  135     E6,1706            NEXTIME  EQUALS TMIS      +3     B
  1661   REF  7  LAST  135     E6,1707            TTEMP    EQUALS TMIS      +4     B
  1662   REF  8  LAST  135     E6,1711            KV2      EQUALS TMIS      +6     I(6)
  1663   REF  9  LAST  135     E6,1711            BIASTEMP EQUALS TMIS      +6     B
  1664   REF 10  LAST  135     E6,1717            KV3      EQUALS TMIS      +12D   I(6)
  1665   REF 11  LAST  135     E6,1717            OGC      EQUALS TMIS      +12D   I

  1666   REF  2  LAST  135     E6,1725            BRATE    EQUALS COFSKEW          B
  1667   REF  3  LAST  135     E6,1725            IG       EQUALS COFSKEW          I

  1668   REF  1                E6,1733            TM       EQUALS CAM              B

R1669    SECOND-ORDER OVERLAYS IN KALCMANU                                        (24D)

  1671   REF  1                E6,1703            K1       =      KV1
  1672   REF  1                E6,1711            K2       =      KV2
  1673   REF  1                E6,1717            K3       =      KV3
  1674   REF  2  LAST  135     E6,1703            P21      EQUALS KV1              I(2)
  1675   REF  3  LAST  135     E6,1705            D21      EQUALS KV1       +2     I(2)
  1676   REF  4  LAST  135     E6,1707            G21      EQUALS KV1       +4     I(2)
  1677   REF  2  LAST  135     E6,1711            C2SQP    EQUALS KV2              I(2)
  1678   REF  3  LAST  135     E6,1713            C2SQM    EQUALS KV2       +2     I(2)
  1679   REF  4  LAST  135     E6,1715            C2PF     EQUALS KV2       +4     I(2)
  1680   REF  2  LAST  135     E6,1717            C2MP     EQUALS KV3              I(2)
  1681   REF  3  LAST  135     E6,1721            C1PP     EQUALS KV3       +2     I(2)
  1682   REF  4  LAST  135     E6,1723            C1MP     EQUALS KV3       +4     I(2)
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                 3:15 DEC. 2,1970  LUMERASE.120   PAGE  136

L        ERASABLE ASSIGNMENTS                                                         USER'S PAGE NO.  47       EQ S4

 1683    REF    4  LAST  135    E6,1725            VECQTEMP =      COFSKEW

 1684    REF    3  LAST  134    E6,1635            DCDU     =      CDUXD
 1685    REF    3  LAST  134    E6,1640            DELDCDU  =      DELCDUX
 1686    REF    1               E6,1641            DELDCDU1 =      DELCDUY
 1687    REF    1               E6,1642            DELDCDU2 =      DELCDUZ


R1688    *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

R1689    STORAGE FOR FINDCDUW

R1690             OVERLAYING KALCMANU STORAGE:                                    (26D)

 1692    REF    2  LAST  135    E6,1646            ECDUW    EQUALS MIS
 1693    REF    1               E6,1646            ECDUWUSR EQUALS ECDUW           B(1)TMP
 1694    REF    1               E6,1647            QCDUWUSR EQUALS ECDUWUSR +1     I(1)TMP
 1695    REF    1               E6,1650            NDXCDUW  EQUALS QCDUWUSR +1     B(1)TMP
 1696    REF    1               E6,1651            FLAGOODW EQUALS NDXCDUW  +1     B(1)TMP
 1697    REF    1               E6,1652            FLPAUTNO EQUALS FLAGOODW +1     B(1)TMP
 1698    REF    1               E6,1653            UNFC/2   EQUALS FLPAUTNO +1     I(6)IN
 1699    REF    1               E6,1661            UNWC/2   EQUALS UNFC/2   +6     I(6)IN
 1700    REF    1               E6,1667            UNFV/2   EQUALS UNWC/2   +6     I(6)S-S
 1701    REF    1               E6,1667            UNFVX/2  =      UNFV/2
 1702    REF    2  LAST  136    E6,1671            UNFVY/2  =      UNFV/2   +2
 1703    REF    3  LAST  136    E6,1673            UNFVZ/2  =      UNFV/2   +4
 1704    REF    4  LAST  136    E6,1675            -DELGMB  EQUALS UNFV/2   +6     B(3)TMP
R1705
R1706             DEFINED IN THE WORK AREA:                                       (18D)

 1708                              0000            UNX/2    =      0
 1709                              0006            UNY/2    =      6
 1710                              0014            UNZ/2    =      14
R1711
R1712    END OF FINDCDUW ERASABLES

R1713    *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

R1714    THE FOLLOWING ARE THE DAP REPLACEMENTS FOR THE ITEMPS AND RUPTREGS,NEEDED BECAUSE DAP IS NOW A TOB,JASK,JAB,TOSK
R1716    ...ANYWAY, THE DAP CAN NOW BE INTERRUPTED.                                       (18D)

 1718                           E6,1737  E6,1760   DAPTEMP1 ERASE  +17D
 1719    REF    7  LAST  133    E6,1740            DAPTEMP2 EQUALS DAPTEMP1 +1
 1720    REF    8  LAST  136    E6,1741            DAPTEMP3 EQUALS DAPTEMP1 +2
 1721    REF    9  LAST  136    E6,1742            DAPTEMP4 EQUALS DAPTEMP1 +3
 1722    REF   10  LAST  136    E6,1743            DAPTEMP5 EQUALS DAPTEMP1 +4
 1723    REF   11  LAST  136    E6,1744            DAPTEMP6 EQUALS DAPTEMP1 +5
 1724    REF   12  LAST  136    E6,1745            DAPTREG1 EQUALS DAPTEMP1 +6
 1725    REF   13  LAST  136    E6,1746            DAPTREG2 EQUALS DAPTEMP1 +7
 1726    REF   14  LAST  136    E6,1747            DAPTREG3 EQUALS DAPTEMP1 +8D
 1727    REF   15  LAST  136    E6,1750               DAPTREG4  EQUALS DAPTEMP1 +9D
 1728    REF   16  LAST  137    E6,1751               DAPTREG5  EQUALS DAPTEMP1 +10D
 1729    REF   17  LAST  137    E6,1752               DAPTREG6  EQUALS DAPTEMP1 +11D

 1730    REF   18  LAST  137    E6,1753               DAPARUPT  EQUALS DAPTEMP1 +12D
 1731    REF    1               E6,1754               DAPALRPT  EQUALS DAPARUPT +1
 1732    REF    2  LAST  137    E6,1755               DAPBQRPT  EQUALS DAPARUPT +2
 1733    REF    3  LAST  137    E6,1757               DAPZRUPT  EQUALS DAPARUPT +4

A1734                                                                               (DAPZRUPT IS ALSO JASK-IN-PROGRESS FLAG)
A1735

R1736              NEEDLER(ATTITUDE ERROR EIGHT BALL DISPLAY) STORAGE.              (6D)

 1738    REF    3  LAST   95       0061               T5TEMP    EQUALS ITEMP1
 1739    REF    4  LAST   95       0063               DINDX     EQUALS ITEMP3
 1740                           E6,1761  E6,1763      AK        ERASE  +2           NEEDLER ATTITUDE INPUTS, SCALED AT 180
 1741    REF    1               E6,1762               AK1       EQUALS AK +1        DEGREES.  P,Q,R AXES IN AK,AK1,AK2.
 1742    REF    2  LAST  137    E6,1763               AK2       EQUALS AK +2

 1743                           E6,1764  E6,1766      EDRIVEX   ERASE  +2           NEEDLER DISPLAY REGS AT 1800 DEGREES.
 1744    REF    1               E6,1765               EDRIVEY   EQUALS EDRIVEX +1   SO THAT 384 BITS REPRESENT 42 3/16 DEG.
 1745    REF    2  LAST  137    E6,1766               EDRIVEZ   EQUALS EDRIVEX  +2

R1746              DOCKED JET INHIBITION COUNTERS                                   (3D)

 17462                          E6,1767  E6,1771      PJETCTR   ERASE  +2
 17463   REF    1               E6,1770               UJETCTR   EQUALS PJETCTR +1
 17464   REF    2  LAST  137    E6,1771               VJETCTR   EQUALS PJETCTR +2

 17465   REF    1               E6,1771               END-E6    EQUALS VJETCTR
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P1747                 EBANK-7 ASSIGNMENTS

 1748                     E7,1400                  SETLOC 3400


R1749            P35 CONSTANTS.        -PAD LOADED-                            (4D)

 1751                     E7,1400  E7,1401   ATIGINC   ERASE   +1              B(2)PL  *MUST BE AT 1400 FOR SYSTEMSTEST
 1752                     E7,1402  E7,1403   PTIGINC   ERASE   +1              B(2)PL


R1753            AOTMARK STORAGE.      -PAD LOADED-                            (12D)

 1755                     E7,1404  E7,1411   AOTAZ     ERASE   +5              B(6)PL
 1756                     E7,1412  E7,1417   AOTEL     ERASE   +5              B(6)PL

R1757            LANDING RADAR.        -PAD LOADED-                            (2D)

 1759                     E7,1420  E7,1420   LRHMAX    ERASE                   B(1)
 1761                     E7,1421  E7,1421   LRWH      ERASE                   B(1)
A1765


R1766            THROTTLE STORAGE.     -PAD LOADED-                            (1D)

 1768                     E7,1422  E7,1422   ZOOMTIME ERASE                    B(1)PL TIME OF DPS THROTTLE-UP COMMAND

R1769            P63 AND P64 CONSTANTS.     -PAD LOADED-                       (4D)

 1771                     E7,1423  E7,1423   TENDBRAK ERASE                    B(1) LANDING PHASE SWITCHING CRITERION
 1772                     E7,1424  E7,1424   TENDAPPR ERASE                    B(1) LANDING PHASE SWITCHING CRITERION
 1773                     E7,1425  E7,1425   DELTTFAP ERASE                    B(1) INCREMENT ADDED TO TTF/8 WHEN
A1774                                                                               SWITCHING FROM P63 TO P64
 1775                     E7,1426  E7,1426   LEADTIME ERASE                    B(1)  TIME INCREMENT SPECIFYING HOW MUCH
A1776                                                                               GUIDANCE IS PROJECTED FORWARD.
A1777

R1778            LANDING RADAR       -PAD LOADED-                              (2D)

 1780                     E7,1427  E7,1427   RPCRTIME ERASE                    B(1) REPOSITIONING CRITERION  (TIME)
 1781                     E7,1430  E7,1430   RPCRTQSW ERASE                    B(1) REPOSITIONING CRITERION (ANGLE)
A1782

R178201          ASTEER    -PAD LOADED-                                        (2D)

 178203                   E7,1431  E7,1432   TNEWA     ERASE   +1              I(2)PL  LAMBERT CYCLE PERIOD
A178204

R178205          P22 STORAGE  - OVERLAYS LANDING PADLOADS -                    (5D)
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 178215 REF    1             E7,1423             REPOSCNT EQUALS TENDBRAK            B(1)TMP   COUNTS NUMBER OF PASSES THROUGH
A17822                                                                                        REPOSITION ROUTINE.
 178225 REF    1             E7,1424             REPOSTM  EQUALS REPOSCNT +1         I(2)TMP   PRESENT TIME PLUS INCREMENTS OF
A17823                                                                                        TEN SECONDS.
 178235 REF    1             E7,1426             DELTATM  EQUALS REPOSTM  +2         I(2)TMP   TIME INTERVAL FOR RUNNING
A17824                                                                                        DESIGNATE TASK.
A178245

R1783   *** RETAIN THE ORDER OF DELVSLV, TIG, RTARG, DELLT4 FOR UPDATE. ***


R1784                P32-35  P72-75  STORAGE.                                         (6D)

 1786                        E7,1433  E7,1440    DELVLVC  ERASE           +5          I(6) DELTA VELOCITY - LOCAL VERTICAL COO
 1787   REF    1             E7,1433             DELVSLV  =        DELVLVC            (TEMP STORAGE OF SAME VECTOR)   -RDINATE
A1788


R1789                P30-P40 INTERFACE UNSHARED.                                      (2D)

 1791                        E7,1441  E7,1442    TIG      ERASE           +1          B(2)
A1792

R1793                INITVEL STORAGE. ALSO USED BY P34,35,74,75,10,11 OTHERS          (8D)

 1795                        E7,1443  E7,1450    RTARG    ERASE           +5          I(6) TARGET VECTOR
 1796                        E7,1451  E7,1452    DELLT4   ERASE           +1          I(2) TIME DIFFERENCE
A1797

R1798                P30-P40 INTERFACE UNSHARED.                                      (3D)

 1800                        E7,1453  E7,1454    TTOGO    ERASE           +1          B(2)
 1801   REF    1             E7,1453             TFI      EQUALS TTOGO
 1802                        E7,1455  E7,1455    WHICH    ERASE                       B(1)
A1803

R1804                ***  P21  ***                                                    (1D)

 1806                        E7,1456  E7,1456    LOSCOUNT ERASE                       B(1)
A1807

R1808                LSR22.3 (RENDEZVOUS NAVIGATION) STORAGE.                         (4D)

R1810      RETAIN THE ORDER OF AIG TO TRKMKCNT FOR DOWNLINK PURPOSES.
 1811                        E7,1457  E7,1457    AIG      ERASE                       B(1)OUT   GIMGAL ANGLES
 1812                        E7,1460  E7,1460    AMG      ERASE                       B(1)OUT   (MUST BE
 1813                        E7,1461  E7,1461    AOG      ERASE                       B(1)OUT    CONSECUTIVE)

 1814                        E7,1462  E7,1462    TRKMKCNT ERASE                       B(1)TMP   TEMPORARY MARK STORAGE.
 1815   REF    1             E7,1462             MARKCTR  =        TRKMKCNT
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L        ERASABLE ASSIGNMENTS                                                           USER'S PAGE NO.  51       EO S4

R1816              P32-P35, P72-P75 STORAGE.  -PERMANENT-                               (6)

 1818                         E7,1463  E7,1463  NORMEX   ERASE                          B(1) PRM SAVE FOR Q
 1819                         E7,1464  E7,1464  QSAVED   ERASE                          B(1) PRM SAVE FOR Q
 1820                         E7,1465  E7,1465  RTRN     ERASE                          B(1) PRM SAVE FOR Q
 1821                         E7,1466  E7,1467  NN       ERASE              +1          B(2)
 1822                         E7,1470  E7,1470  SUBEXIT  ERASE                          B(1) PRM SAVE Q


 18221                        E7,1471           E7OVERLA EQUALS                         START OF E7 OVERLAYS.
 18222  REF    1              E7,1471           WHOCARES EQUALS E7OVERLA                DUMMY FOR EBANK INSENSITIVE 2CADRS

R1823              LUNAR LANDING OVERLAYS                                               (6D)

 18242  REF    1              E7,1463           /AFC/    EQUALS NORMEX                  B(2)TMP    THROTTLE
 18243  REF    1              E7,1465           FCODD    EQUALS /AFC/       +2          B(2)TMP    THROTTLE
 18244  REF    1              E7,1467           FP       EQUALS FCODD       +2          B(2)TMP    THROTTLE
A18245
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P1825    *******  OVERLAY NUMBER 0 IN EBANK 7  *******
A1826


R1827    RENDEZVOUS GUIDANCE STORAGE -P32....P35-                                                    (89D)

  1829   REF    1                E7,1611             TSTRT      EQUALS DELDV                         MIDCOURSE START TIME
  1830   REF    1                E7,1573             TDEC2      EQUALS DELVCSI                       TEMP STORAGE FOR INTEGRATION TIME INPUT
  1831   REF    1                E7,1575             KT         EQUALS DELVTPI                       TEMP STORAGE FOR MIDCOURSE DELTA TIME
  1832                           E7,1471  E7,1476    VACT1      ERASE  +5D                           VELOCITY VECTOR OF ACTIVE  AT CSI TIME
  1833                           E7,1477  E7,1504    RPASS1     ERASE  +5D                           POSITION VECTOR OF PASSIVE AT CSI TIME
  1834                           E7,1505  E7,1512    VPASS1     ERASE  +5D                           VELOCITY VECTOR OF PASSIVE AT CSI TIME
  1835                           E7,1513  E7,1520    VACT2      ERASE  +5D                           VELOCITY VECTOR OF ACTIVE  AT CDH TIME
  1836                           E7,1521  E7,1526    RPASS2     ERASE  +5D                           POSITION VECTOR OF PASSIVE AT CDH TIME
  1837                           E7,1527  E7,1534    VPASS2     ERASE  +5D                           VELOCITY VECTOR OF PASSIVE AT CDH TIME
  1838                           E7,1535  E7,1542    RACT3      ERASE  +5D                           POSITION VECTOR OF ACTIVE  AT TPI TIME
  1839                           E7,1543  E7,1550    VACT3      ERASE  +5D                           VELOCITY VECTOR OF ACTIVE  AT TPI TIME
  1840                           E7,1551  E7,1556    RPASS3     ERASE  +5D                           POSITION VECTOR OF PASSIVE AT TPI TIME
  1841                           E7,1557  E7,1564    VPASS3     ERASE  +5D                           VELOCITY VECTOR OF PASSIVE AT TPI TIME
  1842                           E7,1565  E7,1572    VACT4      ERASE  +5D                           VELOCITY VECTOR OF ACTIVE  AT INTERCEPT
  1843   REF    1                E7,1543             UNVEC      EQUALS VACT3                         CDHMVR UNIT VECTOR TEMP STORAGE.
  1844                           E7,1573  E7,1574    DELVCSI    ERASE  +1D                           THRUST VALUE AT CSI
  1845                           E7,1575  E7,1576    DELVTPI    ERASE  +1D                           THRUST VALUE AT TPI OR MID
  1846   REF    2  LAST   141    E7,1575             DELVMID    EQUALS DELVTPI
  1847                           E7,1577  E7,1600    DIFFALT    ERASE  +1D                           ALT DIFFERENCE AT CDH
  1848                           E7,1601  E7,1602    POSTCSI    ERASE  +1                            PERIGEE ALTITUDE AFTER CSI MANEUVER
  1849                           E7,1603  E7,1604    POSTCDH    ERASE  +1                            PERIGEE ALTITUDE AFTER CDH MANEUVER
  1850                           E7,1605  E7,1606    POSTTPI    ERASE  +1                            PERIGEE ALTITUDE AFTER TPI MANEUVER
  1851   REF    1                E7,1605             LOOPCT     EQUALS POSTTPI                       CSI NEWTON ITERATION COUNTER
  1852   REF    1                E7,1603             HAFPA1     EQUALS POSTCDH                       HALF PERIOD
  1853                           E7,1607  E7,1610    GAMPREV    ERASE  +1                            PREVIOUS GAMMA
  1854   REF    3  LAST   141    E7,1575             DVPREV     EQUALS DELVTPI                       PREVIOUS DELVCSI
  1855                           E7,1611  E7,1612    DELDV      ERASE  +1D
  1856                           E7,1613  E7,1614    CSIALRM    ERASE  +1                            FIRST SOLUTION ALARM
  1857                           E7,1615  E7,1615    VERBNOUN   ERASE
  1858   REF    1                E7,1613             TITER      EQUALS CSIALRM                       ITERATION COUNTER
  1859                           E7,1616  E7,1617    RDOTV      ERASE  +1
  1860   REF    1                E7,1505             VAPREC     EQUALS VPASS1                        I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
  1861   REF    1                E7,1477             RAPREC     EQUALS RPASS1                        I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
  1862   REF    1                E7,1527             VPPREC     EQUALS VPASS2                        I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
  1863   REF    1                E7,1521             RPPREC     EQUALS RPASS2                        I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
  1864   REF    4  LAST   141    E7,1575             DELEL      EQUALS DELVTPI                       I(2) S-S
  1865   REF    2  LAST   141    E7,1611             DELTEE     EQUALS DELDV                         I(2)S-S
  1866   REF    2  LAST   141    E7,1573             SECMAX     EQUALS DELVCSI                       I(2) S-S MAX STOP SIZE FOR ROUTINE
  1867   REF    2  LAST   141    E7,1605             DELTEEO    EQUALS POSTTPI                       I(2) S-S BACK VALUES OF DELTA TIME
  1868                           E7,1620  E7,1621    CENTANG    ERASE                     +1         I(2) S-S CENTRAL ANGLE COVERED(TPI-TPF)

A1869
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R1870                 SOME P47 STORAGE                                              (6D)

 1872                           E7,1622  E7,1627   DELVIMU   ERASE           +5     I(6)DSP NOUN 83 FOR P47 DELTA V (IMU)
A1873

R1874                 P30-P40 COMMON STORAGE.                                       ( 3D)

 1876                           E7,1630  E7,1631   TPASS4    ERASE  +1              INTERCEPT TIME
 1877                           E7,1632  E7,1632   QTEMP     ERASE                  I(1)TMP COMMON RETURN SAVE REGISTER.


A1878
R1879                 P32,33,34 STORAGE.                                            (6D)

 1881                           E7,1633  E7,1634   TCSI      ERASE           +1     B(2) TMP CSI TIME IN CENTISECONDS
 1882                           E7,1635  E7,1636   TTPI      ERASE           +1     B(2) TMP TPI TIME IN CENTISECONDS
 1883                           E7,1637  E7,1640   TTPIO     ERASE           +1     B(2) TMP TTPI STORAGE FOR RECYCLE

R1884                 P30,P40 INTERFACE.                                            (21D)

 1886                           E7,1641  E7,1664   RTIG      ERASE  +19D            I(6)TMP
 1887   REF   1                 E7,1647            VTIG      EQUALS RTIG     +6     I(6)TMP
 1888   REF   1                 E7,1655            DELVSIN   EQUALS VTIG     +6     I(6)TMP
 1889   REF   1                 E7,1663            DELVSAB   EQUALS DELVSIN  +6     I(2)TMP
 1890   REF   1                 E7,1663            VGDISP    =      DELVSAB


 1891                           E7,1665  E7,1665   QTEMP1    ERASE                  I(1)TMP HOLDS RETURN.
 1892   REF   1                 E7,1665            RGEXIT    EQUALS QTEMP1          SAVE Q
 1893   REF   2  LAST   142     E7,1665            SAVQR52   EQUALS QTEMP1

R1894                 INITVEL STORAGE.  (IN OVERLAY 0 AND OVERLAY 1.                (2D)
R1896                         ((CALLS LAMBERT, CONIC SUBROUTINES)

 1897   REF   1                 E7,1565            VTPRIME   EQUALS VACT4           TOTAL VELOCITY AT DESIRED RADIUS
 1898   REF   1                 E7,1616            ITCTR     EQUALS RDOTV           ITERATION COUNTER
 1899                           E7,1666  E7,1667   COZY4     ERASE           +1     COS OF ANGLE WHEN ROTATION STARTS
 1900   REF   3  LAST   141     E7,1611            X1INPUT   EQUALS DELDV           X1 TEMP STORAGE
 1901   REF   1                 E7,1607            INTIME    EQUALS GAMPREV         TIME OF RINIT
A1902


R1903                 PERIAPO STORAGE. (2D)                                         (2D)

 1905                           E7,1670  E7,1671   XXXALT    ERASE           +1     RADIUS TO LAUNCH PAD OR LANDING SIGHT

 1906   REF   1                 E7,1672            END-IN/M  EQUALS XXXALT   +2     NEXT AVAIL ERASABLE AFTER INITVEL/MIDGIM
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R1907             S40.1 STORAGE.                                                       (12D)

 1910                           E7,1672  E7,1705   UT        ERASE                +11D  I(6)    THRUST DIRECTION
 1911   REF    1                E7,1700            VGTIG     EQUALS UT            +6    I(6)OUT
 1912   REF    1                E7,1700            VGPREV    =      VGTIG
R1913   ASTEER STORAGE.                                                                (22D)

 1915                           E7,1706  E7,1733   VG        ERASE                +21D  I(6)
 1916   REF    1                E7,1714            RMAG      EQUALS VG            +6    I(2)
 1917   REF    1                E7,1716            MUASTEER  EQUALS RMAG          +2    I(2)
 19171  REF    1                E7,1720            MU/A      EQUALS MUASTEER      +2    I(2)
 19172  REF    1                E7,1722            RTMAG     EQUALS MU/A          +2    I(2)
 19173  REF    1                E7,1724            R1C       EQUALS RTMAG         +2    I(6)
 19174  REF    1                E7,1732            SS        EQUALS R1C           +6    I(2)

 19175  REF    2  LAST   142    E7,1655            IC        =      DELVSIN
 19176  REF    1                E7,1762            TIGSAVE   =      P21TIME
 19177  REF    1                E7,1764            TIGSAVEP  =      SCAXIS
 19178  REF    2  LAST   143    E7,1766            MUSCALE   =      SCAXIS        +2
R1918

R1919             P40 STORAGE.                                                         (6D)

R1921                  F,MDOT,AND TDECAY MUST BE CONTIGUOUS FOR VLOAD.
 1922                           E7,1734  E7,1741   F         ERASE                +5    I(2)TMP  S40.1 GENERATES THIS FOR S40.3
 1923   REF    1                E7,1736            MDOT      EQUALS F             +2    I(2)TMP MASS CHNG RATE, KG/CS AT 2**3.
 1924   REF    1                E7,1740            TDECAY    EQUALS MDOT          +2    I(2)IN  DELTA-T TAILOFF, (2**28)CS.
 1925                           E7,1742  E7,1743   VEX       ERASE                +1    I(2) EXHAUST VELOCITY FOR TGO COMPUTAT'N
A1926


R1927             MIDTOAV1(2) STORAGE. (CALLED BY P40,P41,P42)                         (1D)

 1929                           E7,1744  E7,1744   IRETURN1 ERASE                       B(1)     RETURN FROM MIDTOAV1 AND 2
A1930
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P1931    ******* OVERLAY  NUMBER 1 IN EBANK 7  *******
A1932


R1933                INITVEL  (CALLED BY P34,35,38,39,10,11,S40.9,S40.1)              (6D)

 1935    REF   1                E7,1471             RTARG1    EQUALS VACT1             I(6)S TEMP STORAGE OF RTARG
A1936

R1937                P35-P40 INTERFACE.                                                 (6D)

 1939    REF   2  LAST  141     E7,1505             VPASS4    EQUALS VPASS1             I(6)TMP VELOCITY OF PASSIVE AT INTERCEPT


R1940                INITVEL OVERLAYS RENDESVOUS GUIDANCE (LISTED IN OVERLAY 0)

R1941                SOME P38-39,P78-79 STORAGE.                                        (2D)

 1943    REF   1                E7,1630             TINT      EQUALS TPASS4             I(2)  TIME OF INTERCEPT
A1944

R1945                LAT - LONG TEMPORARIES. CAN OVERLAY WITH S40.1                      (3D)

 1947    REF   2  LAST  143     E7,1672             ERADM     EQUALS UT                 I(2)
 1948    REF   1                E7,1674             INCORPEX  EQUALS ERADM     +2       I(1)


R1949                LRS24.1 STORAGE. (CAN SHARE WITH P30'S)                            (40D)

 1951    REF   1                E7,1675             RLMSRCH   EQUALS INCORPEX +1        I(6) TMP LM POSITION VECTOR
 1952    REF   1                E7,1703             VXRCM     EQUALS RLMSRCH  +6        I(6)    CM V X R VECTOR
 1953    REF   1                E7,1711             LOSDESRD  EQUALS VXRCM    +6        I(6)    DESIRED LOS VECTOR
 1954    REF   1                E7,1717             UXVECT    EQUALS LOSDESRD +6        I(6)    X-AXIS SRCH PATTERN COORDS
 1955    REF   1                E7,1725             UYVECT    EQUALS UXVECT   +6        I(6)    Y-AXIS SRCH PATTERN COORDS
 1956    REF   1                E7,1733             DATAGOOD  EQUALS UYVECT   +6        B(1)DSP FOR R1 - ALL 1-S WHEN LOCKON
 1957    REF   1                E7,1734             OMEGDISP  EQUALS DATAGOOD +1        B(2)    ANGLE OMEGA DISPLAYED IN R2
 1958    REF   1                E7,1734             OMEGAD    =      OMEGDISP                   PINBALL DEFINITION.
 1959    REF   2  LAST  144     E7,1736             NSRCHPNT  EQUALS OMEGDISP +2        B(1)TMP SEARCH PATTERN POINT COUNTER.
 1960    REF   1                E7,1737             SAVLEMV   EQUALS NSRCHPNT +1        I(6) S-S SAVES LOSVEL


A1961
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L        ERASABLE ASSIGNMENTS                                                                  USER'S PAGE NO.  56      EO S4

P1962    ******* OVERLAY NUMBER 2 IN EBANK 7  *******
A1963

R1964              INCORP STORAGE IN E7.                                                      (47D)

 1966    REF    2  LAST  140    E7,1471              TX789     EQUALS E7OVERLA                I(6)
 1967    REF    1               E7,1477              GAMMA     EQUALS TX789     +6            I(3)
 1968    REF    1               E7,1502              OMEGA     EQUALS GAMMA     +3            I(18)
 1969    REF    1               E7,1524              BVECTOR   EQUALS OMEGA     +18D          I(18)
 1970    REF    1               E7,1546              DELTAQ    EQUALS BVECTOR   +18D          I(2)
R1971              AOTMARK STORAGE                                                            (3D)

 1973    REF    1               E7,1550              MARKCNTR  EQUALS DELTAQ    +2            I(1)
 1974    REF    1               E7,1551              XYMARK    EQUALS MARKCNTR  +1            B(1)
 1975    REF    1               E7,1552              MKDEX     EQUALS XYMARK    +1            B(1)TMP INDEX FOR AOTMARK
A1976

R1977              PLANET STORAGE.                                                            (8D)

 1979    REF    1               E7,1553              PLANVEC   EQUALS MKDEX     +1            (6) REFER VECTOR OF PLANET
 1980    REF    1               E7,1561              TSIGHT    EQUALS PLANVEC   +6            (2) TIME OF MARK OR EST TIME OF MARK
A1981


R1982              LRS22.3 STORAGE. (CAN SHARE WITH P30'S AND OVERLAY LRS24.1                 (30D).

 1984    REF    2  LAST  144    E7,1675              LGRET     EQUALS RLMSRCH                 I(1)  TMP
 1985    REF    1               E7,1675              RDRET     EQUALS LGRET                   B(1)   TEMP RETURN.
 1986    REF    2  LAST  145    E7,1675              IGRET     EQUALS LGRET                   B(1)   TEMP RETURN.
 1987    REF    1               E7,1676              MX        EQUALS RDRET     +1            I(6)
 1988    REF    1               E7,1704              MY        EQUALS MX +6                   I(6)
 1989    REF    1               E7,1712              MZ        EQUALS MY +6                   I(6)
 1990    REF    2  LAST  145    E7,1676              E0        EQUALS MX                      I(2)
 1991    REF    3  LAST  145    E7,1700              E1        EQUALS MX +2                   I(2)
 1992    REF    4  LAST  145    E7,1702              E2        EQUALS MX +4                   I(2)
 1993    REF    1               E7,1704              E3        EQUALS E2        +2            I(2)
 1994    REF    1               E7,1720              SCALSHFT  EQUALS MZ        +6            B(1) SCALE SHIFT FOR EARTH/MOON
 1995    REF    1               E7,1721              RXZ       EQUALS SCALSHFT  +1            I(2)
 1996    REF    1               E7,1723              ULC       EQUALS RXZ       +2            I(6)
 1997    REF    1               E7,1731              SINTHETA  EQUALS ULC       +6            I(2)

R1998          ***** IN OVERLAY ONE *****

 1999    REF    1               E7,1746              N49FLAG   EQUALS RDOTMSAV                B(1)S     FLAG INDICATING V0649 RESPONSE
A2000

R2001              LRS22.1 STORAGE. (MUST NOT SHARE WITH P30'S)                                (13D)

R2003              (OUTPUTS ARE TO LRS22.3)
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 2004   REF    1               E7,1733          RRTRUN   EQUALS SINTHETA +2      B(2)OUT  RR TRUNION ANGLE
 2005   REF    1               E7,1735          RRSHAFT  EQUALS RRTRUN   +2      B(2)OUT RRSHAFT ANGLE
 2006   REF    1               E7,1737          LRS22.1X EQUALS RRSHAFT  +2      B(1)TMP
 2007   REF    1               E7,1740          RRBORSIT EQUALS LRS22.1X +1      I(6) TMP RADAR BORESIGHT VECTOR.
 2008   REF    1               E7,1746          RDOTMSAV EQUALS RRBORSIT +6      B(2) S     RR RANGE-RATE(FPS)
A2009

R2010         LRS22.1  (SAME AS PREVIOUS SECTION) ALSO DOWNLINK FOR RR  (R29)(10D)   CANNOT SHARE WITH L.A.D.

 2012   REF    2  LAST  145    E7,1750          RDOTM    EQUALS RDOTMSAV +2      B(2)OUT  RANGE-RATE READING
 2013   REF    1               E7,1752          TANGNB   EQUALS RDOTM    +2      B(2)TMP  RR GIMBAL ANGLES
R2014         RETAIN THE ORDER OF MKTIME TO RM FOR DOWNLINK PURPOSES
 2015   REF    1               E7,1754          MKTIME   EQUALS TANGNB   +2      B(2)OUT  TIME OF RR READING
 2016   REF    1               E7,1756          RM       EQUALS MKTIME   +2      I(2)OUT  RANGE READING
 2017   REF    1               E7,1760          RANGRDOT EQUALS RM       +2      B(2) DOWNLINKED RAW RANGE AND RRATE
A20175
R2018         R61LEM - PREFERRED TRACKING ATTITUDE ROUTINE  **IN OVERLAY ONE*
R2019                  (CALLED BY P20,P22LEM,LSR22.3)                            (1D)

 2021   REF    2  LAST  146    E7,1745          R65CNTR  EQUALS RRBORSIT +5      B(1)SS  COUNT NUMBER OF TIMES PREFERRED
A2022                                                                                    TRACKING ROUTINE IS TO CYCLE
 2023   REF    1               E7,1745          WHCHREAD EQUALS R65CNTR          TELLS WHICH RR DATA TRIGGERED N49 DISPLA

A2024

R2025         P21 STORAGE                                                        (2D)

 2027   REF    1               E7,1762          P21TIME  EQUALS RANGRDOT +2      I(2)TMP
A2028

R2029         KALCMANU, VECPOINT STORAGE.  CALLED BY R63, R61, R65.              (12D)

 2031   REF    2  LAST  143    E7,1764          SCAXIS   EQUALS P21TIME  +2      I(6)
 2032   REF    3  LAST  143    E7,1772          POINTVSM EQUALS SCAXIS   +6      I(6)
A2033
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P2034    *******  OVERLAY NUMBER 3 IN EBANK 7  *******
A2035


R2036              SERVICE  STORAGE                                                       (6D)

 2038    REF    3  LAST  145    E7,1471              ABVEL    EQUALS E70VERLA             B(2)  DISPLAY
 2039    REF    1               E7,1473              HDOTDISP EQUALS ABVEL     +2         B(2)  DISPLAY
 2040    REF    2  LAST  123    E7,1475              TTFDISP  EQUALS HDOTDISP  +2         B(2)  DISPLAY
A2041

R2042              BURN PROG STORAGE.                                                     (2D)

 2044    REF    1               E7,1477              SAVET-30 EQUALS TTFDISP   +2         B(2)TMP TIG-30 RESTART
A2045

R2046              SERVICER STORAGE.                                                      (69D)

 2048    REF    1               E7,1501              VGBODY   EQUALS SAVET-30 +2          B(6)OUT SET.BY S41.1 VG LEM, SC.COORDS
 2049    REF    1               E7,1501              DELVCTL  =      VGBODY
 2050    REF    2  LAST  147    E7,1507              DVTOTAL  EQUALS VGBODY    +6         B(2) DISPLAY NOUN
 2051    REF    1               E7,1511              GOBLTIME EQUALS DVTOTAL   +2         B(2) NOMINAL TIG FOR CALC. OF GOBLATE.
 2052    REF    1               E7,1513              ABDVCONV EQUALS GOBLTIME +2          I(2)
 2053    REF    1               E7,1515              DVCNTR   EQUALS ABDVCONV +2          B(1)
 2054    REF    1               E7,1516              TGO      EQUALS DVCNTR    +1         B(2)
 2055    REF    1               E7,1520              R        EQUALS TGO       +2         I(6)
 2056    REF    1               E7,1520              UNITGOBL EQUALS R                    I(6)
 2057    REF    2  LAST  147    E7,1526              V        EQUALS R         +6
 2058    REF    1               E7,1526              DELVREF  EQUALS V                    I(6)
 2059    REF    1               E7,1534              HCALC    EQUALS DELVREF   +6         B(2)     LR
 2060    REF    1               E7,1536              UNIT/R/  EQUALS HCALC     +2         I(6)
P2061                    (THE FOLLOWING SERVICER ERASABLES CAN BE SHARED WITH SECOND DPS GUIDANCE STORAGE)

 2063    REF    1               E7,1544              RN1      EQUALS UNIT/R/   +6         B(6)
 2064    REF    1               E7,1552              VN1      EQUALS RN1       +6         I(6)                      (IN ORDER  )
 2065    REF    1               E7,1560              PIPTIME1 EQUALS VN1       +6         B(2)                      (   FOR    )
 2066    REF    1               E7,1562              GDT1/2   EQUALS PIPTIME1 +2          I(6)                      (  COPY    )
 2067    REF    1               E7,1570              MASS1    EQUALS GDT1/2    +6         I(2)                      (  CYCLE   )
 2068    REF    1               E7,1572              R1S      EQUALS MASS1     +2         I(6)
 2069    REF    1               E7,1600              V1S      EQUALS R1S       +6         I(6)


R2070              ALIGNMENT/S40.2.3 COMMON STORAGE.                                      (18D)

 2072    REF    1               E7,1606              XSMD     EQUALS V1S       +6         I(6)
 2073    REF    1               E7,1614              YSMD     EQUALS XSMD      +6         I(6)
 2074    REF    1               E7,1622              ZSMD     EQUALS YSMD      +6         I(6)

 2075    REF    2  LAST  147    E7,1606              XSCREF   =      XSMD
 2076    REF    2  LAST  147    E7,1614              YSCREF   =      YSMD
 2077    REF   1              E7,1622          ZSCFEF    =      ZSMD

 2078    REF   2  LAST  148   E7,1630          END-ALIG EQUALS ZSMD       +6    NEXT AVAIL ERASABLE AFTER ALIGN/S40.2,3


R2079              ******    P22    ******                                      (24D)

 2081    REF   1              E7,1630          RSUBL    EQUALS END-ALIG         I(6)S-S  LM POSITION VECTOR
 2082    REF   1              E7,1636          UCSM     EQUALS RSUBL      +6    I(6)S-S  VECTOR U
 2083    REF   1              E7,1644          NEWVEL   EQUALS UCSM       +6    I(6)S-S  TERMINAL VELOCITY VECTOR
 2084    REF   1              E7,1652          NEWPOS   EQUALS NEWVEL     +6    I(6)S-S  TERMINAL POSITION VECTOR
 2085    REF   1              E7,1660          LNCHTM   EQUALS NEWPOS     +6    I(2)S-S EST. LAUNCH TIME FOR LEM
 2086    REF   1              E7,1662          TRANSTM  EQUALS LNCHTM     +2    I(2)S-S TRANSFER TIME
 2087    REF   1              E7,1664          NCSMVEL  EQUALS TRANSTM    +2    I(6)S-S NEW CSM VELOCITY
A2088

R208805            *****   P21   *****                                          (19D)

 208815 REF    1                 1163          P21ORIG   =      DISPDEX
 20882   REF   3  LAST  145   E7,1675          P21BASER EQUALS RLMSRCH          I(6)TMP
 208825 REF    1              E7,1703          P21BASEV EQUALS P21BASER +6      I(6)TMP
 20883   REF   1              E7,1711          P21VEL   EQUALS P21BASEV +6      I(2)TMP  *** NOUN 91 ***
 208835 REF    1              E7,1713          P21GAM   EQUALS P21VEL     +2    I(2)TMP  *** NOUN 91 ***
 20884   REF   1              E7,1715          P21ALT   EQUALS P21GAM     +2    I(2)TMP  *** NOUN 91 ***
A208845
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P2089    *******  OVERLAY NUMBER 4 IN EBANK 7  *******
A2090

R2097    VARIABLES FOR SECOND DPS GUIDANCE (THE LUNAR LANDING)                        (800)

R2099    THESE ERASABLES MAY BE SHARED WITH CARE

 2100    REF    2  LAST   147    E7,1544              OURTEMPS =       RN1                OVERLAY LAST PART OF SERVICER
 2101    REF    1                E7,1544              LANDTEMP =       OURTEMPS           B(6)     GUIDANCE
 2102    REF    1                E7,1552              TTF/8TMP =       LANDTEMP +6        B(2)    GUIDANCE
 2103    REF    1                E7,1554              ELINCR   =       TTF/8TMP +2        B(2)    GUIDANCE
 2104    REF    1                E7,1556              AZINCR   =       ELINCR   +2        B(2)    GUIDANCE
 2105    REF    1                E7,1560              KEEP-2   =       AZINCR   +2        B(2)    TO PREVENT PIPTIME1 OVERLAY
 2106    REF    1                E7,1562              TABLTTF  =       KEEP-2     +2      B(2)    GUIDANCE
 2107    REF    1                E7,1573              TRIPOLD  =       TABLTTF  +9D       B(2)    GUIDANCE
 2113    REF    1                E7,1621              E2DPS     EQUALS OURPERMS
R2114


R2115    THESE ERASABLES MUST NOT OVERLAY GOBLTIME OR SERVICER
 2116    REF    3  LAST   147    E7,1606              PIFPSET  =       XSMD               B(1)    THROTTLE
 2117    REF    1                E7,1607              RTNHOLD  =       PIFPSET  +1        B(1)    THROTTLE
 2118    REF    1                E7,1610              FWEIGHT  =       RTNHOLD  +1        B(2)    THROTTLE
 2119    REF    1                E7,1612              PIF      =       FWEIGHT  +2        B(2)   THROTTLE
 2120    REF    1                E7,1614              PSEUDO55 =       PIF      +2        B(1)   THROTTLE DOWNLINK
 2121    REF    1                E7,1615              FC       =       PSEUDO55 +1        B(2)    THROTTLE
 2122    REF    1                E7,1617              TTHROT   =       FC       +2        B(1)    THROTTLE
 2123    REF    1                E7,1620              FCOLD    =       TTHROT   +1        B(1)    THROTTLE
A2124


R2125    THESE ERASABLES SHOULD NOT BE SHARED DURING P63, P64, P65, P66, P67

 2126    REF    1                E7,1621              OURPERMS =       FCOLD    +1        MUSTN'T OVERLAY OURTEMPS OR SERVICER
 2127    REF    2  LAST   149    E7,1621              WCHPHOLD =       OURPERMS           B(1)    GUIDANCE
 2128    REF    1                E7,1622              FILLER   =       WCHPHOLD +1
 2129    REF    1                E7,1623              FLPASS0  =       FILLER   +1        B(1) GUIDANCE
 2130    REF    1                E7,1624              TPIP     =       FLPASS0  +1        B(2)
 2131    REF    1                E7,1626              VGU      =       TPIP     +2        B(6)    GUIDANCE
 2132    REF    1                E7,1634              LAND     =       VGU      +6        B(6)    GUIDANCE    CONTIGUOUS
 2133    REF    1                E7,1642              TTF/8    =       LAND     +6        B(2)    GUIDANCE     CONTIGUOUS
 2134   *REF    1                E7,1644              ELIDUMMY =       TTF/8    +2         (1)    DUMMY FOR ELINCR1
 2135   *REF    1                E7,1645              AZIDUMMY =       ELIDUMMY +1         (1)    DUMMY FOR AZINCR1
 2136   *REF    1                E7,1646              ZERDUMMY =       AZIDUMMY +1         (1)    DUMMY FOR ZERLINA
 2137   *REF    1                E7,1647              ELVDUMMY =       ZERDUMMY +1         (1)    DUMMY FOR ELVIRA
 2138   *REF    1                E7,1650              LRADRET  =       ELVDUMMY +1        B(1)    LR
 2139    REF    1                E7,1651              VSELECT  =       LRADRET  +1        B(1)    LR
 2140    REF    1                E7,1652              VMEAS    =       VSELECT  +1        B(2)    LR
 2141    REF    1                E7,1654              HMEAS    =       VMEAS    +2        B(2)    LR
 2142    REF    1                E7,1656              VN2      =       HMEAS    +2        B(6)    LR
 2143   REF    1                E7,1656            GNUP       =        VN2              B(6)      LR
 2144   REF    2  LAST   150    E7,1656            GNUV       =        VN2              B(6)      LR
 2145   REF    3  LAST   150    E7,1656            LRADRET1   =        VN2              B(1)      LR
 2146   REF    4  LAST   150    E7,1664            DELTAH     =        VN2        +6    B(2)     DISPLAY
 2147   REF    1                F7,1666            FUNNYDSP   =        DELTAH     +2    B(2)     DISPLAY
 2148   PEF    1                E7,1670            EOUPPERM EQUALS FUNNYDSP +2     NEXT AVAILABLE EPASABLE AFTEP OUPPERMS
R2149

R2150   (ERASABLES WHICH OVERLAY THE ABOVE BLOCK)

 2151  *REF    2  LAST   149    E7,1644            VDGVERT    =        ELIDUMMY         B(2)     P65,P66
 2152  *PEF    2  LAST   149    E7,1646            NIGNLOOP   =        ZERDUMMY         B(1)     IGNALG
 2153  *REF    2  LAST   149    E7,1647            NGUIDSUB   =        ELVDUMMY         B(1)     IGNALG
 2155  *FEF    3  LAST   150    E7,1647            WCHVERT    =        ELVDUMMY         B(1)     P65,P66,P67
 2156   REF    2  LAST   150    E7,1666            FUELNEED   =        FUNNYDSP         B(1)     DISPLAY
 2157   REF    3  LAST   150    E7,1666            TREDES     =        FUNNYDSP         B(1)     DISPLAY
 2158   PEF    4  LAST   150    E7,1667            LOOKANGL   =        FUNNYDSP +1      B(1)     DISPLAY
A2159

R2160   ERASABLES CONVENIENTLY DEFINABLE IN THE WORK AREA

 2161                              0022            PROJ       =        18D              I(2)     GUIDANCE
 2162                              0024            UNLRB/2    =        20D              I(6)     GUIDANCE (DUPING P64 ONLY)
 2163                              0024            UNLR/2     =        20D              I(6)     GUIDANCE
R2164

R2165   THE END OF THE LUNAP LANDING ERASABLES
A2166


R2167                 R12     (FOR LUNAP LANDING)                                        (6D)

 2169   REF    1                E7,1670            LRLCTR   EQUALS EQURPERM           B(1) LR DATA TEST
 2170   REF    1                E7,1671            LRRCTR   EQUALS LRLCTR      +1     B(1)
 2171   REF    1                E7,1672            LRMCTR   EQUALS LRRCTR      +1     B(1)
 2172   REF    1                E7,1673            LRSCTR   EQUALS LRMCTR      +1     B(1)
 2173   RFF    1                E7,1674            STILBADH EQUALS LRSCTR      +1     B(1)
 2174   REF    1                E7,1675            STILBADV EQUALS STILBADH +1        B(1)
A2175


R2176                 LANDING ANALOGS DISPLAY STORAGE.                                  (40D)

 2178   REF    1                E7,1676            LATVMETR EQUALS STILBADV +1        B(1)PRM LATVEL MONITOR METER   (AN ORDER)
 2179   REF    1                E7,1677            FORVMETR EQUALS LATVMETR +1        B(1)PRM FORVEL MONITOR METER   (-ED PAIR)
 2180   REF    1                E7,1700            LATVEL   EQUALS FORVMETR +1        B(1)PRM LATERAL VELOCITY    (AN ORDER)
 2181   FEF    1                E7,1701            FORVEL   FQUALS LATVEL   +1        B(1)PRM FORWARD VELOCITY    (-ED PAIR)
 2182   REF    1                E7,1702            TRAKLATV EQUALS FORVEL   +1        B(1)PRM MONITOR FLG 4 LATVEL   (AN ORDER)
 2183   REF    1                E7,1703            TRAKFWDV EQUALS TRAKLATV +1        B(1)PRM MONIT. FLAG FOR FORVEL (ED PAIR)
 2184   REF    1                E7,1704            VHY      EQUALS TRAKFWDV +1        B(1)PRM VHY=VMP.UHYP    (AN ORDER)
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  2185   REF    1                E7,1705          VHZ      EQUALS VHY      +1    B(1)PRM VHZ=VMP.UHZP    (-ED PAIR)
  2186   REF    1                E7,1706          VVECT    EQUALS VHZ      +1    B(3)PRM UPDATED S.P. VELOCITY VECTOR
  2187   REF    1                E7,1711          ALTRATE  EQUALS VVECT    +3    B(1)PRM ALTITUDE RATE IN BIT UNITS
  2188   REF    1                E7,1712          ALTSAVE  EQUALS ALTRATE  +1    B(2)PRM ALTITUDE IN BIT UNITS
  2189   REF    1                E7,1714          LADQSAVE EQUALS ALTSAVE  +2    B(1)PRM SAVE Q IN LANDISP
  2190   REF    1                E7,1715          DT       EQUALS LADQSAVE +1    B(1)PRM TIME 1 MINUS (PIPTIME +1)
  2191   REF    1                E7,1716          DALTRATE EQUALS DT       +1    B(1)PRM ALTITUDE RATE ERROR CORRECTION
  2192   REF    1                E7,1717          UHYP     EQUALS DALTRATE +1    B(6)PRM SM UNIT VECTOR
  2193   REF    1                E7,1717          QAXIS    =      UHYP
  2194   REF    2  LAST   151    E7,1725          UHZP     EQUALS UHYP     +6    B(6)PRM SM UNIT VECTOR
  2195   REF    2  LAST   120    E7,1733          DELVS    EQUALS UHZP     +6    B(6)PRM DELVS = WMXR
  2196   REF    1                E7,1741          ALTBITS  EQUALS DELVS    +6    B(2)PRM ALTITUDE IN BIT UNITS, 2.34FT/BT
  2197   REF    1                E7,1743          RUNIT    EQUALS ALTBITS  +2    B(3)PRM SM HALF-UNIT R VECTOR
  2198   REF    1                E7,1745          LASTLADW EQUALS RUNIT    +2    ONLY A TAG TO SIGNIFY LAST L.A.D. WORD
A2199

R21991               P66 ERASABLES (R.O.D.)                                      (1D)

 21993   REF    2  LAST   151    E7,1746          RODCOUNT EQUALS RUNIT    +3
A21994

R2200                P66 ERASABLES (R.O.D.)                                      (14D)

 2202    REF    2  LAST   146    E7,1756          RODSCAL1 EQUALS RM             B(1)
 2203    REF    1                E7,1757          LASTTPIP EQUALS RODSCAL1 +1    I(2)
 2204    REF    1                E7,1761          THISTPIP EQUALS LASTTPIP +2    B(2)
 2206    REF    1                E7,1763          OLDPIPAX EQUALS THISTPIP +2    B(1)
 2207    REF    1                E7,1764          OLDPIPAY EQUALS OLDPIPAX +1    B(1)
 2208    REF    1                E7,1765          OLDPIPAZ EQUALS OLDPIPAY +1    B(1)
 2209    REF    1                E7,1766          DELVROD  EQUALS OLDPIPAZ +1    B(6)
A2209

R2210                NOUN 63 COMPONENT                                           (2D)
 2212    REF    1                E7,1774          HCALC1   EQUALS DELVROD  +6    I(2)
A2213
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P2214    *******  OVERLAY NUMBER 5 IN EBANK 7  *******
A2215


R2216              ASCENT GUIDANCE ERASABLES.                                            (21D)

 2218    REF   2  LAST  148   E7,1630           RCO       EQUALS END-ALIG           I(2)TMP  TARGET RADIUS AND OUT-OF-PLANE
 2219    REF   1              E7,1632           YCO       EQUALS RCO      +2        I(2)TMP  DISTANCE, SCALED AT 2(24).
 2220    REF   1              E7,1634           1/DV1     EQUALS YCO       +2       B(2)TMP  ATMAG
 2221    REF   1              E7,1636           1/DV2     EQUALS 1/DV1     +2       B(2)TMP  ATMAG
 2222    REF   1              E7,1640           1/DV3     EQUALS 1/DV2     +2       B(2)TMP  ATMAG
 2223    REF   1              E7,1642           XRANGE    EQUALS 1/DV3     +2       B(2)TMP
 2224    REF   1              E7,1644           ENGOFFDT  EQUALS XRANGE    +2       B(1)TMP
 2225    REF   1              E7,1645           VGVECT    EQUALS ENGOFFDT +1        I(6)OUT  VELOCITY-TO-BE-GAINED
 2226    REF   1              E7,1653           TXO       EQUALS VGVECT  +6         I(2)TMP  TIME AT WHICH X-AXIS OVERRIDE
A2227                                                                               IS ALLOWED.

R2228    END OF THE ASCENT GUIDANCE ERASABLES.

R2229    THE FOLLOWING CARDS KEEP THE ASSEMBLER HAPPY UNTIL THE SYMBOLS ARE DELETED FROM THE PINBALL NOUN TABLES.

 2231    REF   1              E7,1745           END-E7.0 EQUALS IRETURN1 +1         FIRST UNUSED LOCATION IN E7 OVERLAY 0
 2232    REF   1              E7,1747           END-E7.1 EQUALS N49FLAG  +1         FIRST UNUSED LOCATION IN E7 OVERLAY 1
 2233    REF   1                 4000           END-E7.2 EQUALS POINTVSM +6         FIRST UNUSED LOCATION IN E7 OVERLAY 2
 2234    REF   3  LAST  152   E7,1630           END-E7.3 EQUALS END-ALIG            FIRST UNUSED LOCATION IN E7 OVERLAY 3
 2235                         E7,1777           END-E7.4 EQUALS 3777                ** LAST LOCATION USED IN E7 OVERLAY 4 **
 2236    REF   1              E7,1655           END-E7.5 EQUALS TXO      +2         FIRST UNUSED LOCATION IN E7 OVERLAY 5
 2237                         E7,1777           END-E7   EQUALS 3777                **LAST LOCATION USED IN E7 **
A2238



*** END OF LUMERASE.120 ***
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 0001                               4000                SETLOC 4000

 00015  REF    1                                        COUNT* $$/RUPTS        FIX-FIX LEAD INS
 0002                               4000   0 0004 0     INHINT                 GO
 0003   REF    1                    4001   3 4054 1     CAF     GCBB
 0004   REF    1                    4002  56  006 1     XCH     BBANK
 0005   REF    1                    4003   1 2667 0     TCF     GOPROG

 0006   REF    1                    4004  52  011 0     DXCH    ARUPT          T6RUPT
 0007                               4005   0 0006 1     EXTEND
 0008   REF    1                    4006   3 4056 0     DCA     T6ADR
 0009                               4007  52  006 0     DTCB

 0010   REF    2  LAST   153        4010  52  011 0     DXCH    ARUPT          T5RUPT - AUTOPILOT
 0011                               4011   0 0006 1     EXTEND
 0012   REF    1                    4012   3 1275 0     DCA     T5ADR
 0013                               4013  52  006 0     DTCB

 0014   REF    3  LAST   153        4014  52  011 0     DXCH    ARUPT          T3RUPT
 0015   REF    1                    4015   3 4057 1     CAF     T3RPTBB
 0016   REF    2  LAST   153        4016  56  006 1     XCH     BBANK
 0017   REF    1                    4017   1 3407 0     TCF     T3RUPT

 0018   REF    4  LAST   153        4020  52  011 0     DXCH    ARUPT          T4RUPT
 0019   REF    1                    4021   3 4064 1     CAF     T4RPTBB
 00195  REF    3  LAST   153        4022  56  006 1     XCH     BBANK
 0020   REF    1                    4023   1 2000 1     TCF     T4RUPT

 0023   REF    5  LAST   153        4024  52  011 0     DXCH    ARUPT          KEYRUPT1
 0024   REF    1                    4025   3 4060 0     CAF     KEYRPTBB
 0025   REF    4  LAST   153        4026  56  006 1     XCH     BBANK
 0026   REF    1                    4027   1 3274 1     TCF     KEYRUPT1

 0027   REF    6  LAST   153        4030  52  011 0     DXCH    ARUPT          KEYRUPT2
 0028   REF    1                    4031   3 4061 1     CAF     MKRUPTBB
 0029   REF    5  LAST   153        4032  56  006 1     XCH     BBANK
 0030   REF    1                    4033   1 2332 0     TCF     MARKRUPT

 0031   REF    7  LAST   153        4034  52  011 0     DXCH    ARUPT          UPRUPT
 0032   REF    1                    4035   3 4060 0     CAF     UPRPTBB
 0033   REF    6  LAST   153        4036  56  006 1     XCH     BBANK
 0034   REF    1                    4037   1 3317 0     TCF     UPRUPT

 0035   REF    8  LAST   153        4040  52  011 0     DXCH    ARUPT          DOWNRUPT
 0036   REF    1                    4041   3 4062 1     CAF     DWNRPTBB
 0037   REF    7  LAST   153        4042  56  006 1     XCH     BBANK
 0038   REF    1                    4043   1 3506 0     TCF     DODOWNTM

 0039   REF    9  LAST   153        4044  52  011 0     DXCH    ARUPT          RADAR RUPT
 0040   REF    1                    4045   3 4063 0     CAF     RDRPTBB
 0041    REF   8  LAST  153       4046  56 006 1              XCH     BBANK
 0042    REF   1                  4047   1 3150 1             TCF     RADAREAD

 0043    REF  10  LAST  153       4050  52 011 0              DXCH    ARUPT          RUPT10 IS USED ONLY BY LANDING GUIDANCE
 0044    REF   1                  4051   3 4065 0             CA      RUPT10BB
 0045    REF   9  LAST  154       4052  56 006 1              XCH     BBANK
 0046    REF   1                  4053   1 2275 1             TCF     PITFALL


 0047    REF   1            E3,1400                           EBANK=  LST1           RESTART USES E0, E3
 0048    REF   2  LAST  153       4054   12103 0  GOBB        BBCON   GOPROG

 0049    REF   1            E6,1464                           EBANK=  PERROR
 0050    REF   1                  4055   02065 0  T6ADR       2CADR   DOT6RUPT
 0050    REF   1                  4056   36106 0

 0051    REF   2  LAST  154 E3,1400                           EBANK=  LST1
 0052    REF   2  LAST  153       4057   02103 1  T3RPTBB     BBCON   T3RUPT

 0053    REF   1                  0073                        EBANK=  KEYTEMP1
 0054    REF   2  LAST  153       4060   10100 1  KEYRPTBB    BBCON   KEYRUPT1

 0055    REF   1            E7,1404                           EBANK=  ACTAZ
 0056    REF   2  LAST  153       4061   16107 0  MKRUPTBB    BBCON   MARKRUPT

 0057    REF   2  LAST  153       4060            UPRPTBB     =       KEYRPTBB

 0058    REF   1                  0340                        EBANK=  DNTMBUFF
 0059    REF   2  LAST  153       4062   12100 0  DWNRPTBB    BBCON   DODOWNTM

 0060    REF   1                  0110                        EBANK=  RADMODES
 0061    REF   2  LAST  154       4063   52100 1  RDRPTBB     BBCON   RADAREAD

 0062    REF   1            E6,1414                           EBANK=  M11
 0063    REF   2  LAST  153       4064   14106 0  T4RPTBB     BBCON   T4RUPT

 00631   REF   2  LAST  106       1265                        EBANK=  ELVIRA
 00632   REF   2  LAST  154       4065   22102 1  RUPT10BB    BBCON   PITFALL
 0001                       12,2000                        BANK    12
 000101 REF    1            06,2000                        SETLOC  T4RUP
 000102                     06,2000                        BANK

 0002    REF    2  LAST  154  E6,1414                      EBANK=  M11
 00025   REF    1                                          COUNT*  $$/T4RPT
 0003    REF    1           06,2000  54 016 1  T4RUPT      TS      BANKRUPT

 0004                       06,2001  0 0006 1              EXTEND
 0005    REF    1           06,2002  22 012 1              QXCH    QRUPT

 0007    REF    1           06,2003  11'313 0              CCS     DSRUPTSW          GOES 7(-1)0 AROUND AND AROUND
 0008    REF    1           06,2004  1 2010 0              TCF     NORMT4 +1
 0009    REF    2  LAST  155  06,2005  1 2007 0            TCF     NORMT4

 0010    REF    1           06,2006  1 2134 1              TCF     QUIKDSP

 0015    REF    1           06,2007  3 4757 0  NORMT4      CAF     SEVEN
 0016    REF    1           06,2010  54 070 1              TS      RUPTREG1
 0017    REF    2  LAST  155  06,2011  55'313 0            TS      DSRUPTSW

 0019                          4066                        BLOCK   02
 001901  REF    1              4000                        SETLOC  FFTAG10
 001902                        4066                        BANK

 001904  REF    1                                          COUNT*  $$/T4RPT
 0020    REF    1              7727            100MRUPT    =       OCT37766          (DEC 16374)
R0023    RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
R0024    IN LOWER 5 BITS.

 0025                          4066  04025 1   RELTAB      OCT     04025
 0026                          4067  10003 0               OCT     10003
 0027                          4070  14031 0               OCT     14031
 0028                          4071  20033 0               OCT     20033
 0029                          4072  24017 1               OCT     24017
 0030                          4073  30036 1               OCT     30036
 0031                          4074  34034 1               OCT     34034
 0032                          4075  40023 1               OCT     40023
 0033                          4076  44035 1               OCT     44035
 0034                          4077  50037 0               OCT     50037
 0035                          4100  54000 0               OCT     54000
 0036                          4101  60000 1   RELTAB11    OCT     60000
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P0037            SWITCHED-BANK PORTION.

 0038                          12,2000                       BANK    12
 003801 REF    2  LAST  155    06,2000                       SETLOC T4RUP
 0038C2                        06,2012                       BANK

 0039   REF    2 LAST   155 TO  155:     10     10*          COUNT* $$/T4RPT
 0042   REF    1               06,2012  11'036 1  CDRVE      CCS     DSPTAB +11D
 0043   REF    1               06,2013  0 2063 0             TC      DSPOUT
 0044   REF    2  LAST  156    06,2014  0 2063 0             TC      DSPOUT

 0045   REF    2  LAST  156    06,2015  57'036 0             XCH     DSPTAB +11D
 0046   REF    1               06,2016  7 4356 1             MASK    LOW11
 0047   REF    3  LAST  156    06,2017  55'036 1             TS      DSPTAB +11D
 0048   REF    1               06,2020  6 4101 0             AD      RELTAB11
 0049                          06,2021  0 0006 1             EXTEND
 00491  REF    1               06,2022  01 010 1             WRITE   OUT0
 00492  REF    1               06,2023  0 2071 0             TC      HANG20
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P0050   DSPOUT PROGRAM. PUTS OUT DISPLAYS.

 0055   REF   1                 06,2024  55'016 0  DSPOUTSB TS      NOUT
 0056   REF   1                 06,2025  4 4755 0           CS      ZERO
 0057   REF   1                 C6,2026  54 073 1           TS      DSRUPTEM        SET TO -0 FOR 1ST PASS THRU DSPTAB
 0058   REF   1                 06,2027  56 776 1           XCH     DSPCNT
 0059   REF   1                 C6,2030  6 4754 0           AD      NEGO            TO PREVENT +0
 0060   REF   2  LAST   157     06,2031  54 776 0           TS      DSPCNT
 0061   REF   3  LAST   157     C6,2032  50 776 1  DSPSCAN  INDEX   DSPCNT
 0062   REF   4  LAST   156     06,2033  11'023 0           CCS     DSPTAB
 0063   REF   4  LAST   157     06,2034  10 776 0           CCS     DSPCNT          IF DSPTAB ENTRY +, SKIP
 0064   REF   1                 06,2035  1 2030 1           TCF     DSPSCAN -2      IF DSPCNT +, TRY AGAIN
 0065   REF   1                 06,2036  1 2047 1           TCF     DSPLAY          IF DSPTAB ENTRY -, DISPLAY
 0066                           06,2037   00012 1  TABLNTH  OCT     12              DEC 10   LENGTH OF DSPTAB
 0067   REF   2  LAST   157     C6,2040  10 073 1           CCS     DSRUPTEM        IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
 0068                           06,2041   37764 0  120MRUPT DEC     16372           (DSPCNT = 0). +0 INTO NOUT.
 0069   REF   2  LAST   157     C6,2042  55'016 0           TS      NOUT
 0070   REF   2  LAST    93     06,2043  0 0002 0           TC      Q
 0071   REF   3  LAST   157     06,2044  54 073 1           TS      DSRUPTEM        IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
 0072   REF   1                 06,2045  3 2037 1           CAF     TABLNTH         (DSPCNT=0). +0 INTO DSRUPTEM. PASS AGAIN
 0073   REF   2  LAST   157     C6,2046  1 2031 0           TCF     DSPSCAN -1

 0074   REF   1                 06,2047  6 4753 1  DSPLAY   AD      ONE
 0075   REF   5  LAST   157     C6,2050  50 776 1           INDEX   DSPCNT
 0076   REF   5  LAST   157     C6,2051  55'023 0           TS      DSPTAB          REPLACE POSITIVELY
 0077   REF   2  LAST   156     06,2052  7 4356 1           MASK    LOW11           REMOVE BITS 12 TO 15
 0078   REF   4  LAST   157     C6,2053  54 073 1           TS      DSRUPTEM
 0079   REF   1                 06,2054  3 4350 0           CAF     HI5
 0080   REF   6  LAST   157     C6,2055  50 776 1           INDEX   DSPCNT
 0081   REF   1                 06,2056  7 4056 1           MASK    RELTAB          PICK UP BITS 12 TO 15 OF RELTAB ENTRY
 0082   REF   5  LAST   157     C6,2057  6 0073 0           AD      DSRUPTEM
 0083                           C6,2060  0 0006 1           EXTEND
 0084   REF   2  LAST   156     C6,2061  01 010 1           WRITE   OUT0

 00841  REF   1                 06,2062  1 6737 0           TCF     Q+1


 00842  REF   1                 C6,2063  10 101 0  DSPOUT   CCS     FLAGWRD5        IS DSKY FLAG ON
 00843  REF   2  LAST   157     C6,2064  3 4755 1           CAF     ZERO            NO
 00844  REF   1                 C6,2065  1 2130 0           TCF     NODSPOUT        NO
 00845  REF   3  LAST   157     06,2066  11'016 0           CCS     NOUT            YES
 00846  REF   1                 06,2067  0 2024 0           TC      DSPOUTSB
 00847  REF   2  LAST   157     06,2070  1 2130 0           TCF     NODSPOUT        NO DISPLAY REQUESTS

 0085   REF   1                 06,2071  4 2171 0  HANG20   CS      14,11,9
 0086   REF   3  LAST   155     C6,2072  27'313 0           ADS     DSRUPTSW

 0087   REF   1                 06,2073  3 7731 0           CAF     20MRUPT

 0088   REF   1                 06,2074  54 027 0  SETTIME4 TS      TIME4
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R00881  THE STATUS OF THE PROCEED PUSHBUTTON IS MONITORED EVERY 120 MILLISECONDS VIA THE CHANNEL 32 BIT 14 INBIT.
R008812 THE STATE OF THIS INBIT IS COMPARED WITH ITS STATE DURING THE PREVIOUS T4RUPT AND IS PROCESSED AS FOLLOWS.

R008814     IF PREV ON AND NOW ON      -    BYPASS
R008815     IF PREV ON AND NOW OFF     -    UPDATE IMODES33
R008816     IF PREV OFF AND NOW ON     -    UPDATE IMODES33 AND PROCESS VIA PINBALL
R008817     IF PREV OFF AND NOW OFF    -    BYPASS

R008818 THE LOGIC EMPLOYED REQUIRES ONLY 9 MCT (APPROX. 108 MICROSECONDS) OF COMPUTER TIME WHEN NO CHANGES OCCUR.


 00882  REF    1                 06,2075   3 1303 0  PROCEEDE CA      IMODES33         MONITIOR FOR PROCEED BUTTON
 008821                          06,2076   0 0006 1           EXTEND
 008822 REF    1                 06,2077   06 032 0           RXOR    CHAN32
 008823 REF   12  LAST   87      06,2100   7 4736 0           MASK    BIT14
 008824                          06,2101   0 0006 1           EXTEND
 008825 REF    1                 06,2102   1 2116 1           BZF     T4JUMP           NO CHANGE

 008826 REF    2  LAST  158      06,2103   23'303 0           LXCH    IMODES33
 008827                          06,2104   0 0006 1           EXTEND
 008828 REF    1                 06,2105   06 001 0           RXOR    LCHAN
 008829 REF    3  LAST  158      06,2106   55'303 1           TS      IMODES33         UPDATE IMODES33
 00883  REF   13  LAST  158      06,2107   7 4736 0           MASK    BIT14
 008831 REF    1                 06,2110   10 000 0           CCS     A
 008832 REF    2  LAST  158      06,2111   1 2116 1           TCF     T4JUMP           WAS ON - NOW OFF

 008833 REF    1                 06,2112   3 4355 0           CAF     CHRPRIO          WAS OFF - NOW ON
 008834 REF    1                 06,2113   0 5072 1           TC      NOVAC
 008835 REF    1                    0777                      EBANK=  DSPCOUNT
 008836 REF    1                 06,2114    03452 1           2CADR   PROCKEY
 008836 REF    1                 06,2115    60101 1
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P0089              JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

 0090   REF    2  LAST  155   06,2116  50 070 0  T4JUMP    INDEX   RUPTREG1
 0091                         06,2117   1 2120 1           TCF     +1

 0092   REF    1              06,2120   0 3156 0           TC      RCSMONIT
 0093   REF    1              06,2121   1 3006 0           TCF     RRAUTCHK
 0094   REF    1              06,2122   1 2172 0           TCF     IMUMON
 0095   REF    1              06,2123   1 3132 0           TCF     DAPT4S
 0096   REF    2  LAST  159   06,2124   0 3156 0           TC      RCSMONIT
 0097   REF    2  LAST  159   06,2125   1 3006 0           TCF     RRAUTCHK
 0098   REF    2  LAST  159   06,2126   1 2172 0           TCF     IMUMON
 0099   REF    2  LAST  159   06,2127   1 3132 0           TCF     DAPT4S

 0102   REF    1                 7731            20MRUPT   =       OCT37776        (DEC 16382)
```

```
P0150           ADDITIONAL ROUTINES FOR 20MS. KEYBOARD ACTIVITY

 0151                          06,2130  0 0006 1  NODSPOUT EXTEND
 0152    REF   3  LAST  157    06,2131  01 010 1           WRITE   OUTO

 0153    REF   1               06,2132  3 2041 0           CAF     120MRUPT        SET FOR NEXT CDRIVE
 0154    REF   1               06,2133  1 2074 1           TCF     SETTIME4

 0155    REF  14  LAST  158    06,2134  3 4736 1  QUIKDSP  CAF     BIT14
 01551   REF   4  LAST  157    06,2135  7 1313 0           MASK    DSRUPTSW
 01552                         06,2136  0 0006 1           EXTEND
 01553   REF   1               06,2137  1 2165 0           BZF     QUIKOFF         WROTE LAST TIME, NOW TURN OFF RELAYS.

 01555   REF   4  LAST  157    06,2140  11'016 0           CCS     NOUT
 0156    REF   2  LAST  157    06,2141  0 2024 0           TC      DSPOUTSB
 0157    REF   1               06,2142  1 2152 1           TCF     NODSPY          NOUT=0 OR BAD RETURN FROM DSPOUTSB
 01575   REF  15  LAST  160    06,2143  4 4736 0           CS      BIT14           GOOD RETURN (WE DISPLAYED SOMETHING)
 01577   REF   5  LAST  160    06,2144  27'313 0  QUIKRUPT ADS     DSRUPTSW

 0158    REF   2  LAST  157    06,2145  3 7731 0           CAF     20MRUPT
 0159    REF   2  LAST  157    06,2146  54 027 0           TS      TIME4

 0160    REF  13  LAST   87    06,2147  3 4743 0           CAF     BIT9
 0161    REF   6  LAST  160    06,2150  27'313 0           ADS     DSRUPTSW

 0162    REF   1               06,2151  0 5270 1           TC      RESUME

 0163                          06,2152  0 0006 1  NODSPY   EXTEND
 0164    REF   4  LAST  160    06,2153  01 010 1           WRITE   OUTO

 0165    REF   3  LAST  160    06,2154  3 7731 0  SYNCT4   CAF     20MRUPT
 0166    REF   3  LAST  160    06,2155  26 027 0           ADS     TIME4

 0167    REF  14  LAST  160    06,2156  3 4743 0           CAF     BIT9
 0168    REF   7  LAST  160    06,2157  27'313 0           ADS     DSRUPTSW

 0169    REF   8  LAST  160    06,2160  11'313 0           CCS     DSRUPTSW
 0170    REF   2  LAST  160    06,2161  0 5270 1           TC      RESUME
 0171                          06,2162   37737 0  OCT37737 OCT     37737
 0172    REF   1               06,2163  0 2154 0           TC      SYNCT4
 0173    REF   3  LAST  160    06,2164  0 5270 1           TC      RESUME

 0174                          06,2165  0 0006 1  QUIKOFF  EXTEND
 0175    REF   5  LAST  160    06,2166  01 010 1           WRITE   OUTO
 0176    REF  16  LAST  160    06,2167  3 4736 1           CAF     BIT14           RESET DSRUPTSW TO SEND DISPLAY NEXT PASS
 0177    REF   1               06,2170  1 2144 0           TCF     QUIKRUPT

 0179                          06,2171   22400 0  14,11,9  OCT     22400
```

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P0300    PROGRAM NAME:  IMUMON

R0301    FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS ENTERED EVERY 480 MS.  IT DETECTS CHANGES OF THE IMU STATUS BITS IN
R0303    CHANNEL 30 AND CALLS THE APPROPRIATE SUBROUTINES.  THE BITS PROCESSED AND THEIR RELEVANT SUBROUTINES ARE:

R0305               FUNCTION                   BIT     SUBROUTINE CALLED
R0306               --------                   ---     -----------------
R0307               TEMP IN LIMITS              15     TLIM
R0308               ISS TURN-ON REQUEST         14     ITURNON
R0309               IMU FAIL                    13     IMUFAIL (SETISSW)
R0310               IMU CDU FAIL                12     ICDUFAIL (SETISSW)
R0311               IMU CAGE                    11     IMUCAGE
R0312               IMU OPERATE                  9     IMUOP

R0313               THE LAST SAMPLED STATE OF THESE BITS IS LEFT IN IMODES30.  ALSO, EACH SUBROUTINE CALLED FINDS THE NEW
R0315    VALUE OF THE BIT IN A, WITH Q SET TO THE PROPER RETURN LOCATION, NXTIFAIL.

P0317    CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS.

R0318    JOBS OR TASKS INITIATED:  NONE.

R0319    SUBROUTINES CALLED:  TLIM, ITURNON, SETISSW, IMUCAGE, IMUOP.

R0320    ERASABLE INITIALIZATION:
R0321               FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(IMODES30) = OCT 37411.
R0323               RESTART WITH ACTIVE GROUPS: C(IMODES30) = (B(IMODES30)AND(OCT 00035)) PLUS OCT 37400.
R0325                                    THIS LEAVES IMU FAIL BITS INTACT.

R0326    ALARMS:  NONE.

R0327    EXIT:  TNONTEST.

R0328    OUTPUT:  UPDATED IMODES30 WITH CHANGES PROCESSED BY APPROPRIATE SUBROUTINE.

 0330    REF   1                06,2172  3 1302 1  IMUMON    CA      IMODES30          SEE IF THERE HAS BEEN A CHANGE IN THE
 0331                           06,2173  0 0006 1            EXTEND                    RELEVANT BITS OF CHAN 30.
 0332    REF   1                06,2174  06 030 1            RXOR    CHAN30
 0333    REF   1                06,2175  7 2761 1            MASK    30RDMSK
 0334                           06,2176  0 0006 1            EXTEND
 0335    REF   1                06,2177  1 2227 0            BZF     TNONTEST          NO CHANGE IN STATUS.

 0336    REF   3  LAST  159     06,2200  54 070 1            TS      RUPTREG1          SAVE BITS WHICH HAVE CHANGED.
 0337    REF   2  LAST  161     06,2201  23'302 1            LXCH    IMODES30          UPDATE IMODES30.
 0338                           06,2202  0 0006 1            EXTEND
 0339    REF   2  LAST  158     06,2203  06 001 0            RXOR    LCHAN
 0340    REF   3  LAST  161     06,2204  55'302 0            TS      IMODES30

 0341    REF   2  LAST  157     06,2205  4 4753 0            CS      ONE
 0342    REF   4  LAST  161     06,2206  56 C70 0            XCH     RUPTREG1
 0343                           06,2207  0 0006 1            EXTEND
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0344  REF   1               06,2210  6 2514 0              BZMF    TLIM             CHANGE IN IMU TEMP.
0345  REF   1               06,2211  1 2213 1              TCF     NXTIFBIT         BEGIN BIT SCAN.

0346  REF   3  LAST  161    06,2212  6 4753 1   -1         AD      ONE              (RE-ENTERS HERE FROM NXTIFAIL.)
0347  REF   5  LAST  161    06,2213  24 070 0  NXTIFBIT INCR    RUPTREG1         ADVANCE BIT POSITION NUMBER.
0348                        06,2214  6 0000 1   +1         DOUBLE
0349  REF   2  LAST  158    06,2215  54 000 0              TS      A                SKIP IF OVERFLOW.
0350  REF   2  LAST  162    06,2216  1 2213 1              TCF     NXTIFBIT         LOOK FOR BIT.

0351  REF   1               06,2217  56 071 1              XCH     RUPTREG2         SAVE OVERFLOW-CORRECTED DATA.
0352  REF   6  LAST  162    06,2220  50 070 0              INDEX   RUPTREG1         SELECT NEW VALUE OF THIS BIT.
0353  REF  17  LAST  160    06,2221  3 4736 1              CAF     BIT14
0354  REF   4  LAST  161    06,2222  7 1302 0              MASK    IMODES30
0355  REF   7  LAST  162    06,2223  50 070 0              INDEX   RUPTREG1
0356  REF   1               06,2224  0 2755 1              TC      IFAILJMP

0357  REF   2  LAST  162    06,2225  10 071 0  NXTIFAIL CCS     RUPTREG2         PROCESS ANY ADDITIONAL CHANGES.
0358  REF   3  LAST  162    06,2226  1 2212 0              TCF     NXTIFBIT -1
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P0359   PROGRAM NAME:  TNONTEST.

R0360   FUNCTIONAL DESCRIPTION:  THIS PROGRAM HONORS REQUESTS FOR ISS INITIALIZATION.  ISS TURN-ON (CHANNEL 30 BIT 14)
R0362   AND ISS OPERATE (CHANNEL 30 BIT 9) REQUESTS ARE TREATED AS A PAIR AND PROCESSING TAKES PLACE .480 SECONDS
R0364   AFTER EITHER ONE APPEARS.  THIS INITIALIZATION TAKES ON ONE OF THE FOLLOWING THREE FORMS:

R0366             1)  ISS TURN-ON:  IN THIS SITUATION THE COMPUTER IS OPERATING WHEN THE ISS IS TURNED ON.  NOMINALLY,
R0368             BOTH ISS TURN-ON AND ISS OPERATE APPEAR.  THE PLATFORM IS CAGED FOR 90 SECONDS AND THE ICDU'S ZEROED
R0370             SO THAT AT THE END OF THE PROCESS THE GIMBAL LOCK MONITOR WILL FUNCTION PROPERLY.

R0372             2)  ICDU INITIALIZATION:  IN THIS CASE THE COMPUTER WAS PROBABLY TURNED ON WITH THE ISS IN OPERATE OR
R0374             A FRESH START WAS DONE WITH THE ISS IN OPERATE.  IN THIS CASE ONLY ISS OPERATE IS ON.  THE ICDU'S ARE
R0376             ZEROED SO THE GIMBAL LOCK MONITOR WILL FUNCTION.  AN EXCEPTION IS IF THE ISS IS IN GIMBAL LOCK AFTER
R0378             A RESTART, THE ICDU'S WILL NOT BE ZEROED.

R0379             3)  RESTART WITH RESTARTABLE PROGRAM USING THE IMU:  IN THIS CASE, NO INITIALIZATION TAKES PLACE SINCE
R0381             IT IS ASSUMED THAT THE USING PROGRAM DID THE INITIALIZATION AND THEREFORE T4RUPT SHOULD NOT INTERFERE.

R0383   IMODES30 BIT 7 IS SET = 1 BY THE FIRST BIT (CHANNEL 30 BIT 14 OR 9) WHICH ARRIVES.  FOLLOWING THIS, TNONTEST IS
R0385   ENTERED, FINDS BIT 7 = 1 BUT BIT 8 = 0, SO IT SETS BIT 8 = 1 AND EXITS.  THE NEXT TIME IT FINDS BIT 8 = 1 AND
R0387   PROCEEDS, SETTING BITS 8 AND 7 = 0.  AT PROCTNON, IF ISS TURN-ON REQUEST IS PRESENT, THE ISS IS CAGED (ZERO +
R0389   COARSE).  IF ISS OPERATE IS NOT PRESENT PROGRAM ALARM 00213 IS ISSUED.  AT THE END OF A 90 SECOND CAGE, BIT 2
R0391   OF IMODES30 IS TESTED.  IF IT IS = 1, ISS TURN-ON WAS NOT PRESENT FOR THE ENTIRE 90 SECONDS.  IN THAT CASE, IF
R0393   THE ISS TURN-ON REQUEST IS PRESENT THE 90 SECOND WAIT IS REPEATED, OTHERWISE NO ACTION OCCURS UNLESS A PROGRAM
R0395   WAS WAITING FOR THE INITIALIZATION IN WHICH CASE THE PROGRAM IS GIVEN AN IMUSTALL ERROR RETURN.  IF THE DELAY
R0397   WENT PROPERLY, THE ISS DELAY OUTBIT IS SENT AND THE ICDU'S ZEROED.  A TASK IS INITIATED TO REMOVE THE PIPA FAIL
R0399   INHIBIT BIT IN 10.24 SECONDS.  IF A MISSION PROGRAM WAS WAITING IT IS INFORMED VIA ENDIMU.

R0401   AT PROCTNON, IF ONLY ISS OPERATE IS PRESENT (OPONLY), THE CDU'S ARE ZEROED UNLESS THE PLATFORM IS IN COARSE
R0403   ALIGN (= GIMBAL LOCK HERE) OR A MISSION PROGRAM IS USING THE IMU (IMUSEFLG = 1).

R0405   CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS AFTER IMUMON.

R0406   JOBS OR TASKS INITIATED:  1) ENDTNON, 90 SECONDS AFTER CAGING STARTED.  2) ISSUP, 4 SECONDS AFTER CAGING DONE.
R0408            3) PFAILOK, 10.24 SECONDS AFTER INITIALIZATION COMPLETED.  4) UNZ2, 320 MILLISECONDS AFTER ZEROING
R0410            STARTED.

R0411   SUBROUTINES CALLED:  CAGESUB, CAGESUB2, ZEROICDU, ENDIMU, IMUBAD, NOATTOFF, SETISSW, VARDELAY.

R0413   ERASABLE INITIALIZATION:  SEE IMUMON.

R0414   ALARMS:  PROGRAM ALARM 00213 IF ISS TURN-ON REQUESTED WITHOUT ISS OPERATE.

R0416   EXIT:  ENDTNON EXITS TO C33TEST.  TASKS HAVING TO DO WITH INITIALIZATION EXIT AS FOLLOWS:  MISSION PROGRAM
R0418   WAITING AND INITIALIZATION COMPLETE, EXIT TO ENDIMU, MISSION PROGRAM WAITING AND INITIALIZATION FAILED, EXIT TO
R0420   IMUBAD, IMU NOT IN USE, EXIT TO TASKOVER.

R0421   OUTPUT:  ISS INITIALIZED.

 0422   REF    5  LAST   162    06,2227   4 1302 0   TNONTEST CS      IMODES30          AFTER PROCESSING ALL CHANGES, SEE IF IT
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L          T4RUPT PROGRAM                                                                                USER'S PAGE NO.  10       E6 S4

 0423    REF  15  LAST   87    06,2230  7 4745 1            MASK    BIT7            IS TIME TO ACT ON A TURN-ON SEQUENCE.
 0424    REF   3  LAST  162    06,2231  10 000 0            CCS     A
 0425    REF   1               06,2232  1 2374 1            TCF     C33TEST         NO - EXAMINE CHANNEL 33.

 0426    REF  13  LAST   87    06,2233  3 4744 1            CAF     BIT8            SEE IF FIRST SAMPLE OR SECOND.
 0427    REF   6  LAST  163    06,2234  7 1302 0            MASK    IMODES30
 0428    REF   4  LAST  164    06,2235  10 000 0            CCS     A
 0429    REF   1               06,2236  1 2242 0            TCF     PROCTNON        REACT AFTER SECOND SAMPLE.

 0430    REF  14  LAST  164    06,2237  3 4744 1            CAF     BIT8            IF FIRST SAMPLE, SET BIT TO REACT NEXT
 0431    REF   7  LAST  164    06,2240  27'302 0            ADS     IMODES30        TIME.
 0432    REF   2  LAST  164    06,2241  1 2374 1            TCF     C33TEST

R0433               PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

 0435    REF   1               06,2242  4 2777 0  PROCTNON  CS      BITS7&8
 0436    REF   8  LAST  164    06,2243  7 1302 0            MASK    IMODES30
 0437    REF   9  LAST  164    06,2244  55'302 0            TS      IMODES30
 0438    REF  18  LAST  162    06,2245  7 4736 0            MASK    BIT14           SEE IF TURN-ON REQUEST.
 0439    REF   5  LAST  164    06,2246  10 000 0            CCS     A
 0440    REF   1               06,2247  1 2347 1            TCF     OPONLY          OPERATE ON ONLY.

 0441    REF  10  LAST  164    06,2250  4 1302 0            CS      IMODES30        IF TURN-ON REQUEST, WE SHOULD HAVE IMU
 0442    REF  15  LAST  160    06,2251  7 4743 1            MASK    BIT9            OPERATE.
 0443    REF   6  LAST  164    06,2252  10 000 0            CCS     A
 0444                          06,2253  1 2256 0            TCF     +3

 0445    REF   1               06,2254  0 5567 0            TC      ALARM           ALARM IF NOT.
 0446                          06,2255   00213 1            OCT     213

 0447    REF   1               06,2256  0 2735 1  +3        TC      CAGESUB
 0448    REF   1               06,2257  3 3005 1            CAF     90SECS
 0449    REF   1               06,2260  0 5203 0            TC      WAITLIST
 0450    REF   3  LAST  155    E6,1414                      EBANK=  M11
 0451    REF   1               06,2261   02266 1            2CADR   ENDTNON
 0451    REF   1               06,2262   14106 0

 0452    REF   3  LAST  164    06,2263  1 2374 1            TCF     C33TEST

 0453    REF   2  LAST  164    06,2264  3 3005 1  RETNON    CAF     90SECS
 0454    REF   1               06,2265  0 5224 0            TC      VARDELAY

 0455    REF  13  LAST   88    06,2266  4 4752 1  ENDTNON   CS      BIT2            RESET TURN-ON REQUEST FAIL BIT.
 0456    REF  11  LAST  164    06,2267  7 1302 0            MASK    IMODES30
 0457    REF  12  LAST  164    06,2270  57'302 1            XCH     IMODES30
 0458    REF  14  LAST  164    06,2271  7 4752 1            MASK    BIT2            IF IT WAS OFF, SEND ISS DELAY COMPLETE.
 0459                          06,2272  0 0006 1            EXTEND
 0460    REF   1               06,2273  1 2306 1            BZF     ENDTNON2

 0461    REF  19  LAST  164    06,2274  3 4736 1            CAF     BIT14           IF IT WAS ON AND TURN-ON REQUEST NOW
 0462   REF  13  LAST  164   06,2275  7 1302 0            MASK    IMODES30        PRESENT, RE-ENTER 90 SEC DELAY IN WL.
 0463                        06,2276  0 0006 1            EXTEND
 0464   REF   1              06,2277  1 2264 1            BZF     RETNON

 0465   REF   1              06,2300  4 0074 0            CS      FLAGWRD0        IF IT IS NOT ON NOW, SEE IF A PROG WAS
 0466   REF   1              06,2301  7 4744 0            MASK    IMUSEBIT        WAITING.
 0467   REF   7  LAST  164   06,2302  10 000 0            CCS     A
 0468   REF   1              06,2303  1 5261 0            TCF     TASKOVER
 0469   REF   1              06,2304  0 4635 0            TC      POSTJUMP
 0470   REF   1              06,2305   17637 0            CADR    IMUBAD          UNSUCCESSFUL TURN-ON.

 0471   REF  11  LAST   87   06,2306  3 4735 1  ENDTNON2  CAF     BIT15           SEND ISS DELAY COMPLETE.
 0472                        06,2307  0 0006 1            EXTEND
 0473   REF   1              06,2310  05 012 1            WOR     CHAN12

 0474   REF   1              06,2311  0 4674 0            TC      IBNKCALL        TURN OFF NO ATT LAMP.
 0475   REF   1              06,2312   17266 0            CADR    NOATTOFF

 0476   REF   1              06,2313  0 5457 1  UNZ2      TC      ZEROICDU

 0477   REF   1              06,2314  4 4763 0            CS      BITS4&5         REMOVE ZERO AND COARSE.
 0478                        06,2315  0 0006 1            EXTEND
 0479   REF   2  LAST  165   06,2316  03 012 1            WAND    CHAN12

 0480   REF  14  LAST  131   06,2317  3 4741 1            CAF     BIT11           WAIT 10 SECS FOR CTRS TO FIND GIMBALS
 0481   REF   2  LAST  164   06,2320  0 5224 0            TC      VARDELAY

 0482   REF   1              06,2321  4 2774 0  ISSUP     CS      OCT54           REMOVE CAGING, IMU FAIL INHIBIT, AND
 0483   REF  14  LAST  165   06,2322  7 1302 0            MASK    IMODES30        ICDUFAIL INHIBIT FLAGS.
 0484   REF  15  LAST  165   06,2323  55'302 0            TS      IMODES30

 0485   REF  14  LAST   88   06,2324  4 4746 1            CS      BIT6            ENABLE DAP
 0486   REF   4  LAST  154   06,2325  7 1303 1            MASK    IMODES33
 0487   REF   5  LAST  165   06,2326  55'303 1            TS      IMODES33

 04871  REF   1              06,2327  4 0076 1            CS      FLAGWRD2        TEST DRIFTFLG: IF ON, DO NOTHING BECAUSE
 04872  REF   1              06,2330  7 4735 0            MASK    DRFTBIT         IMUCOMP SHOULD BE ALL SET UP(RESTART
 04873                       06,2331  0 0006 1            EXTEND                  WITH IMUSE DOWN).  IF OFF, SET DRIFTFLG
 04874                       06,2332  1 2336 1            BZF     +4              AND 1/PIPADT TO GET FREEFALL IMUCOMP
 04875  REF   2  LAST  165   06,2333  26 076 1            ADS     FLAGWRD2        GOING (FRESH START OR ISS TURN-ON).
 04876  REF   1              06,2334  3 0025 0            CA      TIME1
 04877  REF   1              06,2335  57'075 1            XCH     1/PIPADT        CANNOT GET HERE IF RESTART WITH IMUSE UP

 0488   REF   1              06,2336  0 2703 1            TC      SETISSW         ISS WARNING MIGHT HAVE BEEN INHIBITED.

 0489   REF  12  LAST  165   06,2337  4 4735 0            CS      BIT15           REMOVE IMU DELAY COMPLETE DISCRETE.
 0490                        06,2340  0 0006 1            EXTEND
 0491   REF   3  LAST  165   06,2341  03 012 1            WAND    CHAN12

 0492   REF   1              06,2342  3 5003 1            CAF     4SECS           DONT ENABLE PROG ALARM ON PIP FAIL FOR
 0493    REF    2  LAST  164    06,2343  0 5203 0               TC       WAITLIST          ANOTHER 4 SECS.
 0494    REF    1               E3,1474                         EBANK=  CDUIND
 0495    REF    1               06,2344   03254 1               2CADR    PFAILOK
 0495    REF    1               06,2345   16103 1

 0499    REF    2  LAST  165    06,2346  1 5261 0               TCF      TASKOVER

 0502    REF   11  LAST   88    06,2347  3 4750 1   OPONLY      CAF      BIT4              IF OPERATE ON ONLY, AND WE ARE IN COARSE
 0503                           06,2350  0 0006 1               EXTEND                     ALIGN, DONT ZERO THE CDUS BECAUSE WE
 0504    REF    4  LAST  165    06,2351  02 012 0               RAND     CHAN12            MIGHT BE IN GIMBAL LOCK
 0505    REF    8  LAST  165    06,2352  10 000 0               CCS      A
 0506    REF    4  LAST  164    06,2353  1 2374 1               TCF      C33TEST

 0507    REF    2  LAST  165    06,2354  3 4744 1               CAF      IMUSEBIT          OTHERWISE, ZERO THE COUNTERS.
 0508    REF    2  LAST  165    06,2355  7 0074 0               MASK     FLAGWRD0          UNLESS SOMEONE IS USING THE IMU.
 0509    REF    9  LAST  166    06,2356  10 000 0               CCS      A
 0510    REF    5  LAST  166    06,2357  1 2374 1               TCF      C33TEST

 0511    REF    1               06,2360  0 2746 0               TC       CAGESUB2          SET TURNON FLAGS.

 05115   REF    2  LAST  165    06,2361  0 4674 0   ISSZERO     TC       IBNKCALL          TURN OFF NO ATT LAMP
 05116   REF    2  LAST  165    06,2362   17266 0               CADR     NOATTOFF              IMU CAGE OFF ENTRY

 0512    REF   12  LAST   88    06,2363  3 4747 1               CAF      BIT5              ISS CDU ZERO
 0513                           06,2364  0 0006 1               EXTEND
 0514    REF    5  LAST  166    06,2365  05 012 1               WOR      CHAN12

 05141   REF    2  LAST  165    06,2366  0 5457 1               TC       ZEROICDU
 0515    REF   15  LAST  165    06,2367  3 4746 0               CAF      BIT6              WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
 0516    REF    3  LAST  166    06,2370  0 5203 0               TC       WAITLIST
 0517    REF    4  LAST  164    E6,1414                         EBANK=  M11
 0518    REF    1               06,2371   02313 1               2CADR    UNZ2
 0518    REF    1               06,2372   14106 0

 0519    REF    6  LAST  166    06,2373  1 2374 1               TCF      C33TEST
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P0520   PROGRAM NAME:  C33TEST

R0521   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THREE FLIP-FLOP INBITS OF CHANNEL 33 AND CALLS THE APPPROPRIATE
R0523   SUBROUTINE TO PROCESS A CHANGE.  IT IS ANALOGOUS TO IMUMON, WHICH MONITORS CHANNEL 30, EXCEPT THAT IT READS
R0525   CHANNEL 33 WITH A WAND INSTRUCTION BECAUSE A 'WRITE' PULSE IS REQUIRED TO RESET THE FLIP-FLOPS.  THE BITS
R0527   PROCESSED AND THE SUBROUTINES CALLED ARE:

R0528             BIT    FUNCTION                   SUBROUTINE
R0529             ---    --------                   ----------
R0530              13    PIPA FAIL                  PIPFAIL
R0531              12    DOWNLINK TOO FAST          DNTMFAST
R0532              11    UPLINK TOO FAST            UPTMFAST

R0533   UPON ENTRY TO THE SUBROUTINE, THE NEW BIT STATE IS IN A.

R0534   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER TNONTEST.

R0535   JOBS OR TASKS INITIATED:  NONE.

R0536   SUBROUTINES CALLED:  PIPFAIL, DNTMFAST AND UPTMFAST ON BIT CHANGES.

R0537   ERASABLE INITIALIZATION:  C(IMODES33) = OCT 16000 ON A FRESH START OR RESTART, THEREFORE, THESE ALARMS WILL
R0539   REAPPEAR IF THE CONDITIONS PERSIST.

R0540   ALARMS:  NONE.

R0541   EXIT:  GLOCKMON.

R0542   OUTPUT:  UPDATED BITS 13, 12 AND 11 OF IMODES33 WITH CHANGES PROCESSED.

 0543   REF   6  LAST  165   06,2374  3 1303 0  C33TEST  CA      IMODES33       SEE IF RELEVANT CHAN 33 BITS HAVE
 0544   REF   1              06,2375  7 5026 1           MASK    33RDMSK
 0545   REF   2  LAST   93   06,2376  54 001 1           TS      L              CHANGED.
 0546   REF   2  LAST  167   06,2377  3 5026 0           CAF     33RDMSK
 0547                        06,2400  0 0006 1           EXTEND
 0548   REF   1              06,2401  03 033 1           WAND    CHAN33         RESETS FLIP-FLOP INPUTS
 0549                        06,2402  0 0006 1           EXTEND
 0550   REF   3  LAST  161   06,2403  06 001 0           RXOR    LCHAN
 0551                        06,2404  0 0006 1           EXTEND
 0552   REF   1              06,2405  1 2434 1           BZF     GLOCKMON       ON NO CHANGE.

 0553   REF   8  LAST  162   06,2406  54 070 1           TS      RUPTREG1       SAVE BITS WHICH HAVE CHANGED.
 0554   REF   7  LAST  167   06,2407  23'303 0           LXCH    IMODES33
 0555                        06,2410  0 0006 1           EXTEND
 0556   REF   4  LAST  167   06,2411  06 001 0           RXOR    LCHAN
 0557   REF   8  LAST  167   06,2412  55'303 1           TS      IMODES33       UPDATED IMODES33.

 0558   REF   3  LAST  157   06,2413  3 4755 1           CAF     ZERO
 0559   REF   9  LAST  167   06,2414  56 070 0           XCH     RUPTREG1
 0560                        06,2415  6 0000 1           DOUBLE
 0561   REF   1             06,2416   1 2421 0            TCF     NXTIBT +1       SCAN FOR BIT CHANGES.

 0562   REF   4  LAST  162  06,2417   6 4753 1   -1       AD      ONE
 0563   REF  10  LAST  167  06,2420  24 070 0  NXTIBT     INCR    RUPTREG1
 0564                       06,2421   6 0000 1   +1       DOUBLE
 0565   REF  10  LAST  166  06,2422  54 000 0            TS      A               (CODING IDENTICAL TO CHAN 30).
 0566   REF   2  LAST  168  06,2423   1 2420 1            TCF     NXTIBT

 0567   REF   3  LAST  162  06,2424  56 071 1            XCH     RUPTREG2
 0568   REF  11  LAST  168  06,2425  50 070 0            INDEX   RUPTREG1        GET NEW VALUE OF BIT WHICH CHANGED.
 0569   REF  14  LAST   87  06,2426   3 4737 0            CAF     BIT13
 0570   REF   9  LAST  167  06,2427   7 1303 1            MASK    IMODES33
 0571   REF  12  LAST  168  06,2430  50 070 0            INDEX   RUPTREG1
 0572   REF   1             06,2431   0 2763 1            TC      C33JMP

 0573   REF   4  LAST  168  06,2432  10 071 0  NXTFL33    CCS     RUPTREG2        PROCESS POSSIBLE ADDITIONAL CHANGES.
 0574   REF   3  LAST  168  06,2433   1 2417 0            TCF     NXTIBT -1
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P0575   PROGRAM NAME:  GLOCKMON

R0576   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THE CDUZ COUNTER TO DETERMINE WHETHER THE ISS IS IN GIMBAL LOCK
R0578   AND TAKES ACTION IF IT IS.  THREE REGIONS OF MIDDLE GIMBAL ANGLE (MGA) ARE USED:

R0580              1) ABS(MGA) LESS THAN OR EQUAL TO 70 DEGREES - NORMAL MODE.
R0581              2) ABS(MGA) GREATER THAN 70 DEGREES AND LESS THAN OR EQUAL TO 85 DEGREES - GIMBAL LOCK LAMP TURNED ON.
R0583              3) ABS(MGA) GREATER THAN 85 DEGREES - ISS PUT IN COARSE ALIGN AND NO ATT LAMP TURNED ON.

R0585   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER C33TEST.

R0586   JOBS OR TASKS INITIATED:  NONE.

R0587   SUBROUTINES CALLED:  1) SETCOARS WHEN ABS(MGA) GREATER THAN 85 DEGREES AND ISS NOT IN COARSE ALIGN.
R0589                        2) LAMPTEST BEFORE TURNING OFF GIMBAL LOCK LAMP.

R0590   ERASABLE INITIALIZATION:
R0591              1) FRESH START OR RESTART WITH NO GROUPS ACTIVE:  C(CDUZ) = 0, IMODES30 BIT 6 = 0, IMODES33 BIT 1 = 0.
R0593              2) RESTART WITH GROUPS ACTIVE:  SAME AS FRESH START EXCEPT C(CDUZ) NOT CHANGED SO GIMBAL MONITOR
R0595                                              PROCEEDS AS BEFORE.

R0596   ALARMS:  1) MGA REGION (2) CAUSES GIMBAL LOCK LAMP TO BE LIT.
R0597            2) MGA REGION (3) CAUSES THE ISS TO BE PUT IN COARSE ALIGN AND THE NO ATT LAMP TO BE LIT IF EITHER NOT
R0598               SO ALREADY.

 0600   REF   1               06,2434  10 034 1  GLOCKMON CCS     CDUZ
 0601   REF   1               06,2435  1 2441 0           TCF     GLOCKCHK          SEE IF MAGNITUDE OF MGA IS GREATER THAN
 0602   REF   1               06,2436  1 2465 0           TCF     SETGLOCK          70 DEGREES.
 0603   REF   2  LAST   169   06,2437  1 2441 0           TCF     GLOCKCHK
 0604   REF   2  LAST   169   06,2440  1 2465 0           TCF     SETGLOCK

 0605   REF   1               06,2441  6 2512 0  GLOCKCHK AD      -70DEGS
 0606                         06,2442  0 0006 1           EXTEND
 0607   REF   3  LAST   169   06,2443  6 2464 0           BZMF    SETGLOCK -1       NO LOCK.

 0608   REF   1               06,2444  6 2513 1           AD      -15DEGS           SEE IF ABS(MGA) GREATER THAN 85 DEGREES.
 0609                         06,2445  0 0006 1           EXTEND
 0610   REF   1               06,2446  6 2462 0           BZMF    NOGIMRUN

 0611   REF  12  LAST   158   06,2447  3 4750 1           CAF     BIT4              IF SO, SYSTEM SHOULD BE IN COARSE ALIGN
 0612                         06,2450  0 0006 1           EXTEND                    TO PREVENT GIMBAL RUNAWAY.
 0613   REF   6  LAST   166   06,2451  02 012 0           RAND    CHAN12
 0614   REF  11  LAST   168   06,2452  10 000 0           CCS     A
 0615   REF   2  LAST   169   06,2453  1 2462 1           TCF     NOGIMRUN

 0616   REF   3  LAST   166   06,2454  0 4674 0           TC      IBNKCALL
 0617   REF   1               06,2455    17144 0           CADR    SETCOARS

 06173  REF   1               06,2456  3 6242 0           CAF     SIX               ENABLE ISS ERROR COUNTERS IN 60 MS
 06174  REF   4  LAST   166   06,2457  0 5203 0           TC      WAITLIST
 06175  REF   2  LAST  166   E3,1474                        EBANK= CDUIND
 06176  REF   1              06,2460   03140 1              2CADR  CA+ECE
 06176  REF   1              06,2461   16103 1
 0618   REF  16  LAST  166   06,2462  3 4746 0  NOGIMRUN CAF    BIT6              TURN ON GIMBAL LOCK LAMP.
 0619   REF   4  LAST  1[illegible]  06,2463  1 2465 0           TCF    SETGLOCK

 0620   REF   4  LAST  167   06,2464  3 4755 1   -1      CAF    ZERO
 0621   REF   6  LAST  157   06,2465  6 1036 0  SETGLOCK AD     DSPTAB +11D       SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
 0622   REF  17  LAST  170   06,2466  7 4746 1           MASK   BIT6              AGREES WITH DESIRED STATE BY HALF ADDING
 0623                        06,2467  0 0006 1           EXTEND                   THE TWO.
 0624   REF   1              06,2470  1 5270 0           BZF    GLOCKOK           OK AS IS.

 0625   REF   7  LAST  170   06,2471  7 1036 1           MASK   DSPTAB +11D       IF OFF, DONT TURN ON IF IMU BEING CAGED.
 0626   REF  12  LAST  169   06,2472  10 000 0           CCS    A
 0627   REF   1              06,2473  1 2507 0           TCF    GLAMPTST          TURN OFF UNLESS LAMP TEST IN PROGRESS.

 0628   REF  18  LAST  170   06,2474  3 4746 0           CAF    BIT6
 0629   REF  16  LAST  165   06,2475  7 1302 0           MASK   IMODES30
 0630   REF  13  LAST  170   06,2476  10 000 0           CCS    A
 0631   REF   2  LAST  170   06,2477  1 5270 0           TCF    GLOCKOK

 0632   REF   [illegible]  LAST  170   06,2500  4 1036 1  GLINVERT CS     DSPTAB +11D       INVERT GIMBAL LOCK LAMP.
 0633   REF  19  LAST  170   06,2501  7 4746 1           MASK   BIT6
 0634   REF  13  LAST  165   06,2502  6 4735 1           AD     BIT15             TO INDICATE CHANGE IN DSPTAB +11D.
 0635   REF   9  LAST  170   06,2503  57'036 0           XCH    DSPTAB +11D
 0636   REF   1              06,2504  7 2162 1           MASK   OCT37737
 0637   REF  10  LAST  170   06,2505  27'036 1           ADS    DSPTAB +11D
 0638   REF   3  LAST  170   06,2506  1 5270 0           TCF    GLOCKOK

 0639   REF   1              06,2507  0 2766 1  GLAMPTST TC     LAMPTEST          TURN OFF UNLESS LAMP TEST IN PROGRESS.
 0640   REF   4  LAST  170   06,2510  1 5270 0           TCF    GLOCKOK
 0641   REF   1              06,2511  1 2500 1           TCF    GLINVERT

 0642                        06,2512   63434 1  -70DEGS  DEC    -.38888           -70 DEGREES SCALED IN HALF-REVOLUTIONS.
 0643                        06,2513   75252 0  -15DEGS  DEC    -.08333
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P0644   PROGRAM NAME:  TLIM.

R0645   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MAINTAINS THE TEMP LAMP (BIT 4 OF CHANNEL 11) ON THE DSKY TO AGREE WITH
R0647   THE TEMP SIGNAL FROM THE ISS (BIT 15 OF CHANNEL 30).  HOWEVER, THE LIGHT WILL NOT BE TURNED OFF IF A LAMP TEST
R0649   IS IN PROGRESS.

R0650   CALLING SEQUENCE:  CALLED BY IMUMON ON A CHANGE OF BIT 15 OF CHANNEL 30.

R0651   JOBS OR TASKS INITIATED:  NONE.

R0652   SUBROUTINES CALLED:  LAMPTEST.

R0653   ERASABLE INITIALIZATION:  FRESH START AND RESTART TURN THE TEMP LAMP OFF.

R0655   ALARMS:  TEMP LAMP TURNED ON WHEN IMU TEMP GOES OUT OF LIMITS.

R0656   EXIT:  NXTIFAIL.

R0657   OUTPUT:  SERVICE OF TEMP LAMP.                                                    IN A, EXCEPT FOR TLIM.

 0659   REF    1              06,2514   7 4733 0   TLIM       MASK     POSMAX             REMOVE BIT FROM WORD OF CHANGES AND SET
 0660   REF    5  LAST   168  06,2515  54 071 0               TS       RUPTREG2           DSKY TEMP LAMP ACCORDINGLY.

 0661   REF   17  LAST   170  06,2516  11*302 0               CCS      IMODES30
 0662   REF    1              06,2517   1 2525 0               TCF      TEMPOK
 0663   REF    2  LAST   171  06,2520   1 2525 0               TCF      TEMPOK

 0664   REF   13  LAST   169  06,2521   3 4750 1               CAF      BIT4               TURN ON LAMP.
 0665                         06,2522   0 0006 1               EXTEND
 0666   REF    1              06,2523  05 011 1               WOR      DSALMOUT
 0667   REF    1              06,2524   1 2225 1               TCF      NXTIFAIL

 0668   REF    2  LAST   170  06,2525   0 2766 1   TEMPOK     TC       LAMPTEST           IF TEMP NOW OK, DONT TURN OFF LAMP IF
 0669   REF    2  LAST   171  06,2526   1 2225 1               TCF      NXTIFAIL           LAMP TEST IN PROGRESS.

 0670   REF   14  LAST   171  06,2527   4 4750 0               CS       BIT4
 0671                         06,2530   0 0006 1               EXTEND
 0672   REF    2  LAST   171  06,2531  03 011 1               WAND     DSALMOUT           TURN OFF LAMP
 0673   REF    3  LAST   171  06,2532   1 2225 1               TCF      NXTIFAIL
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P0674     PROGRAM NAME:  ITURNON.

R0675     FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS CALLED BY IMUMON WHEN A CHANGE OF BIT 14 OF CHANNEL 30 (ISS TURN-ON
R0677     REQUEST) IS DETECTED.  UPON ENTRY, ITURNON CHECKS IF A TURN-ON DELAY SEQUENCE HAS FAILED, AND IF SO, IT EXITS.
R0679     IF NOT, IT CHECKS WHETHER THE TURN-ON REQUEST CHANGE IS TO ON OR OFF.  IF ON, IT SETS BIT 7 OF IMODES30 TO 1 SO
R0681     THAT TNONTEST WILL INITIATE THE ISS INITIALIZATION SEQUENCE.  IF OFF, THE TURN-ON DELAY SIGNAL, CHANNEL 12 BIT
R0683     15, IS CHECKED AND IF IT IS ON, ITURNON EXITS.  IF THE DELAY SIGNAL IS OFF, PROGRAM ALARM 00207 IS ISSUED, BIT 2
R0685     OF IMODES30 IS SET TO 1 AND THE PROGRAM EXITS.
R0686               THE SETTING OF BIT 2 OF IMODES30 (ISS DELAY SEQUENCE FAIL) INHIBITS THIS ROUTINE AND IMUOP FROM
R0688     PROCESSING ANY CHANGES.  THIS BIT WILL BE RESET BY THE ENDTNON ROUTINE WHEN THE CURRENT 90 SECOND DELAY PERIOD
R0690     ENDS.

R0691     CALLING SEQUENCE:  FROM IMUMOM WHEN ISS TURN-ON REQUEST CHANGES STATE.

R0692     JOBS OR TASKS INITIATED:  NONE.

R0693     SUBROUTINES CALLED:  ALARM, IF THE ISS TURN-ON REQUEST IS NOT PRESENT FOR 90 SECONDS.

R0695     ERASABLE INITIALIZATION:  FRESH START AND RESTART SET BIT 15 OF CHANNEL 12 AND BITS 2 AND 7 OF IMODES30 TO 0,
R0697     AND BIT 14 OF IMODES30 TO 1.

R0698     ALARMS:  PROGRAM ALARM 00207 IS ISSUED IF THE ISS TURN-ON REQUEST SIGNAL IS NOT PRESENT FOR 90 SECONDS.

R0700     EXIT:  NXTIFAIL.

R0701     OUTPUT:  BIT 7 OF IMODES30 TO START ISS INITIALIZATION, OR BIT 2 OF IMODES30 AND PROGRAM ALARM 00207 TO INDICATE
R0703     A FAILED TURN-ON SEQUENCE.

  0704    REF  15  LAST  164   06,2533   3 4752 0  ITURNON   CAF     BIT2              IF DELAY REQUEST HAS GONE OFF
  0705    REF  13  LAST  171   06,2534   7 1302 0            MASK    IMODES30          PREMATURELY, DO NOT PROCESS ANY CHANGES
  0706    REF  14  LAST  170   06,2535  10 000 0             CCS     A                 UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
  0707    REF   4  LAST  171   06,2536   1 2225 1            TCF     NXTIFAIL

  0708    REF  20  LAST  164   06,2537   3 4736 1            CAF     BIT14             SEE IF JUST ON OR OFF.
  0709    REF  14  LAST  172   06,2540   7 1302 0            MASK    IMODES30
  0710                         06,2541   0 0006 1            EXTEND
  0711    REF   1              06,2542   1 2556 1            BZF     ITURNON2          IF JUST ON.

  0712    REF  14  LAST  170   06,2543   3 4735 1            CAF     BIT15
  0713                         06,2544   0 0006 1            EXTEND                    SEE IF DELAY PRESENT DISCRETE HAS BEEN
  0714    REF   7  LAST  169   06,2545  02 012 0             RAND    CHAN12            SENT. IF SO, ACTION COMPLETE
  0715                         06,2546   0 0006 1            EXTEND
  0716                         06,2547   1 2551 0            BZF     +2
  0717    REF   5  LAST  172   06,2550   1 2225 1            TCF     NXTIFAIL

  0718    REF  16  LAST  172   06,2551   3 4752 0            CAF     BIT2              IF NOT, SET BIT TO INDICATE REQUEST NOT
  0719    REF  20  LAST  172   06,2552  27'302 0             ADS     IMODES30          PRESENT FOR FULL DURATION.
  0720    REF   2  LAST  164   06,2553   0 5567 0            TC      ALARM
  0721                         06,2554    00207 1            OCT     207
  0722    REF   6  LAST  172   06,2555   1 2225 1            TCF     NXTIFAIL
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 0723    REF  21  LAST  172    06,2556   4 1302 0  ITURNON2 CS      IMODES30        SET BIT7 TO INDICATE WAIT OF 1 SAMPLE
 0724    REF  16  LAST  164    06,2557   7 4745 1           MASK    BIT7
 0725    REF  22  LAST  173    06,2560  27'302 0            ADS     IMODES30
 0726    REF   1               06,2561   3 2564 1           CAF     RRINIT
 07261   REF   2  LAST  154    06,2562  54 110 0            TS      RADMODES
 0727    REF   7  LAST  172    06,2563   1 2225 1           TCF     MXTIFAIL

 07271                         06,2564    00102 1  RRINIT   OCT     00102
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```
R0728    PROGRAM NAME:  IMUCAGE.

R0729    FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF THE IMUCAGE INBIT, CHANNEL 30 BIT 11.  IF THE BIT
R0731    CHANGES TO 0 (CAGE BUTTON PRESSED), THE ISS IS CAGED (ICDU ZERO + COARSE ALIGN + NO ATT LAMP) UNTIL THE
R0733    ASTRONAUT SELECTS ANOTHER PROGRAM TO ALIGN THE ISS.  ANY PULSE TRAINS TO THE ICDU'S AND GYRO'S ARE TERMINATED,
R0735    THE ASSOCIATED OUTCOUNTERS ARE ZEROED AND THE GYRO'S ARE DE-SELECTED.  NO ACTION OCCURS WHEN THE BUTTON IS
R0737    RELEASED (INBIT CHANGES TO 1).

R0738    CALLING SEQUENCE:  BY IMUMON WHEN IMU CAGE BIT CHANGES.

R0739    JOBS OR TASKS INITIATED:  NONE.

R0740    SUBROUTINES CALLED:  CAGESUB.

R0741    ERASABLE INITIALIZATION:  FRESH START AND RESTART SET BIT 11 OF IMODES30 TO 1.

R0743    ALARMS:  NONE.

R0744    EXIT:  NXTIFAIL.

R0745    OUTPUT:  ISS CAGED, COUNTERS ZEROED, PULSE TRAINS TERMINATED AND NO ATT LAMP LIT.

 0747    REF  15  LAST  172    06,2565  10 000 0  IMUCAGE  CCS     A                   NO ACTION IF GOING OFF.
 0748    REF   1               06,2566  1 2361 0           TCF     ISSZERO
 0749    REF   1               06,2567  4 3002 1           CS      OCT77000            TERMINATE ICDU,RCDU, GYRO PULSE TRAINS
 0750                          06,2570  0 0006 1           EXTEND
 0751    REF   1               06,2571  03 014 1           WAND    CHAN14

 0752    REF   1               06,2572  4 2776 1           CS      OCT272              KNOCK DOWN DISPLAY INERTIAL DATA, IMU
 07521                         06,2573  0 0006 1           EXTEND                      ERROR COUNTER ENABLE, ZERO ICDU, COARSE
 07522   REF   8  LAST  172    06,2574  03 012 1           WAND    CHAN12              ALIGN ENABLE, RR ERROR COUNTER ENABLE.

 075221  REF   1               06,2575  4 4745 1           CS      ENGONBIT            INSURE ENGONFLG IS CLEAR.
 075222  REF   2  LAST  157    06,2576  7 0101 0           MASK    FLAGWRD5
 075223  REF   3  LAST  174    06,2577  54 101 0           TS      FLAGWRD5
 07523   REF   1               06,2600  4 4355 1           CS      PRIO30              TURN ENGINE OFF.
 07524                         06,2601  0 0006 1           EXTEND
 07525   REF   3  LAST  171    06,2602  02 011 0           RAND    DSALMOUT
 075251  REF  21  LAST  172    06,2603  6 4736 1           AD      BIT14
 075252                        06,2604  0 0006 1           EXTEND
 075253  REF   4  LAST  174    06,2605  01 011 0           WRITE   DSALMOUT            FORCE BIT14=1, BIT13=0.

 07526   REF   1               06,2606  0 2743 0           TC      CAGESUB1

 07527   REF   4  LAST  169    06,2607  0 4674 0           TC      IBNKCALL            KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 07528   REF   1               06,2610   17175 1           CADR    RNDREFDR

 0753    REF   5  LAST  170    06,2611  4 4755 0           CS      ZERO
 0754    REF   1               06,2612  54 050 0           TS      CDUXCMD
 0755    REF   1               06,2613  54 051 1           TS      CDUYCMD
 0756     REF    1                 06,2614   54 052 1          TS        CDUZCMD
 0757     REF    1                 06,2615   54 047 0          TS        GYROCMD

 0758     REF    1                 06,2616    4 3001 1         CS        OCT740            HAVING WAITED AT LEAST 27 MCT FROM
 0759                              06,2617    0 0006 1         EXTEND                      GYRO PULSE TRAIN TERMINATION, WE CAN
 0760     REF    2  LAST   174     06,2620   03 014 1          WAND      CHAN14            DE-SELECT THE GYROS
 0761     REF    8  LAST   173     06,2621    1 2225 1         TCF       NXTIFAIL
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P0762    PROGRAM NAME:  IMUOP.

R0763    FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES IN THE ISS OPERATE DISCRETE, BIT 9 OF CHANNEL 30.
R0765    IF THE INBIT CHANGES TO 0, INDICATING ISS ON, IMUOP GENERALLY SETS BIT 7 OF IMODES30 TO 1 TO REQUEST ISS
R0767    INITIALIZATION VIA TNONTEST.  AN EXCEPTION IS DURING A FAILED ISS DELAY DURING WHICH BIT 2 OF IMODES30 IS SET
R0769    TO 1 AND NO FURTHER INITIALIZATION IS REQUIRED.  WHEN THE INBIT CHANGES TO 1, INDICATING ISS OFF, IMUSEFLG IS
R0771    TESTED TO SEE IF ANY PROGRAM WAS USING THE ISS.  IF SO, PROGRAM ALARM 00214 IS ISSUED.

R0773    CALLING SEQUENCE:  BY IMUMON WHEN BIT 9 OF CHANNEL 30 CHANGES.

R0774    JOBS OR TASKS INITIATED:  NONE.

R0775    SUBROUTINES CALLED:  ALARM, IF ISS IS TURNED OFF WHILE IN USE.

R0776    ERASABLE INITIALIZATION:    FRESH START AND RESTART, BIT 9 OF IMODES30 IS SET TO 1 EXCEPT WHEN THE GIMBAL LOCK
R0778    LAMP IS ON, IN WHICH CASE IT IS SET TO 0.  THIS PREVENTS ICDU ZERO BY TNONTEST WITH THE ISS IN GIMBAL LOCK.

R0780    ALARMS:  PROGRAM ALARM 00214 IF THE ISS IS TURNED OFF WHILE IN USE.

R0781    EXIT:  NXTIFAIL.

R0782    OUTPUT:  ISS INITIALIZATION REQUEST (IMODES30 BIT 7) OR PROGRAM ALARM 00214.

 0784                          06,2622  0 0006 1  IMUOP    EXTEND
 0785    REF   1               06,2623  1 2643 0           BZF     IMUOP2

 0786    REF  10  LAST  168    06,2624  4 1303 1           CS      IMODES33        DISABLE DAP
 0787    REF  20  LAST  170    06,2625  7 4746 1           MASK    BIT6
 0788    REF  11  LAST  176    06,2626  27'303 1           ADS     IMODES33

 07885   REF   5  LAST  174    06,2627  0 4674 0           TC      IBNKCALL        KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 07886   REF   2  LAST  174    06,2630    17175 1          CADR    RNDREFDR

 07887   REF   2  LAST  164    06,2631  4 2777 0           CS      BITS7&8         KNOCK DOWN RENDEZVOUS, IMUUSE FLAGS
 07888   REF   3  LAST  166    06,2632  7 0074 0           MASK    FLAGWRD0
 0789    REF   4  LAST  176    06,2633  56 074 1           XCH     FLAGWRD0        IF GOING OFF, ALARM IF PROG USING IMU.
 07891                         06,2634  4 0000 0           COM
 0790    REF   1               06,2635  7 4744 0           MASK    IMUSEFLG
 0791    REF  16  LAST  174    06,2636  10 000 0           CCS     A
 0792    REF   9  LAST  175    06,2637  1 2225 1           TCF     NXTIFAIL

 0793    REF   3  LAST  172    06,2640  0 5567 0           TC      ALARM
 0794                          06,2641   00214 0           OCT     214
 0795    REF  10  LAST  176    06,2642  1 2225 1           TCF     NXTIFAIL

 0796    REF  17  LAST  172    06,2643  3 4752 0  IMUOP2   CAF     BIT2            SEE IF FAILED ISS TURN-ON SEQ IN PROG.
 0797    REF  23  LAST  173    06,2644  7 1302 0           MASK    IMODES30
 0798    REF  17  LAST  176    06,2645  10 000 0           CCS     A
 0799    REF  11  LAST  176    06,2646  1 2225 1           TCF     NXTIFAIL        IF SO, DONT PROCESS UNTIL PRESENT 90
 0800    REF   2  LAST  172    06,2647  1 2556 1           TCF     ITURNON2        SECONDS EXPIRES.
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P0801   PROGRAM NAME:  PIPFAIL

R0802   FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF BIT 13 OF CHANNEL 33, PIPA FAIL.  IT SETS BIT 10 OF
R0804   IMODES30 TO AGREE.  IT CALLS SETISSW IN CASE A PIPA FAIL NECESSITATES AN ISS WARNING.  IF NOT,I.E., IMODES30
R0806   BIT 1 = 1, AND A PIPA FAIL IS PRESENT AND THE ISS IS NOT BEING INITIALIZED, PROGRAM ALARM 00212 IS ISSUED.

R0808   CALLING SEQUENCE:  BY C33TEST ON CHANGES OF CHANNEL 33 BIT 13.

R0809   JOBS OR TASKS INITIATED:  NONE.

R0810   SUBROUTINES CALLED:  1) SETISSW, AND 2) ALARM (SEE FUNCTIONAL DESCRIPTION).

R0812   ERASABLE INITIALIZATION:  SEE IMUMON FOR INITIALIZATION OF IMODES30.  THE RELAVANT BITS ARE 5, 7, 8, 9, AND 10.

R0814   ALARMS:  PROGRAM ALARM 00212 IF PIPA FAIL IS PRESENT BUT NEITHER ISS WARNING IS TO BE ISSUED NOR THE ISS IS
R0816   BEING INITIALIZED.

R0817   EXIT:  NXTFL33.

R0818   OUTPUT:  PROGRAM ALARM 00212 AND ISS WARNING MAINTENANCE.

 0819   REF  18  LAST  176   06,2650  10 000 0  PIPFAIL  CCS     A                 SET BIT10 IN IMODES30 SO ALL ISS WARNING
 0820   REF  14  LAST  131   06,2651  3 4742 1           CAF     BIT10             INFO IS IN ONE REGISTER.
 0821   REF  24  LAST  176   06,2652  57'302 1           XCH     IMODES30
 0822   REF   1              06,2653  7 3004 1           MASK    -BIT10
 0823   REF  25  LAST  177   06,2654  27'302 0           ADS     IMODES30

 0824   REF   2  LAST  165   06,2655  0 2703 1           TC      SETISSW

 0825   REF  26  LAST  177   06,2656  4 1302 0           CS      IMODES30          IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
 0826   REF  13  LAST   88   06,2657  7 4753 0           MASK    BIT1              A PROGRAM ALARM IF IMU OPERATING BUT NOT
 0827   REF  19  LAST  177   06,2660  10 000 0           CCS     A                 CAGED OR BEING TURNED ON.
 0828   REF   1              06,2661  1 2432 1           TCF     NXTFL33

 0829   REF  27  LAST  177   06,2662  3 1302 1           CA      IMODES30
 0830   REF   1              06,2663  7 3000 0           MASK    OCT1720
 0831   REF  20  LAST  177   06,2664  10 000 0           CCS     A
 0832   REF   2  LAST  177   06,2665  1 2432 1           TCF     NXTFL33           ABOVE CONDITION NOT MET.

 0833   REF   4  LAST  176   06,2666  0 5567 0           TC      ALARM
 0834                        06,2667   00212 0           OCT     212
 0835   REF   3  LAST  177   06,2670  1 2432 1           TCF     NXTFL33
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L        T4RUPT PROGRAM                                                                USER'S PAGE NO.  24      E6 S4

P0836    PROGRAM NAMES:  DNTMFAST, UPTMFAST

R0837    FUNCTIONAL DESCRIPTION:  THESE PROGRAMS PROCESS CHANGES OF BITS 12 AND 11 OF CHANNEL 33.  IF A BIT CHANGES TO A
R0839    0, A PROGRAM ALARM IS ISSUED.  THE ALARMS ARE:

R0840              BIT     ALARM            CAUSE
R0841              ---     -----            -----
R0842               12     01105            DOWNLINK TOO FAST
R0843               11     01106            UPLINK TOO FAST

R0844    CALLING SEQUENCE:  BY C33TEST ON A BIT CHANGE.

R0845    SUBROUTINES CALLED:  ALARM, IF A BIT CHANGES TO A 0.

R0846    ERASABLE INITIALIZATION:  FRESH START OR RESTART, BITS 12 AND 11 OF IMODES33 ARE SET TO 1.

R0848    ALARMS:  SEE FUNCTIONAL DESCRIPTION.

R0849    EXIT:  NXTFL33.

R0850    OUTPUT:  PROGRAM ALARM ON A BIT CHANGE TO 0.

  0851   REF   21  LAST  177   06,2671  10 000 0  DNTMFAST CCS     A                   DO PROG ALARM IF TM TOO FAST.
  0852   REF    4  LAST  177   06,2672  1 2432 1           TCF     NXTFL33

  0853   REF    5  LAST  177   06,2673  0 5567 0           TC      ALARM
  0854                         06,2674   01105 1           OCT     1105
  0855   REF    5  LAST  178   06,2675  1 2432 1           TCF     NXTFL33

  0856   REF   22  LAST  178   06,2676  10 000 0  UPTMFAST CCS     A                   SAME AS DNLINK TOO FAST WITH DIFFERENT
  0857   REF    6  LAST  178   06,2677  1 2432 1           TCF     NXTFL33             ALARM CODE.

  0858   REF    6  LAST  178   06,2700  0 5567 0           TC      ALARM
  0859                         06,2701   01106 1           OCT     1106
  0860   REF    7  LAST  178   06,2702  1 2432 1           TCF     NXTFL33
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P0861    PROGRAM NAME:  SETISSW

R0862    FUNCTIONAL DESCRIPTION:  THIS PROGRAM TURNS THE ISS WARNING LAMP ON AND OFF (CHANNEL 11 BIT 1 = 1 FOR ON,
R0864    0 FOR OFF) DEPENDING ON THE STATUS OF IMODES30 BITS 13 (IMU FAIL) AND 4 (INHIBIT IMU FAIL), 12 (ICDU FAIL) AND
R0866    3 (INHIBIT ICDU FAIL), AND 10 (PIPA FAIL) AND 1 (INHIBIT PIPA FAIL).  THE LAMP IS LEFT ON IF A LAMP TEST IS IN
R0868    PROGRESS.

R0869    CALLING SEQUENCE:  CALLED BY IMUMON ON CHANGES TO IMU FAIL AND ICDU FAIL.  CALLED BY IFAILOK AND PFAILOK UPON
R0871    REMOVAL OF THE FAIL INHIBITS.  CALLED BY PIPFAIL WHEN THE PIPA FAIL DISCRETE CHANGES.  IT IS CALLED BY PIPUSE
R0873    SINCE THE PIPA FAIL PROGRAM ALARM MAY NECESSITATE AN ISS WARNING, AND LIKEWISE BY PIPFREE WHEN THE ALARM DEPARTS
R0875    AND IT IS CALLED BY IMUZERO3 AND ISSUP AFTER THE FAIL INHIBITS HAVE BEEN REMOVED.

R0877    JOBS OR TASKS INITIATED:  NONE.

R0878    SUBROUTINES CALLED:  NONE.

R0879    ERASABLE INITIALIZATION:

R0880              1) IMODES30 - SEE IMUMON.
R0881              2) IMODES33 BIT 1 = 0 (LAMP TEST NOT IN PROGRESS).

R0882    ALARMS:  ISS WARNING.

R08821   THE FOLLOWING PROGRAM ALARMS WILL SHOW WHICH FAILURE CAUSED THE ISS WARN
R08822   PROGRAM ALARM 00777  PIPA FAIL
R08823   PROGRAM ALARM 03777  ICDU FAIL
R08824   PROGRAM ALARM 04777  ICDU , PIPA FAILS
R08825   PROGRAM ALARM 07777  IMU FAIL
R08826   PROGRAM ALARM 10777  IMU , PIPA FAILS
R08827   PROGRAM ALARM 13777  IMU , ICDU FAILS
R08828   PROGRAM ALARM 14777  IMU , ICDU , PIPA FAILS

R0883    EXIT:  VIA Q.

R0884    OUTPUT:  ISS WARNING LAMP SET PROPERLY.

 0885    REF   1               06,2703  3 4761 0  SETISSW  CAF     OCT15          SET ISS WARNING USING THE FAIL BITS IN
 0886    REF  28  LAST  177    06,2704  7 1302 0           MASK    IMODES30       BITS 13, 12, AND 10 OF IMODES30 AND THE
 0887                          06,2705  0 0006 1           EXTEND                 FAILURE INHIBIT BITS IN POSITIONS
 0888    REF  15  LAST  177    06,2706  7 4742 0           MP      BIT10          4, 3, AND 1.
 0889    REF  29  LAST  179    06,2707  3 1302 1           CA      IMODES30
 0890                          06,2710  0 0006 1           EXTEND
 0891    REF   5  LAST  167    06,2711  04 001 1           ROR     LCHAN          0 INDICATES FAILURE
 0892                          06,2712  4 0000 0           COM
 0893    REF   1               06,2713  7 5025 1           MASK    OCT15000
 0894    REF  23  LAST  178    06,2714  10 000 0           CCS     A
 0895    REF   1               06,2715  1 2726 1           TCF     ISSWON         FAILURE.

 0896    REF  14  LAST  177    06,2716  3 4753 1  ISSWOFF  CAF     BIT1           DONT TURN OFF ISS WARNING IF LAMP TEST
 0897    REF  12  LAST  176    06,2717  7 1303 1           MASK    IMODES33       IN PROGRESS.
 0898    REF  24  LAST  179   06,2720  10 000 0                CCS     A
 0899    REF   3  LAST  157   06,2721  0 0002 0                TC      Q

 0900    REF  15  LAST  179   06,2722  4 4753 0                CS      BIT1
 0901                         06,2723  0 0006 1                EXTEND
 0902    REF   5  LAST  174   06,2724  03 011 1                WAND    DSALMOUT
 0903    REF   4  LAST  180   06,2725  0 0002 0                TC      Q

 0904                         06,2726  0 0006 1  ISSWON        EXTEND
 090402  REF   1              06,2727  22 066 1                QXCH    ITEMP6
 090404  REF   1              06,2730  0 5744 0                TC      VARALARM       TELL EVERYONE WHAT CAUSED THE ISSWARNING
 09041   REF  16  LAST  180   06,2731  3 4753 1                CAF     BIT1
 0905                         06,2732  0 0006 1                EXTEND
 0906    REF   6  LAST  180   06,2733  05 011 1                WOR     DSALMOUT
 0907    REF   2  LAST  180   06,2734  0 0066 1                TC      ITEMP6

 0908    REF   1              06,2735  4 3003 0  CAGESUB       CS      BITS5&15       SET OUTBITS AND INTERNAL FLAGS FOR
 0909                         06,2736  0 0006 1                EXTEND                 SYSTEM TURN-ON OR CAGE. DISABLE THE
 0910    REF   9  LAST  174   06,2737  03 012 1                WAND    CHAN12         ERROR COUNTER AND REMOVE IMU DELAY COMP.
 0911    REF   2  LAST  165   06,2740  3 4763 1                CAF     BITS4&5        SEND ZERO AND COARSE.
 0912                         06,2741  0 0006 1                EXTEND
 0913    REF  10  LAST  180   06,2742  05 012 1                WOR     CHAN12

 0914    REF  11  LAST  170   06,2743  4 1036 1  CAGESUB1      CS      DSPTAB +11D    TURN ON NO ATT LAMP
 0915    REF   1              06,2744  7 2773 1                MASK    OC40010
 0916    REF  12  LAST  180   06,2745  27'036 1                ADS     DSPTAB +11D

 0918    REF  30  LAST  179   06,2746  4 1302 0  CAGESUB2      CS      IMODES30       SET FLAGS TO INDICATE CAGING OR TURN-ON
 0919    REF   1              06,2747  7 2775 1                MASK    OCT75              AND INHIBIT ALL ISS WARNING INFO
 0920    REF  31  LAST  180   06,2750  27'302 0                ADS     IMODES30

 0922    REF  13  LAST  179   06,2751  4 1303 1                CS      IMODES33       DISABLE DAP AUTO AND HOLD MODES
 0923    REF  21  LAST  176   06,2752  7 4746 1                MASK    BIT6
 0924    REF  14  LAST  180   06,2753  27'303 1                ADS     IMODES33

 0925    REF   5  LAST  180   06,2754  0 0002 0                TC      Q

 0926    REF   3  LAST  177   06,2703                IMUFAIL   EQUALS  SETISSW
 0927    REF   4  LAST  180   06,2703                ICDUFAIL  EQUALS  SETISSW
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P0928                JUMP TABLES AND CONSTANTS.

 0929   REF    1                06,2755  1 2533 1  IFAILJMP TCF      ITURNON          CHANNEL 30 DISPATCH.
 0930   REF    1                06,2756  1 2703 0           TCF      IMUFAIL
 0931   REF    1                06,2757  1 2703 0           TCF      ICDUFAIL
 0932   REF    1                06,2760  1 2565 1           TCF      IMUCAGE
 0933                           06,2761   76400 1  30RDMSK  OCT      76400            (BIT 10 NOT SAMPLED HERE).
 0934   REF    1                06,2762  1 2622 1           TCF      IMUOP

 0935   REF    1                06,2763  1 2650 1  C33JMP   TCF      PIPFAIL          CHANNEL 33 DISPATCH.
 0936   REF    1                06,2764  1 2671 1           TCF      DNTMFAST
 0937   REF    1                06,2765  1 2676 0           TCF      UPTMFAST

R0938                SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.
 0939   REF   15  LAST  180     06,2766  4 1303 1  LAMPTEST CS       IMODES33         BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
 0940   REF   17  LAST  180     06,2767  7 4753 0           MASK     BIT1             PROGRESS.
 0941   REF   25  LAST  180     06,2770  10 000 0           CCS      A
 0942   REF    6  LAST  180     06,2771  24 002 0           INCR     Q
 0943   REF    7  LAST  181     06,2772  0 0002 0           TC       Q

 0944   REF    1                   5026            33RDMSK  EQUALS PRIO16
 0945                           06,2773   40010 1  OC40010  OCT      40010
 0947                           06,2774   00054 0  OCT54    OCT      54
 0948                           06,2775   00075 0  OCT75    OCT      75
 0948.5                         06,2776   00272 0  OCT272   OCT      00272
 0949                           06,2777   00300 1  BITS7&8  OCT      300
 0950                           06,3000   01720 0  OCT1720  OCT      1720
 0951                           06,3001   00740 1  OCT740   OCT      00740
 0952   REF    1                   5025            OCT15000 EQUALS PRIO15
 0953                           06,3002   77000 1  OCT77000 OCT      77000
 0954                           06,3003   40040 1  BITS6&15 OCT      40040
 0955                           06,3004   76777 1  -BIT10   OCT      -1000

 0956                           06,3005   21450 0  90SECS   DEC      9000
 0957   REF    1                   5751            120MS    =        OCT14            (DEC12)
 0958   REF    4  LAST  160        5270            CLOCKOK  EQUALS RESUME
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P0959   PROGRAM NAME_  RRAUTCHK

R0960   FUNCTIONAL DESCRIPTION_
R0961   RRAUTCHK IS THE RENDEZVOUS RADAR INBIT MONITOR. INITIALLY THE RR
R0962   POWER ON AUTO (CHAN 33 BIT 2) INBIT IS CHECKED. IF NO CHANGE, THE
R0963   PROGRAM EXITS TO RRCDUCHK. IF A CHANGE, RADMODES IS UPDATED
R0964   AND A CHECK MADE IF RR POWER HAS JUST COME ON. IF JUST OFF, A CHECK
R0965   IS MADE TO SEE IF A PROGRAM WAS USING THE RR (STATE BIT 7). IF NO,
R0966   THE PROGRAM EXITS TO RRCDUCHK. IF YES, PROGRAM ALARM 00514
R0967   IS REQUESTED BEFORE EXITING TO RRCDUCHK. IF RR POWER HAS JUST COME
R0968   ON, A CHECK IS MADE TO SEE IF A PROGRAM WAS USING THE RR (STATE BIT 7).
R0969   IF YES, THE PROGRAM EXITS TO RRCDUCHK WITHOUT REQUESTING THE TURN-ON
R0970   SEQUENCE. IF NO, RADMODES IS UPDATED TO INDICATE RR CDU ZERO AND
R0971   RR TURN-ON SEQUENCE (BITS 13, 1). A 10 MILLISECOND WAITLIST CALL
R0972   IS THEN SET FOR RRTURNON BEFORE THE PROGRAM EXITS TO NORRGMON.

R0973   CALLING SEQUENCE_
R0974   T4RUPT EVERY 480 MILLISECONDS

R0975   ERASABLE INITIALIZATION REQUIRED_
R0976   RADMODES, STATE

R0977   SUBROUTINES CALLED_
R0978   WAITLIST

R0979   JOBS OR TASKS INITIATED_
R0980   RRTURNON

R0981   ALARMS_  PROGRAM ALARM 00514 - RADAR GOES OUT OF AUTO MODE WHILE BEING
R0982   USED

R0983   EXIT_  RRCDUCHK, NORRGMON

 0984   REF   3  LAST  173   06,3006   3 0110 1  RRAUTCHK CA      RADMODES        SEE IF CHANGE IN RR AUTO MODE BIT.
 0985                        06,3007   0 0006 1           EXTEND
 0986   REF   2  LAST  167   06,3010   06 033 1           RXOR    CHAN33
 0987   REF   1              06,3011   7 4752 1           MASK    AUTOMBIT
 0988                        06,3012   0 0006 1           EXTEND
 0989   REF   1              06,3013   1 3037 1           BZF     RRCDUCHK

 0990   REF   4  LAST  182   06,3014   22 110 1           LXCH    RADMODES        UPDATE RADMODES.
 0991                        06,3015   0 0006 1           EXTEND
 0992   REF   6  LAST  179   06,3016   06 001 0           RXOR    LCHAN
 09925  REF   1              06,3017   7 3033 0           MASK    OCT05776        CLR CONT. DES., REMODE, REPOS, CDUZERO,
 0993   REF   5  LAST  182   06,3020   54 110 0           TS      RADMODES          AND TURNON BITS.
 0994   REF  18  LAST  176   06,3021   7 4752 1           MASK    BIT2            SEE IF JUST ON.
 0995   REF  26  LAST  181   06,3022   10 000 0           CCS     A
 0996   REF   2  LAST  182   06,3023   1 3034 1           TCF     RRCDUCHK -3     OFF.  GO DISABLE RR CDU ERROR COUNTERS.
 0999   REF   1              06,3024   3 7663 0           CA      OCT10001        SET RRCDUZRO AND TURNON BITS.
 1000   REF   6  LAST  182   06,3025   26 110 0           ADS     RADMODES
 1001    REF    5   LAST   168     06,3026   3 4753 1              CAF      ONE
 1002    REF    5   LAST   169     06,3027   0 5203 0              TC       WAITLIST
 1003    REF    1                  E7,1456                         EBANK=   LOSCOUNT
 1004    REF    1                  06,3030    02062 1              2CADR    RRTURNON
 1004    REF    1                  06,3031    52107 0

 1005    REF    1                  06,3032   1 3132 0              TCF      NORRGMON

 1006                              06,3033    05776 1   OCT05776   OCT      5776
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P1007    PROGRAM NAME_ RRCDUCHK

R1008    FUNCTIONAL DESCRIPTION_
R1009    RRCDUCHK CHECKS FOR RR CDU FAIL (CHAN 30 BIT 7). INITIALLY THE
R1010    RR CDU FAIL BIT IS SAMPLED (CHAN 30 BIT 7). IF NO CHANGE, THE
R1011    PROGRAM EXITS TO RRGIMON. IF A CHANGE, THE RR AUTO MODE
R1012    (RADMODES BIT 2) BIT IS CHECKED. IF NOT IN RR AUTO MODE, THE
R1013    PROGRAM EXITS TO NORRGMON. IF IN AUTO MODE, RADMODES BIT 7
R1014    (RR CDU OK) IS UPDATED AND IF P-20 IS OPERATING PROGRAM ALARM 00515 IS
R1015    REQUESTED. CONTROL IS TRANSFERRED TO SETTRKF TO UPDATE
R1016    THE TRACKER FAIL LAMP (DSPTAB+11D BIT 8). CONTROL RETURNS TO
R1017    RRGIMON.

R1018    CALLING SEQUENCE_
R1019    EVERY 480 MILLISECONDS FROM RRAUTCHK (VIA T4RUPT) UNLESS A
R1020    TURN-ON SEQUENCE HAS JUST BEEN INITIATED.

R1021    ERASABLE INITIALIZATION REQUIRED_
R1022    RADMODES

R1023    SUBROUTINES CALLED_
R1024    SETTRKF

R1025    JOBS OR TASKS INITIATED_
R1026    NONE

R1027    ALARMS_
R1028    TRACKER FAIL
R1029    PROGRAM ALARM 00515 - RRCDU FAIL DURING P-20

R1030    EXIT_
R1031    RRGIMON, NORRGMON

 10315   REF  12  LAST  182    06,3034  4 4752 1        -3  CS      BIT2
 10316                         06,3035  0 0006 1            EXTEND
 10317   REF  11  LAST  180    06,3036  03 012 1            WAND    CHAN12          AT TURNON, DISABLE CDU ERROR COUNTERS.

 1032    REF   7  LAST  182    06,3037  3 0110 1  RRCDUCHK  CA      RADMODES        LAST SAMPLED BIT IN RADMODES.
 1033                          06,3040  0 0006 1            EXTEND
 1034    REF   2  LAST  161    06,3041  06 030 1            RXOR    CHAN30
 1035    REF   1               06,3042  7 4745 1            MASK    RCDUFBIT
 1036                          06,3043  0 0006 1            EXTEND
 1037    REF   1               06,3044  1 3071 0            BZF     RRGIMON

 1038    REF   2  LAST  182    06,3045  3 4752 0            CAF     AUTOMBIT        IF RR NOT IN AUTO MODE, DON'T CHANGE BIT
 1039    REF   8  LAST  184    06,3046  7 0110 0            MASK    RADMODES        7 OF RADMODES. IF THIS WERE NOT DONE,
 1040    REF  27  LAST  182    06,3047  10 000 0            CCS     A               THE TRACKER FAIL MIGHT COME ON WHEN
 1041    REF   2  LAST  183    06,3050  1 3132 0            TCF     NORRGMON        JUST READING LR DATA.

 1042    REF   2  LAST  184    06,3051  3 4745 0            CAF     RCDUFBIT        SET BIT 7 OF RADMODES FOR SETTRKF.
 1043    REF    9  LAST  184    06,3052  22 110 1              LXCH    RADMODES          UPDATE RADMODES.
 1044                           06,3053  0 0006 1              EXTEND
 1045    REF    3  LAST  167    06,3054  06 001 0              RXOR    L
 1046    REF   10  LAST  185    06,3055  54 110 0              TS      RADMODES

 1047    REF   11  LAST  185    06,3056  3 0110 1              CA      RADMODES          DID RR CDU FAIL
 1048    REF    3  LAST  184    06,3057  7 4745 1              MASK    RCDUFBIT
 1049    REF   28  LAST  184    06,3060  10 000 0              CCS     A
 1050    REF    1               06,3061  1 3070 1              TCF     TRKFLCDU          NO
 1051    REF    5  LAST  176    06,3062  4 0074 0              CS      FLAGWRD0          RNDVFLG  P20 OR P22 OPERATING
 1052    REF    1               06,3063  7 4745 1              MASK    RNDVZBIT
 1053    REF   29  LAST  185    06,3064  10 000 0              CCS     A
 1054    REF    2  LAST  185    06,3065  1 3070 1              TCF     TRKFLCDU          NO
 1055    REF    7  LAST  178    06,3066  0 5567 0              TC      ALARM             YES
 1056                           06,3067   00515 0              OCT     00515
 1057    REF    1               06,3070  0 4564 1    TRKFLCDU  TC      SETTRKF           UPDATE TRACKER FAIL LAMP ON DSKY.
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P1058    PROGRAM NAME_  RRGIMON                                                      E AUTO MODE EXCEPT WHEN THE RR CDUS ARE

R1060    FUNCTIONAL DESCRIPTION_                                                     TTER IS INITIATED BY THIS MONITOR WHEN
R1062    RRGIMON IS THE RR GIMBAL LIMIT MONITOR. INITIALLY THE FOLLOWING IS         ED TO DRIVE THE GIMBALS TO T = 0 AND
R1064    CHECKED_ REMODE, RR CDU:S BEING ZEROED, REPOSITION, AND RR
R1065    NOT IN AUTO MODE (RADMODES BITS 14, 13, 11 2). IF ANY OF THESE
R1066    EXIST THE PROGRAM EXITS TO GPMATRIX. IF NONE ARE PRESENT RRLIMCHK
R1067    IS CALLED TO SEE IF THE PRESENT RR CDU ANGLES (OPTY, OPTX) ARE WITHIN
R1068    THE LIMITS OF THE CURRENT MODE. IF WITHIN LIMITS, THE PROGRAM EXITS
R1069    TO NORRGMON. IF NOT WITHIN LIMITS, THE REPOSITION FLAG (RADMODES
R1070    BIT 11) IS SET, THE RR AUTO TRACKER AND RR ERROR COUNTER
R1071    (CHAN 12 BITS 14, 2) ARE DISABLED, AND A 20 MILLISECOND WAITLIST
R1072    CALL IS SET FOR DORREPOS AFTER WHICH THE PROGRAM EXITS TO NORRGMON.

R1073    CALLING SEQUENCE_
R1074    EVERY 480 MILLISECONDS FROM RRCDUCHK (VIA T4RUPT) UNLESS TURN-ON
R1075    HAS JUST BEEN INITIATED VIA RRAUTCHK OR IF THERE HAS BEEN A CHANGE IN
R1076    THE RR CDU FAIL BIT (CHAN 30 BIT 7) AND THE RR IS NOT IN THE AUTO MODE
R1077    (RADMODES BIT 2).

R1078    ERASABLE INITIALIZATION_  RADMODES

R1079    SUBROUTINES CALLED_
R1080    RRLIMCHK, WAITLIST

R1081    JOBS OR TASKS INITIATED_
R1082    DORREPOS

R1083    ALARMS_
R1084    NONE

R1085    EXIT_
R1086    NORRGMON

  1087   REF   4  LAST  1[illegible]  06,3071  30 101 1  RRGIMON  CAE     FLAGWRD5          IS NO ANGLE MONITOR FLAG SET
  1088   REF   1                      06,3072  7 4750 0           MASK    NORRMBIT
  1089   REF  30  LAST  185           06,3073  10 000 0           CCS     A
  1090   REF   3  LAST  184           06,3074  1 3132 0           TCF     NORRGMON          YES - SKIP LIMIT CHECK
  10901  REF   1                      06,3075  4 0103 1           CS      FLAGWRD7          IS SERVICER RUNNING?
  10902  REF   1                      06,3076  7 4747 0           MASK    AVEGFBIT
  10903  REF  31  LAST  186           06,3077  10 000 0           CCS     A
  10904                               06,3100  1 3105 1           TCF     +5                NO.  DO R25
  10905  REF   1                      06,3101  3 0102 1           CA      FLAGWRD6          YES.  IS MUNFLAG SET?
  10906  REF   1                      06,3102  7 4744 0           MASK    MUNFLBIT
  10907  REF  32  LAST  186           06,3103  10 000 0           CCS     A
  10908  REF   4  LAST  186           06,3104  1 3132 0           TCF     NORRGMON          YES.  DON'T DO R25
  1091   REF   1                      06,3105  3 3127 0       +5  CAF     OCT32002          INHIBIT BY REMODE,ZEROING,MONITOR.
  1092   REF  12  LAST  185           06,3106  7 0110 0           MASK    RADMODES          OR RR NOT IN AUTO.
  1093   REF  33  LAST  186           06,3107  10 000 0           CCS     A
  1094   REF   5  LAST  186           06,3110  1 3132 0           TCF     NORRGMON
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 1095   REF    1               06,3111  0 4523 1            TC      RRLIMCHK     SEE IF ANGLES IN LIMITS.
 1096   REF    1               06,3112   00035 1            ADRES   CDUT

 1097   REF    1               06,3113  1 3115 0            TCF     MONREPOS

 1098   REF    5  LAST   186   06,3114  1 3132 0            TCF     NORRGMON     (ADDITIONAL CODING MAY GO HERE).

 1099   REF    1               06,3115  3 4741 1  MONREPOS  CAF     REPOSBIT     SET FLAG TO SHOW REPOSITION IN PROGRESS.
 1100   REF   13  LAST   136   06,3116  26 110 0            ADS     RADMODES

 1101   REF    1               06,3117  4 3130 1            CS      OCT20002     DISABLE TRACKER AND ERROR COUNTER.
 1102                          06,3120  0 0006 1            EXTEND
 1103   REF   12  LAST   184   06,3121  03 012 1            WAND    CHAN12

 1104   REF    2  LAST    37   06,3122  3 4752 0            CAF     TWO
 1105   REF    6  LAST   183   06,3123  0 5203 0            TC      WAITLIST
 1106   REF    2  LAST   183   E7,1456                      EBANK=  LOSCOUNT
 1107   REF    1               06,3124   02127 1            2CADR   DORREPOS
 1107   REF    1               06,3125   52107 0

 1108   REF    7  LAST   137   06,3126  1 3132 0            TCF     NORRGMON

 1109                          06,3127   32002 1  OCT32002  OCT     32002
 1110                          06,3130   20002 1  OCT20002  OCT     20002
 1111                          06,3131   02100 1  OCT02100  OCT     02100        P20,P22 MASK BITS
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P1112    PROGRAM NAME: GPMATRIX (DAPT4S) MOD. NO. 2  DATE: OCTOBER 27, 1966

R1113    AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R11131   MODIFIED:  7FEB. 1968 BY P. S. WEISSMAN TO DELETE COMPUTATION OF MR12 AND MR13, WHICH ARE NO LONGER REQUIRED.

R1114    THIS PROGRAM CALCULATES ALL THE SINGLE-PRECISION MATRIX ELEMENTS WHICH ARE USED BY LEM DAP TO TRANSFORM VECTORS
R1116    FROM GIMBAL TO PILOT (BODY) AXES AND BACK AGAIN.  THESE ELEMENTS ARE USED EXCLUSIVELY BY BASIC LANGUAGE ROUTINES
R1118    AND THEREFORE ARE NOT ARRAYED FOR USE BY INTERPRETIVE PROGRAMS.

R1115    CALLING SEQUENCE: GPMATRIX IS TRANSFERRED TO FROM DAPT4S AND IS THUS EXECUTED 4 TIMES A SECOND BY T4RUPT.
R1121    DAPT4S IS LISTED IN T4JUMP TABLE TWICE EXPLICITLY AND ALSO OCCURS AFTER RRAUTCHK (WHICH IS ALSO LISTED TWICE).

R1123    SUBROUTINES CALLED: SPSIN, SPCOS.

R1124    NORMAL EXIT MODE:  TCF   RESUME

R1125    ALARM AND ABORT MODES:  NONE.

R1130    INPUT:  CDUX, CDUY, CDUZ.

R1131    OUTPUT:  M11, M21, M31, M22, M32.

R1132    AOG = CDUX, AIG = CDUY, AMG = CDUZ: MNEMONIC IS: OIM = XYZ

R1133      *        *     SIN(MG)          0            1  *
R1134      M    =   *    COS(MG)COS(OG) SIN(OG)        0  *
R1135       GP      *   -COS(MG)SIN(OG) COS(OG)        0  *

R1136      *        *  0    COS(OG)/COS(MG)          -SIN(OG)/COS(MG)          *
R1137      M    =   *  0    SIN(OG)                   COS(OG)                  *
R1138       PG      *  1  -SIN(MG)COS(OG)/COS(MG)   SIN(MG)SIN(OG)/COS(MG)   *

  1143   REF   5  LAST  176   E6,1414                       EBANK=  M11
  1144   REF   1              06,3132              DAPT4S   EQUALS  GPMATRIX
R1145    T4RUPT DAP LOGIC:

  1146   REF   2  LAST  169   06,3132  30 034 0  GPMATRIX CAE     CDUZ               SINGLE ENTRY POINT
  1147   REF   1              06,3133  0 5033 1           TC      SPSIN              SIN(CDUZ) = SIN(MG)
  1148   REF   6  LAST  188   06,3134  55'414 0           TS      M11                SCALED AT 1

  1149   REF   3  LAST  188   06,3135  30 034 0           CAE     CDUZ
  1150   REF   1              06,3136  0 5032 0           TC      SPCOS              COS(CDUZ) = COS(MG)
  1151   REF   1              06,3137  54 061 1           TS      COSMG              SCALED AT 1 (ONLY A FACTOR)

  1152   REF   1              06,3140  30 032 0           CAE     CDUX
  1153   REF   2  LAST  188   06,3141  0 5033 1           TC      SPSIN              SIN(CDUX) = SIN(OG)
  1154   REF   1              06,3142  55'417 0           TS      M22                SCALED AT 1 (ALSO IS MR22)

  1155   REF   2  LAST  188   06,3143  4 1417 0           CS      M22
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 1156                           06,3144  0 0006 1           EXTEND
 1157   REF   2  LAST  188      06,3145  7 0061 1           MP      COSMG          -SIN(OG)COS(MG)
 1158   REF   1                 06,3146  55'416 1           TS      M31            SCALED AT 1

 1159   REF   2  LAST  188      06,3147  30 032 0           CAE     CDUX
 1160   REF   2  LAST  188      06,3150  0 5032 0           TC      SPCOS          COS(CDUX) = COS(OG)
 1161   REF   1                 06,3151  55'420 1           TS      M32            SCALED AT 1 (ALSO IS MR23)

 1162                           06,3152  0 0006 1           EXTEND
 1163   REF   3  LAST  189      06,3153  7 0061 1           MP      COSMG          COS(OG)COS(MG)
 1164   REF   1                 06,3154  55'415 1           TS      M21            SCALED AT 1

 1191   REF   5  LAST  191      06,3155  0 5270 1           TC      RESUME

 1192   REF   3  LAST  159      06,3132            NORRGMON EQUALS DAPT4S
 1193   REF   6  LAST  189         5270            ENDDAPT4 EQUALS RESUME
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L         RCS FAILURE MONITOR                                                       USER'S PAGE NO.    1       E0 S4

R0001     PROGRAM DESCRIPTION

R0002     AUTHOR:  J S MILLER

R00025    MODIFIED 6 MARCH 1968 BY P S WEISSMAN TO SET UP JOB FOR 1/ACCS WHEN THE MASKS ARE CHANGED.

R0003          THIS ROUTINE IS ATTACHED TO T4RUPT, AND IS ENTERED EVERY 480 MS.  ITS FUNCTION IS TO EXAMINE THE LOW 8 BITS
R0005     OF CHANNEL 32 TO SEE IF ANY ISOLATION-VALVE CLOSURE BITS HAVE APPEARED OR DISAPPEARED (THE CREW IS WARNED OF JET
R0007     FAILURES BY LAMPS LIT BY THE GRUMMAN FAILURE-DETECTION CIRCUITRY; THEY MAY RESPOND BY OPERATING SWITCHES WHICH
R0009     ISOLATE PAIRS OF JETS FROM THE PROPELLANT TANKS AND SET BITS IN CHANNEL 32).  IN THE EVENT THAT CHANNEL 32 BITS
R0011     DIFFER FROM 'PVALVEST', THE RECORD OF ACTIONS TAKEN BY THIS ROUTINE, THE APPROPRIATE BITS IN 'CH5MASK' &
R0013     'CH6MASK', USED BY THE DAP JET-SELECTION LOGIC, ARE UPDATED, AS IS 'PVALVEST'.  TO SPEED UP & SHORTEN THE
R0015     ROUTINE, NO MORE THAN ONE CHANGE IS ACCEPTED PER ENTRY.  THE HIGHEST-NUMBERED BIT IN CHANNEL 32 WHICH REQUIRES
R0017     ACTION IS THE ONE PROCESSED.

R0018          THE CODING IN THE FAILURE MONITOR HAS BEEN WRITTEN SO AS TO HAVE ALMOST COMPLETE RESTART PROTECTION.  FOR
R0020     EXAMPLE, NO ASSUMPTION IS MADE WHEN SETTING A 'CH5MASK' BIT TO 1 THAT THE PREVIOUS STATE IS 0, ALTHOUGH IT OF
R0022     COURSE SHOULD BE.  ONE CASE WHICH MAY BE SEEN TO EVADE PROTECTION IS THE OCCURRENCE OF A RESTART AFTER UPDATING
R0024     ONE OR BOTH DAP MASK-WORDS BUT BEFORE UPDATING 'PVALVEST', COUPLED WITH A CHANGE IN THE VALVE-BIT BACK TO ITS
R0026     FORMER STATE.  THE CONSEQUENCE OF THIS IS THAT THE NEXT ENTRY WOULD NOT SEE THE CHANGE INCOMPLETELY INCORP-
R0028     ORATED BY THE LAST PASS (BECAUSE IT WENT AWAY AT JUST THE RIGHT TIME), BUT THE DAP MASK-WORDS WILL BE INCORRECT.
R0030     THIS COMBINATION OF EVENTS SEEMS QUITE REMOTE, BUT NOT IMPOSSIBLE UNLESS THE CREW OPERATES THE SWITCHES AT HALF-
R0032     SECOND INTERVALS OR LONGER.  IN ANY EVENT, A DISAGREEMENT BETWEEN REALITY AND THE DAP MASKS WILL BE CURED IF
R0034     THE MISINTERPRETED SWITCH IS REVERSED AND THEN RESTORED TO ITS CORRECT POSITION (SLOWLY).

R0036     CALLING SEQUENCE:

R0037               TCF     RCSMONIT         (IN INTERRUPT MODE, EVERY 480 MS.)

R0038     EXIT:  TCF  RCSMONEX  (ALL PATHS EXIT VIA SUCH AN INSTRUCTION)
 0039     REF    7  LAST  189       5270                RCSMONEX EQUALS RESUME

R0040     ERASABLE INITIALIZATION REQUIRED:

R0041               VIA FRESH START:  PVALVEST            = +0  (ALL JETS ENABLED)
R0042                                 CH5MASK, CH6MASK    = +0  (ALL JETS OK)

R0043     OUTPUT:  CH5MASK & CH6MASK UPDATED  (1'S WHERE JETS NOT TO BE USED, IN CHANNEL 5 & 6 FORMAT)
R0045              PVALTEST UPDATED  (1,S WHEN VALVE CLOSURES HAVE BEEN TRANSLATED INTO CH5MASK & CH6MASK; CHAN 32 FORMAT)
R00465             JOB TO DO 1/ACCS.

R0047     DEBRIS:  A, L, Q AND DEBRIS OF NOVAC.

R0048     SUBROUTINE CALLED:  NOVAC.

 0052     REF    1                  1262                    EBANK= CH5MASK

 0059                            23,2000                    BANK    23
 0060     REF    1               06,2000                    SETLOC  RCSMONT
 0061                            06,3156                    BANK
 0062  REF   1                                                 COUNT* $$/T4RCS

 00625 REF   1                 06,3156            RCSMONIT EQUALS RCSMON

 0063  REF   6  LAST  174      06,3156  4 4755 0  RCSMON   CS      ZERO
 0064                          06,3157  0 0006 1           EXTEND
 0065  REF   2  LAST  158      06,3160  05 032 0           RXOR    CHAN32        PICK UP + INVERT INVERTED CHANNEL 32.
 0066  REF   1                 06,3161  7 4357 0           MASK    LOW8          KEEP JET-FAIL BITS ONLY.
 0067  REF   8  LAST  181      06,3162  54 002 1           TS      Q

 0068  REF   1                 06,3163  4 1276 1           CS      PVALVEST            -    -
 0069  REF   9  LAST  191      06,3164  7 0002 1           MASK    Q             FORM PC + PC.
 0070  REF   4  LAST  185      06,3165  54 001 1           TS      L               (P = PREVIOUS ISOLATION VALVE STATE,
 0071  REF  10  LAST  191      06,3166  4 0002 1           CS      Q                C = CURRENT VALVE STATE (CH 32)).
 0072  REF   2  LAST  191      06,3167  7 1276 1           MASK    PVALVEST
 0073  REF   5  LAST  191      06,3170  26 001 1           ADS     L             RESULT NZ INDICATES ACTION REQUIRED.

 0074                          06,3171  0 0006 1           EXTEND
 0075  REF   1                 06,3172  1 5270 0           BZF     RCSMONEX      QUIT IF NO ACTION REQUIRED.

 0076                          06,3173  0 0006 1           EXTEND
 0077  REF  17  LAST  173      06,3174  7 4745 1           MP      BIT7          MOVE BITS 8 - 1 OF A TO 14 - 7 OF L.
 0078  REF   6  LAST  191      06,3175  56 001 0           XCH     L             ZERO TO L IN THE PROCESS.

 0079  REF   7  LAST  191      06,3176  24 001 0   -3      INCR    L
 0080                          06,3177  6 0000 1           DOUBLE                BOUND TO GET OVERFLOW IN THIS LOOP,
 0081                          06,3200  54 000 0           OVSK                  SINCE WE ASSURED INITIAL NZ IN A.
 0082                          06,3201  1 3176 0           TCF     -3

 0083  REF   8  LAST  191      06,3202  50 001 0           INDEX   L
 0084  REF  15  LAST  164      06,3203  3 4743 0           CA      BIT8 -1       SAVE THE RELEVANT BIT (8 - 1).
 0085  REF  11  LAST  191      06,3204  54 002 1           TS      Q
 0086  REF   3  LAST  191      06,3205  7 1276 1           MASK    PVALVEST      LOOK AT PREVIOUS VALVE STATE BIT.
 0087  REF  34  LAST  189      06,3206  10 000 0           CCS     A
 0088  REF   1                 06,3207  1 3223 0           TCF     VOPENED       THE VALVE HAS JUST BEEN OPENED.

 0089  REF   2  LAST  190      06,3210  4 1262 1           CS      CH5MASK       THE VALVE HAS JUST BEEN CLOSED.
 0090  REF   9  LAST  191      06,3211  50 001 0           INDEX   L
 0091  REF   1                 06,3212  7 3242 1           MASK    5FAILTAB
 0092  REF   3  LAST  191      06,3213  27'262 1           ADS     CH5MASK       SET INHIBIT BIT FOR CHANNEL 5 JET.

 0093  REF   1                 06,3214  4 1263 0           CS      CH6MASK
 0094  REF  10  LAST  191      06,3215  50 001 0           INDEX   L
 0095  REF   1                 06,3216  7 3252 0           MASK    6FAILTAB
 0096  REF   2  LAST  191      06,3217  27'263 0           ADS     CH6MASK       SET INGIBIT BIT FOR CHANNEL 6 JET.

 0097  REF  12  LAST  191      06,3220  3 0002 0           CA      Q
 0098  REF   4  LAST  191      06,3221  27'276 1           ADS     PVALVEST      RECORD ACTION TAKEN.

 0099  REF   1                 06,3222  1 3236 1           TCF     1/ACCFIX      SET UP 1/ACCJOB AND EXIT.
 0100    REF  11  LAST  191    06,3223  50 001 0  VOPENED  INDEX    L             A VALVE HAS JUST BEEN OPENED.
 0101    REF   2  LAST  191    06,3224  4 3242 1           CS       5FAILTAB
 0102    REF   4  LAST  191    06,3225  7 1262 1           MASK     CH5MASK
 0103    REF   5  LAST  192    06,3226  55'262 1           TS       CH5MASK       REMOVE INHIBIT BIT FOR CHANNEL 5 JET.

 0104    REF  12  LAST  192    06,3227  50 001 0           INDEX    L
 0105    REF   2  LAST  191    06,3230  4 3252 0           CS       6FAILTAB
 0106    REF   3  LAST  191    06,3231  7 1263 0           MASK     CH6MASK
 0107    REF      LAST  192    06,3232  55'263 0           TS       CH6MASK       REMOVE INHIBIT BIT FOR CHANNEL 6 JET.

 0108    REF  13  LAST  191    06,3233  4 0002 1           CS       0
 0109    REF   5  LAST  191    06,3234  7 1276 1           MASK     PVALVEST
 0110    REF   6  LAST  192    06,3235  55'276 1           TS       PVALVEST      RECORD ACTION TAKEN.

 0111    REF   1               06,3236  3 7715 0  1/ACCFIX CAF      PRIO27        SET UP 1/ACCS SO THAT THE SWITCH CURVES
 0112    REF   2  LAST  158    06,3237  0 5072 1           TC       NOVAC           FOR TJETLAW CAN BE MODIFIED IF CH5MASK
 0113    REF   4  LAST  133    E6,1537                     EBANK=   AOSQ            HAS BEEN ALTERED.
 0114    REF   1               06,3240   02454 0           2CADR    1/ACCJOB
 0114    REF   1               06,3241   40106 1
 0115    REF   2  LAST  191    06,3242  1 5270 0           TCF      RCSMONEX      EXIT.


 0117                          06,3241            5FAILTAB EQUALS   -1            CH 5 JET BIT CORRESPONDING TO CH 32 BIT:
 0118                          06,3243   00040 0           OCT      00040         8
 0119                          06,3244   00020 0           OCT      00020         7
 0120                          06,3245   00100 0           OCT      00100         6
 0121                          06,3246   00200 0           OCT      00200         5
 0122                          06,3247   00010 0           OCT      00010         4
 0123                          06,3250   00001 0           OCT      00001         3
 0124                          06,3251   00004 0           OCT      00004         2
 0125                          06,3252   00002 0           OCT      00002         1

 0126                          06,3251            6FAILTAB EQUALS   -1            CH 6 JET BIT CORRESPONDING TO CH 32 BIT:
 0127                          06,3253   00010 0           OCT      00010         8
 0128                          06,3254   00020 0           OCT      00020         7
 0129                          06,3255   00004 0           OCT      00004         6
 0130                          06,3256   00200 0           OCT      00200         5
 0131                          06,3257   00001 0           OCT      00001         4
 0132                          06,3260   00002 0           OCT      00002         3
 0133                          06,3261   00040 0           OCT      00040         2
 0134                          06,3262   00100 0           OCT      00100         1
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L        DOWNLINK LISTS                                                                    USER'S PAGE NO.   1       EO S4

 0001                        22,2004                    BANK    22
 0002    REF    1            05,2000                    SETLOC  DOWNTEL1
 0003                        05,2065                    BANK

 0004    REF    2  LAST  154      0340                  EBANK=  DNTMBUFF

R0005    SPECIAL DOWNLINK OP CODES
A0006                                                   OP CODE ADDRESS(EXAMPLE) SENDS..     BIT 15  BITS 14-12 BITS 11
A0007                                                                                                                 -0
A0008                                                   ------- ----------      ----------     ------  ---------- -------
A0009                                                                                                                 --
A0010                                                   1DNADR  TIME2           (2 AGC WDS)      0         0      ECADR
A0011                                                   2DNADR  TEPHEM          (4 AGC WDS)      0         1      ECADR
A0012                                                   3DNADR  VGBODY          (6 AGC WDS)      0         2      ECADR
A0013                                                   4DNADR  STATE           (8 AGC WDS)      0         3      ECADR
A0014                                                   5DNADR  UPBUFF          (10AGC WDS)      0         4      ECADR
A0015                                                   6DNADR  DSPTAB          (12AGC WDS)      0         5      ECADR
A0016                                                   DNCHAN  30              CHANNELS         0         7      CHANNEL
A0017                                                                                                             ADDRESS
A0018                                                   DNPTR   NEXTLIST        POINTS TO NEXT   0         6      ADRES
A0019                                                                            LIST.

R0020    DOWNLIST FORMAT DEFINITIONS AND RULES-
R0021    1. END OF A LIST = -XDNADR (X = 1 TO 6), -DNPTR, OR -DNCHAN.
R0022    2. SNAPSHOT SUBLIST = LIST WHICH STARTS WITH A -1DNADR.
R0023    3. SNAPSHOT SUBLIST CAN ONLY CONTAIN 1DNADRS.
R0024    4. TIME2 1DNADR MUST BE LOCATED IN THE CONTROL LIST OF A DOWNLIST.
R0025    5. ERASABLE DOWN TELEMETRY WORDS SHOULD BE GROUPED IN SEQUENTIAL
R0026       LOCATIONS AS MUCH AS POSSIBLE TO SAVE STORAGE USED BY DOWNLINK LISTS.


 0027    REF    1                                       COUNT*  $$/DLIST
 0028                            0007          ERASZERO EQUALS  7
 0029    REF    1                0007          UNKNOWN  EQUALS  ERASZERO
 0030    REF    2  LAST  193     0007          SPARE    EQUALS  ERASZERO        USE SPARE TO INDICATE AVAILABLE SPACE
 0032                        05,2065   77340 0 LOWIDCOD OCT     77340           LOW ID CODE


 0033    REF    1            05,2172           NOMDNLST EQUALS  LMCSTADL        FRESH START AND POST P27 DOWNLIST

 0034    REF    1            05,2407           AGSLIST  EQUALS  LMAGSIDL

 0035    REF    2  LAST  193 05,2407           UPDNLIST EQUALS  LMAGSIDL        UPDATE PROGRAM (P27) DOWNLIST
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P0036    LM ORBITAL MANEUVERS LIST

R0037          -----------------  CONTROL LIST  --------------------------

 0038                             05,2066                LMORBMDL  EQUALS                  SEND ID BY SPECIAL CODING
 0039    REF    1                 05,2066  32127 1               DNPTR   LMORBM01          COLLECT SNAPSHOT
 0040    REF    3  LAST   193     05,2067  24340 0               6DNADR  DNTMBUFF          SEND SNAPSHOT
 0041    REF    1                 05,2070  03451 1               1DNADR  DELLT4            DELLT4,+1
 0042    REF    1                 05,2071  13443 0               3DNADR  RTARG             RTARG,+1...+5
 0043    REF    1                 05,2072  02256 1               1DNADR  ELEV              ELEV,+1
 0044    REF    1                 05,2073  01344 0               1DNADR  TEVENT            TEVENT,+1
 0045    REF    1                 05,2074  25733 1               6DNADR  REFSMMAT          REFSMMAT+0...+11D
 0046    REF    1                 05,2075  03633 1               1DNADR  TCSI              TCSI,+1
 0047    REF    1                 05,2076  12266 0               3DNADR  DELVEET1          DELVEET1+0...+5
 0048    REF    2  LAST   143     05,2077  13700 1               3DNADR  VGTIG             VGTIG+0...+5
 0049    REF    2  LAST   107     05,2100  01340 1               1DNADR  DNLRVELZ          DNLRVELZ,DNLRALT
 0050    REF    2  LAST   144     05,2101  03630 1               1DNADR  TPASS4            TPASS4,+1
 0051    REF    1                 05,2102  32136 1               DNPTR   LMORBM02          COMMON DATA
 0052    REF    1                 05,2103  00024 1               1DNADR  TIME2             TIME2/1
 0053    REF    1                 05,2104  32145 0               DNPTR   LMORBM03          COLLECT SNAPSHOT
 0054    REF    4  LAST   194     05,2105  24340 0               6DNADR  DNTMBUFF          SEND SNAPSHOT
 0055    REF    1                 05,2106  32154 0               DNPTR   LMORBM04          COMMON DATA
 0056    REF    1                 05,2107  07115 0               2DNADR  POSTORKU          POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0058    REF    1                 05,2110  00007 0               1DNADR  SPARE
 0059    REF    1                 05,2111  01776 0               1DNADR  TCDH              TCDH,+1
 0060    REF    1                 05,2112  12274 0               3DNADR  DELVEET2          DELVEET2+0...+5
 0061    REF    1                 05,2113  03635 1               1DNADR  TTPI              TTPI,+1
 0062    REF    1                 05,2114  12365 1               3DNADR  DELVEET3          DELVEET3+0...+5
 0063    REF    2  LAST   107     05,2115  01333 0               1DNADR  DNRRANGE          DNRRANGE,DNRRDOT
 0065    REF    2  LAST   107     05,2116  05336 1               2DNADR  DNLRVELX          DNLRVELX,DNLRVELY,DNLRVELZ,DNLRALT
 0066    REF    1                 05,2117  03577 1               1DNADR  DIFFALT           DIFFALT,+1
 0067    REF    1                 05,2120  01331 1               1DNADR  LEMMASS           LEMMASS,CSMMASS
 0068    REF   32  LAST   180     05,2121  01302 1               1DNADR  IMODES30          IMODES30,IMODES33
 0069    REF    1                 05,2122  03441 0               1DNADR  TIG               TIG,+1
 0070    REF    1                 05,2123  32157 0               DNPTR   LMORBM05          COMMON DATA
 0071    REF    1                 05,2124  32170 0               DNPTR   LMORBM06          COMMON DATA
 0072    REF    2  LAST   194     05,2125  00007 0               1DNADR  SPARE             FORMERLY PIF
 0073    REF    2  LAST   147     05,2126  74261 1              -1DNADR  TGO               TGO,+1

R0074          -----------------  SUB-LISTS  ---------------------------

 0075    REF    2  LAST   120     05,2127  76056 0  LMORBM01-1DNADR  R-OTHER +2        R-OTHER+2,+3           SNAPSHOT
 0076    REF    3  LAST   194     05,2130  01723 0               1DNADR  R-OTHER +4        R-OTHER+4,+5
 0077    REF    2  LAST   120     05,2131  01725 0               1DNADR  V-OTHER           V-OTHER,+1
 0078    REF    3  LAST   194     05,2132  01727 1               1DNADR  V-OTHER +2        V-OTHER+2,+3
 0079    REF    4  LAST   194     05,2133  01731 0               1DNADR  V-OTHER +4        V-OTHER+4,+5
 0080    REF    1                 05,2134  01570 1               1DNADR  T-OTHER           T-OTHER,+1
 0081    REF    4  LAST   194     05,2135  76060 0              -1DNADR  R-OTHER           R-OTHER+0,+1

 0082    REF    1                 05,2136  04320 1  LMORBM02 2DNADR  REDOCTR           REDOCTR,THETAD,+1,+2   COMMON DATA
 0083   REF   1              05,2137   01432 0            1DNADR FSBBQ        FSBBQ,+1
 0084   REF   5  LAST  129   05,2140   07021 0            2DNADR OMEGAP       OMEGAP,OMEGAQ,OMEGAR,GARBAGE
 0085   REF   4  LAST  136   05,2141   07235 1            2DNADR CDUXD        CDUXD,CDUYD,CDUZD,GARBAGE
 0086   REF   3  LAST  189   05,2142   04032 1            2DNADR CDUX         CDUX,CDUY,CDUZ,CDUT
 0087   REF  16  LAST   96   05,2143   24074 1            6DNADR STATE        STATE+0...+11D (FLAGWORDS)
 0088   REF  13  LAST  180   05,2144   52754 0           -6DNADR DSPTAB       DSPTAB TABLES

 0089   REF   1              05,2145   76555 0  LMORBM03-1DNADR RN +2         RN +2,+3                    SNAPSHOT
 0090   REF   2  LAST  195   05,2146   01224 1            1DNADR RN +4        RN +4,+5
 0091   REF   1              05,2147   01226 0            1DNADR VN           VN,+1
 0092   REF   2  LAST  195   05,2150   01230 1            1DNADR VN +2        VN +2,+3
 0093   REF   3  LAST  195   05,2151   01232 0            1DNADR VN +4        VN +4,+5
 0094   REF   1              05,2152   01234 0            1DNADR PIPTIME      PIPTIME,+1
 0095   REF   3  LAST  195   05,2153   76557 1           -1DNADR RN           RN,+1

 0096   REF   3  LAST  134   05,2154   07243 0  LMORBM04 2DNADR OMEGAPD      OMEGAPD,OMEGAQD,OMEGARD,GARBAGE
 0097   REF   1              05,2155   10372 0            3DNADR CADRFLSH     CADRFLSH,+1,+2,FAILREG,+1,+2
 0098   REF  14  LAST  187   05,2156   77667 0           -1DNADR RADMODES     RADMODES,DAPBOOLS           COMMON DATA

 0099   REF   6  LAST  195   05,2157   07021 0  LMORBM05 2DNADR OMEGAP       OMEGAP,OMEGAQ,OMEGAR,GARBAGE
 0100   REF   5  LAST  195   05,2160   07235 1            2DNADR CDUXD        CDUXD,CDUXD,CDUZD,GARBAGE
 0101   REF   4  LAST  195   05,2161   04032 1            2DNADR CDUX         CDUX,CDUY,CDUZ,CDUT
 0102   REF   1              05,2162   03024 1            1DNADR ALPHAQ       ALPHAQ,ALPHAR               COMMON DATA
 0103   REF   1              05,2163   03113 1            1DNADR POSTORKP     POSTORKP,NEGTORKP
 0104                        05,2164   34011 0            DNCHAN 11           CHANNELS11,12
 0105                        05,2165   34013 1            DNCHAN 13           CHANNELS13,14
 0106                        05,2166   34030 0            DNCHAN 30           CHANNELS30,31
 0107                        05,2167   43745 0           -DNCHAN 32           CHANNELS32,33

 0108   REF   2  LAST  147   05,2170   03560 1  LMORBM06 1DNADR PIPTIME1     PIPTIME,+1                  COMMON DATA
 0109   REF   4  LAST   99   05,2171   67453 1           -3DNADR DELV         DELV+0...+5

R0110      ------------------------------------------------------------
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P0111    LM COAST AND ALIGNMENT DOWNLIST

R0112         -----------------  CONTROL LIST  --------------------------

 0113                           05,2172                  LMCSTADL EQUALS                    SEND ID BY SPECIAL CODING
 0114   REF   1                 05,2172   32127 1                 DNPTR   LMCSTA01          COLLECT SNAPSHOT
 0115   REF   5  LAST  194      05,2173   24340 0                 6DNADR  DNTMBUFF          SEND SNAPSHOT
 0116   REF   1                 05,2174   02020 1                 1DNADR  AGSK              AGSK,+1
 0117   REF   2  LAST  124      05,2175   02774 1                 1DNADR  TALIGN            TALIGN,+1
 0118   REF   2  LAST  194      05,2176   07115 0                 2DNADR  POSTORKU          POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0120   REF   3  LAST  194      05,2177   01333 0                 1DNADR  DNRRANGE          DNRRANGE,DNRRDOT
 0121   REF   2  LAST  194      05,2200   01344 0                 1DNADR  TEVENT            TEVENT,+1
 0122   REF   2  LAST  194      05,2201   25733 1                 6DNADR  REFSMMAT          REFSMMAT+0...+11D
 0123   REF   1                 05,2202   00735 0                 1DNADR  AOTCODE           AOTCODE,GARBAGE
 0124   REF   1                 05,2203   12022 1                 3DNADR  RLS               RLS+0...+5
 0125   REF   3  LAST  194      05,2204   05336 1                 2DNADR  DNLRVELX          DNLRVELX,DNLRVELY,DNLRVELZ,DNLRALT
 0126   REF   1                 05,2205   32224 1                 DNPTR   LMCSTA06          COMMON DATA
 0127   REF   1                 05,2206   32136 1                 DNPTR   LMCSTA02          COMMON DATA
 0128   REF   2  LAST  194      05,2207   00024 1                 1DNADR  TIME2             TIME2/1
 0129   REF   1                 05,2210   32145 0                 DNPTR   LMCSTA03          COLLECT SNAPSHOT
 0130   REF   6  LAST  196      05,2211   24340 0                 6DNADR  DNTMBUFF          SEND SNAPSHOT
 0131   REF   1                 05,2212   32154 0                 DNPTR   LMCSTA04          COMMON DATA
 0132   REF   1                 05,2213   32226 0                 DNPTR   LMCSTA07          COMMON DATA
 0133   REF   4  LAST  196      05,2214   05336 1                 2DNADR  DNLRVELX          DNLRVELX,DNLRVELY,DNLRVELZ,DNLRALT
 0134   REF   1                 05,2215   04036 0                 2DNADR  CDUS              CDUS,PIPAX,PIPAY,PIPAZ
 0135   REF   2  LAST   96      05,2216   00112 0                 1DNADR  LASTYCMD          LASTYCMD,LASTXCMD
 0136   REF   2  LAST  194      05,2217   01331 1                 1DNADR  LEMMASS           LEMMASS,CSMMASS
 0137   REF  33  LAST  194      05,2220   01302 1                 1DNADR  IMODES30          IMODES30,IMODES33
 0138   REF   2  LAST  194      05,2221   03441 0                 1DNADR  TIG               TIG,+1
 0139   REF   1                 05,2222   32157 0                 DNPTR   LMCSTA05          COMMON DATA
 0140   REF  14  LAST  195      05,2223   52754 0                -6DNADR  DSPTAB            DSPTAB+0...+11D TABLE

R0141         -----------------  SUB-LISTS  --------------------------

 0142   REF   2  LAST  194      05,2127                  LMCSTA01 EQUALS  LMORBM01          COMMON DOWNLIST DATA

 0143   REF   2  LAST  194      05,2136                  LMCSTA02 EQUALS  LMORBM02          COMMON DOWNLIST DATA

 0144   REF   2  LAST  194      05,2145                  LMCSTA03 EQUALS  LMORBM03          COMMON DOWNLIST DATA

 0145   REF   2  LAST  194      05,2154                  LMCSTA04 EQUALS  LMORBM04          COMMON DOWNLIST DATA

 0146   REF   2  LAST  194      05,2157                  LMCSTA05 EQUALS  LMORBM05          COMMON DOWNLIST DATA

 0147   REF   1                 05,2224   05700 0        LMCSTA06 2DNADR  X789              X789+0...+3                COMMON DATA
 0148   REF   3  LAST  196      05,2225   77665 1                -1DNADR  LASTYCMD          LASTYCMD,LASTXCMD
 0149   REF   2  LAST  123      05,2226   12737 1        LMCSTA07 3DNADR  OGC               OGC,+1,IGC,+1,MGC,+1       COMMON DATA
 0150   REF   2  LAST  124      05,2227   02755 1                 1DNADR  BESTI             BESTI,BESTJ
 0151   REF   2  LAST  124      05,2230   12760 0                 3DNADR  STARSAV1          STARSAV1+0...+5
 0152   REF   3  LAST  128      05,2231   65011 1                -3DNADR  STARSAV2          STARSAV2+0...+5
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R0153         ------------------------------------------------------------------------
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L          DOWNLINK LISTS                                                                          USER'S PAGE NO.   6       FO S4

P0154      LM RENDEZVOUS AND PRE-THRUST DOWNLIST

R0155          -----------------  CONTROL LIST  --------------------------

 0156                              05,2232               LMRENDDL EQUALS                 SEND ID BY SPECIAL CODING
 0157    REF   1                   05,2232    32127 1             DNPTR   LMREND01       COLLECT SNAPSHOT
 0158    REF   7  LAST   196       05,2233    24340 0             6DNADR  DNTMBUFF       SEND SNAPSHOT
 0159    REF   1                   05,2234    32276 0             DNPTR   LMREND07       COLLECT SNAPSHOT
 0160    REF   8  LAST   198       05,2235    14340 0             4DNADR  DNTMBUFF       SEND SNAPSHOT
 0161    REF   2  LAST   194       05,2236    03451 1             1DNADR  DELLT4         DELLT4,+1
 0162    REF   2  LAST   194       05,2237    13443 0             3DNADR  RTARG          RTARG+0...+5
 0163    REF   1                   05,2240    13433 1             3DNADR  DELVSLV        DELVSLV+0...+5
 0164    REF   2  LAST   194       05,2241    03633 1             1DNADR  TCSI           TCSI,+1
 0165    REF   2  LAST   194       05,2242    12266 0             3DNADR  DELVEET1       DELVEET+0-..+5
 0166    REF   3  LAST   194       05,2243    00007 0             1DNADR  SPARE
 0167    REF   3  LAST   194       05,2244    03630 1             1DNADR  TPASS4         TPASS4,+1
 0168    REF   1                   05,2245    32224 1             DNPTR   LMREND06       COMMON DATA
 0169    REF   1                   05,2246    32136 1             DNPTR   LMREND02       COMMON DATA
 0170    REF   3  LAST   196       05,2247    00024 1             1DNADR  TIME2          TIME2/1
 0171    REF   1                   05,2250    32145 0             DNPTR   LMREND03       COLLECT SNAPSHOT
 0172    REF   9  LAST   198       05,2251    24340 0             6DNADR  DNTMBUFF       SEND SNAPSHOT
 0173    REF   1                   05,2252    32154 0             DNPTR   LMREND04       COMMON DATA
 0174    REF   3  LAST   196       05,2253    07115 0             2DNADR  POSTORKU       POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0176    REF   4  LAST   198       05,2254    00007 0             1DNADR  SPARE
 0177    REF   2  LAST   194       05,2255    01776 0             1DNADR  TCDH           TCDH,+1
 0178    REF   2  LAST   194       05,2256    12274 0             3DNADR  DELVEET2       DELVEET2+0...+5
 0179    REF   2  LAST   194       05,2257    03635 1             1DNADR  TTPI           TTPI,+1
 0180    REF   2  LAST   194       05,2260    12365 1             3DNADR  DELVEET3       DELVEET3+0...+5
 0181    REF   2  LAST   194       05,2261    02256 1             1DNADR  ELEV           ELEV,+1
 0182    REF   2  LAST   196       05,2262    04036 0             2DNADR  CDUS           CDUS,PIPAX,PIPAY,PIPAZ
 0183    REF   4  LAST   196       05,2263    00112 0             1DNADR  LASTYCMD       LASTYCMD,LASTXCMD
 0184    REF   3  LAST   196       05,2264    01331 1             1DNADR  LEMMASS        LEMMASS,CSMMASS
 0185    REF  34  LAST   196       05,2265    01302 1             1DNADR  IMODES30       IMODES30,IMODES33
 0186    REF   3  LAST   196       05,2266    03441 0             1DNADR  TIG            TIG,+1
 0187    REF   1                   05,2267    32157 0             DNPTR   LMREND05       COMMON DATA
 0188    REF   3  LAST   117       05,2270    02302 1             1DNADR  DELTAR         DELTAR,+1
 0189    REF   1                   05,2271    03620 0             1DNADR  CENTANG        CENTANG,+1
 0190    REF   1                   05,2272    03466 0             1DNADR  NN             NN,+1
 0191    REF   2  LAST   194       05,2273    03577 1             1DNADR  DIFFALT        DIFFALT,+1
 0192    REF   1                   05,2274    02347 0             1DNADR  DELVTPF        DELVTPF,+1
 0193    REF   5  LAST   198       05,2275    77770 1            -1DNADR  SPARE

R0194          -----------------  SUB-LISTS  --------------------------

 0195    REF   3  LAST   196       05,2127               LMREND01 EQUALS LMORBM01        COMMON DOWNLIST DATA

 0196    REF   3  LAST   196       05,2136               LMREND02 EQUALS LMORBM02        COMMON DOWNLIST DATA

 0197    REF   3  LAST   196       05,2145               LMREND03 EQUALS LMORBM03        COMMON DOWNLIST DATA
 0198    REF   3  LAST  196   05,2154              LMRENDO4 EQUALS LMORBM04        COMMON DOWNLIST DATA

 0199    REF   3  LAST  196   05,2157              LMRENDO5 EQUALS LMORBM05        COMMON DOWNLIST DATA

 0200    REF   2  LAST  196   05,2224              LMRENDO6 EQUALS LMCSTA06        COMMON DOWNLIST DATA

 0201    REF   1              05,2276   74320 0  LMRENDO7-1DNADR AIG               AIG,AMG                 SNAPSHOT
 0202    REF   1              05,2277   03461 1            1DNADR AOG              AOG,TRKMKCNT
 0203    REF   2  LAST  146   05,2300   03752 1            1DNADR TANGNB           TANGNB,+1
 0204    REF   2  LAST  146   05,2301   03754 1            1DNADR MKTIME           MKTIME,+1
 0205    REF   2  LAST  146   05,2302   74017 1           -1DNADR RANGRDOT         DNRRANGE,DNRRDOT
R0206         --------------------------------------------------------
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P0207   LM DESCENT AND ASCENT DOWNLIST

R0208        ----------------  CONTROL LIST  -------------------------

 0209                            05,2303               LMDSASDL EQUALS                    SEND ID BY SPECIAL CODING
 0210    REF   1                 05,2303   32341 0              DNPTR   LMDSAS07          COLLECT SNAPSHOT
 0211    REF   1                 05,2304   32355 0              DNPTR   LMDSAS08          SEND SNAPSHOT
 0212    REF   3  LAST  196      05,2305   01344 0              1DNADR  TEVENT            TEVENT,+1
 0213    REF   2  LAST  136      05,2306   13253 1              3DNADR  UNFC/2            UNFC/2+0...+5
 0214    REF   2  LAST  152      05,2307   13645 1              3DNADR  VGVECT            VGVECT+0...+5
 0215    REF   2  LAST  149      05,2310   03642 1              1DNADR  TTF/8             TTF/8,+1
 0216    REF   2  LAST  150      05,2311   03664 0              1DNADR  DELTAH            DELTAH,+1
 0217    REF   2  LAST  196      05,2312   12022 1              3DNADR  RLS               RLS+0...+5
 0220    REF   6  LAST  198      05,2313   00007 0              1DNADR  SPARE
 0221    REF   1                 05,2314   32224 1              DNPTR   LMDSAS09          COMMON DATA
 0222    REF   1                 05,2315   32136 1              DNPTR   LMDSAS02          COMMON DATA
 0223    REF   4  LAST  198      05,2316   00024 1              1DNADR  TIME2             TIME2/1
 0224    REF   1                 05,2317   32145 0              DNPTR   LMDSAS03          COLLECT SNAPSHOT
 0225    REF  10  LAST  198      05,2320   24340 0              6DNADR  DNTMBUFF          SEND SNAPSHOT
 0226    REF   1                 05,2321   32154 0              DNPTR   LMDSAS04          COMMON DATA
 0227    REF   4  LAST  198      05,2322   07115 0              2DNADR  POSTORKU          POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0229    REF   1                 05,2323   12636 1              3DNADR  RGU               RGU+0...+5
 0230    REF   2  LAST  149      05,2324   13626 1              3DNADR  VGU               VGU+0...+5
 0231    REF   2  LAST  149      05,2325   13634 1              3DNADR  LAND              LAND+0...+5
 0232    REF   2  LAST  119      05,2326   02262 0              1DNADR  AT                AT,+1
 0233    REF   2  LAST  121      05,2327   02400 1              1DNADR  TLAND             TLAND,+1
 0234    REF   2  LAST  149      05,2330   03615 0              1DNADR  FC                FC,GARBAGE
 0235    REF   5  LAST  198      05,2331   00112 0              1DNADR  LASTYCMD          LASTYCMD,LASTXCMD
 0236    REF   4  LAST  198      05,2332   01331 1              1DNADR  LEMMASS           LEMMASS,CSMMASS
 0237    REF  35  LAST  198      05,2333   01302 1              1DNADR  IMODES30          IMODES30,IMODES33
 0238    REF   4  LAST  198      05,2334   03441 0              1DNADR  TIG               TIG,+1
 0239    REF   1                 05,2335   32157 0              DNPTR   LMDSAS05          COMMON DATA
 0240    REF   1                 05,2336   32170 0              DNPTR   LMDSAS06          COMMON DATA
 0241    REF   2  LAST  149      05,2337   03614 1              1DNADR  PSEUDO55          PSEUDO55,GARBAGE
 0242    REF   2  LAST  139      05,2340   74324 1             -1DNADR  TTOGO             TTOGO,+1
R0243        ----------------  SUB-LISTS  -------------------------

 0244    REF   4  LAST  198      05,2136               LMDSAS02 EQUALS LMORBM02           COMMON DOWNLIST DATA

 0245    REF   4  LAST  198      05,2145               LMDSAS03 EQUALS LMORBM03           COMMON DOWNLIST DATA

 0246    REF   4  LAST  199      05,2154               LMDSAS04 EQUALS LMORBM04           COMMON DOWNLIST DATA

 0247    REF      LAST  199      05,2157               LMDSAS05 EQUALS LMORBM05           COMMON DOWNLIST DATA

 0248    REF   2  LAST  194      05,2170               LMDSAS06 EQUALS LMORBM06           COMMON DOWNLIST DATA

 0249    REF   2  LAST  119      05,2341   75441 1     LMDSAS07-1DNADR  LRZCDUDL          LRZCDUDL,GARBAGE                  SNAPSHOT
 0250    REF   2  LAST  149      05,2342   03651 0              1DNADR  VSELECT           VSELECT,GARBAGE
 0251    REF   1                 05,2343   02337 1              1DNADR  LRVTIMDL          LRVTIMDL,+1
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L        DOWNLINK LISTS                                                                USER'S PAGE NO.   9        EO S4

 0252    REF    2  LAST   149     05,2344    03652 0                 1DNADR  VMEAS             VMEAS,+1
 0253    REF    3  LAST   199     05,2345    03754 1                 1DNADR  MKTIME            MKTIME, +1
 0254    REF    2  LAST   149     05,2346    03654 0                 1DNADR  HMEAS             HMEAS,+1
 0255    REF    3  LAST   151     05,2347    03756 0                 1DNADR  RM                RM,+1
 0256    REF    2  LAST   199     05,2350    03457 1                 1DNADR  AIG               AIG,AMG
 0257    REF    2  LAST   199     05,2351    03461 1                 1DNADR  AOG               AOG,TRKMKCNT
 0258    REF    3  LAST   199     05,2352    03752 1                 1DNADR  TANGNB            TANGNB,+1
 0259    REF    4  LAST   201     05,2353    03754 1                 1DNADR  MKTIME            MKTIME,+1
 0260    REF    2  LAST   119     05,2354    75443 0                -1DNADR  LRXCDUDL          LRXCDUDL,LRYCDUDL

 0261    REF   11  LAST   200     05,2355    24340 0  LMDSAS08      6DNADR  DNTMBUFF          SEND SNAPSHOT
 0262    REF   12  LAST   201     05,2356    57423 0                -5DNADR  DNTMBUFF +12D

 0263    REF    3  LAST   199     05,2224             LMDSAS09      EQUALS  LMCSTA06          COMMON DOWNLIST DATA

R0264          ----------------------------------------------------------------------
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P0265   LM LUNAR SURFACE ALIGN DOWNLIST

R0266          -----------------  CONTROL LIST  --------------------------

 0267                            05,2357                LMLSALDL EQUALS                     SEND ID BY SPECIAL CODING
 0268   REF   1                  05,2357   32127 1               DNPTR   LMLSAL01           COLLECT SNAPSHOT
 0269   REF  13  LAST  201       05,2360   24340 0               6DNADR  DNTMBUFF           SEND SNAPSHOT
 0270   REF   1                  05,2361   32276 0               DNPTR   LMLSAL07           COLLECT SNAPSHOT
 0271   REF  14  LAST  202       05,2362   14340 0               4DNADR  DNTMBUFF           SEND SNAPSHOT
 0272   REF   3  LAST  196       05,2363   02774 1               1DNADR  TALIGN             TALIGN,+1
 0273   REF   3  LAST  196       05,2364   25733 1               6DNADR  REFSMMAT           REFSMMAT+0...+11D
 0274   REF   2  LAST  116       05,2365   26236 1               6DNADR  YNBSAV             YNBSAV+0...+5,ZNBSAV+0...+5
 0275   REF   1                  05,2366   32224 1               DNPTR   LMLSAL08           COMMON DATA
 0276   REF   1                  05,2367   32136 1               DNPTR   LMLSAL02           COMMON DATA
 0277   REF   5  LAST  200       05,2370   00024 1               1DNADR  TIME2              TIME/1
 0278   REF   1                  05,2371   32145 0               DNPTR   LMLSAL03           COLLECT SNAPSHOT
 0279   REF  15  LAST  202       05,2372   24340 0               6DNADR  DNTMBUFF           SEND SNAPSHOT
 0280   REF   1                  05,2373   32154 0               DNPTR   LMLSAL04           COMMON DATA
 0281   REF   1                  05,2374   32226 0               DNPTR   LMLSAL09           COMMON DATA
 0282   REF   4  LAST  116       05,2375   12230 0               3DNADR  GSAV               GSAV+0...+5
 0283   REF   2  LAST  196       05,2376   02020 1               1DNADR  AGSK               AGSK,+1
 0284   REF   6  LAST  200       05,2377   00112 0               1DNADR  LASTYCMD           LASTYCMD,LASTXCMD
 0285   REF   5  LAST  200       05,2400   01331 1               1DNADR  LEMMASS            LEMMASS,CSMMASS
 0286   REF  36  LAST  200       05,2401   01302 1               1DNADR  IMODES30           IMODES30,IMODES33
 0287   REF   5  LAST  200       05,2402   03441 0               1DNADR  TIG                TIG,+1
 0288   REF   1                  05,2403   32157 0               DNPTR   LMLSAL05           COMMON DATA
 0289   REF   1                  05,2404   32170 0               DNPTR   LMLSAL06           COMMON DATA
 0290   REF   7  LAST  200       05,2405   00007 0               1DNADR  SPARE
 0291   REF   [illegible]  LAST  202       05,2406   77770 1              -1DNADR  SPARE

R0292          -----------------  SUB-LISTS  ----------------------------

 0293   REF   4  LAST  198       05,2127                LMLSAL01 EQUALS LMORBM01            COMMON DOWNLIST DATA

 0294   REF   5  LAST  200       05,2136                LMLSAL02 EQUALS LMORBM02            COMMON DOWNLIST DATA

 0295   REF   5  LAST  200       05,2145                LMLSAL03 EQUALS LMORBM03            COMMON DOWNLIST DATA

 0296   REF   5  LAST  200       05,2154                LMLSAL04 EQUALS LMORBM04            COMMON DOWNLIST DATA

 0297   REF   5  LAST  200       05,2157                LMLSAL05 EQUALS LMORBM05            COMMON DOWNLIST DATA

 0298   REF   3  LAST  200       05,2170                LMLSAL06 EQUALS LMORBM06            COMMON DOWNLIST DATA

 0299   REF   2  LAST  198       05,2276                LMLSAL07 EQUALS LMREND07            COMMON DOWNLIST DATA

 0300   REF   4  LAST  201       05,2224                LMLSAL08 EQUALS LMCSTA06            COMMON DOWNLIST DATA

 0301   REF   2  LAST  196       05,2226                LMLSAL09 EQUALS LMCSTA07            COMMON DOWNLIST DATA
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R0302        ----------------------------------------------------------
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P0303   LM AGS INITIALIZATION AND UPDATE DOWNLIST

R0304        -----------------  CONTROL LIST  --------------------------

 0305                          05,2407           LMAGSIDL EQUALS                    SEND ID BY SPECIAL CODING
 0306   REF   2  LAST  117     05,2407   12200 0          3DNADR AGSBUFF +0         AGSBUFF+0...+5
 0307   REF   3  LAST  204     05,2410   02214 1          1DNADR AGSBUFF +12D       AGSBUFF+12D,GARBAGE
 0308   REF   4  LAST  204     05,2411   12201 1          3DNADR AGSBUFF +1         AGSBUFF+1...+6
 0309   REF   5  LAST  204     05,2412   02215 0          1DNADR AGSBUFF +13D       AGSBUFF+13D,GARBAGE
 0310   REF   6  LAST  204     05,2413   12206 0          3DNADR AGSBUFF +6         AGSBUFF+6...+11
 0311   REF   7  LAST  204     05,2414   02214 1          1DNADR AGSBUFF +12D       AGSBUFF+12,GARBAGE
 0312   REF   8  LAST  204     05,2415   12207 1          3DNADR AGSBUFF +7         AGSBUFF+7...+12D
 0313   REF   9  LAST  204     05,2416   02215 0          1DNADR AGSBUFF +13D       AGSBUFF+13D,GARBAGE
 0314   REF   2  LAST  104     05,2417   25170 0          6DNADR COMPNUMB           COMPNUMB,UPOLDMOD,UPVERB,UPCOUNT,
A0315                                                                               UPBUFF+0...+7
 0316   REF   1                05,2420   25204 0          6DNADR UPBUFF +8D         UPBUFF +8D...+19D
 0317   REF   1                05,2421   32136 1          DNPTR  LMAGSI02           COMMON DATA
 0318   REF   6  LAST  202     05,2422   00024 1          1DNADR TIME2              TIME2/1
 0319   REF   1                05,2423   32145 0          DNPTR  LMAGSI03           COLLECT SNAPSHOT
 0320   REF  16  LAST  202     05,2424   24340 0          6DNADR DNTMBUFF           SEND SNAPSHOT
 0321   REF   1                05,2425   32154 0          DNPTR  LMAGSI04           COMMON DATA
 0322   REF   5  LAST  200     05,2426   07115 0          2DNADR POSTORKU           POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0324   REF   9  LAST  202     05,2427   00007 0          1DNADR SPARE
 0325   REF  10  LAST  204     05,2430   00007 0          1DNADR SPARE
 0326   REF   3  LAST  202     05,2431   02020 1          1DNADR AGSK               AGSK,+1
 0327   REF   2  LAST  204     05,2432   25174 1          6DNADR UPBUFF             UPBUFF+0...+11D
 0328   REF   3  LAST  204     05,2433   15210 0          4DNADR UPBUFF +12D        UPBUFF+12D...+19D
 0329   REF   6  LAST  202     05,2434   01331 1          1DNADR LEMMASS            LEMMASS,CSMMASS
 0330   REF  37  LAST  202     05,2435   01302 1          1DNADR IMODES30           IMODES30,IMODES33
 0331   REF  11  LAST  204     05,2436   00007 0          1DNADR SPARE
 0332   REF   1                05,2437   32157 0          DNPTR  LMAGSI05           COMMON DATA
 0333   REF  15  LAST  196     05,2440   52754 0         -6DNADR DSPTAB             DSPTAB+0...+11D

R0334        -----------------  SUB-LISTS  --------------------------

 0335   REF   6  LAST  202     05,2136           LMAGSI02 EQUALS LMORBM02           COMMON DOWNLIST DATA

 0336   REF   6  LAST  202     05,2145           LMAGSI03 EQUALS LMORBM03           COMMON DOWNLIST DATA

 0337   REF   6  LAST  202     05,2154           LMAGSI04 EQUALS LMORBM04           COMMON DOWNLIST DATA

 0338   REF   6  LAST  202     05,2157           LMAGSI05 EQUALS LMORBM05           COMMON DOWNLIST DATA

R0339        ----------------------------------------------------------------

 0340   REF   2  LAST  193     05,2441   02172 1 DNTABLE  GENADR LMCSTADL           LM COAST AND ALIGN DOWNLIST
 0341   REF   2  LAST  193     05,2442   02407 0          GENADR LMAGSIDL           LM AGS INITIALIZATION/UPDATE DOWNLIST
 0342   REF   1                05,2443   02232 0          GENADR LMRENDDL           LM RENDEZVOUS AND PRE-THRUST DOWNLIST
 0343   REF   1                05,2444   02066 0          GENADR LMORBMDL           LM ORBITAL MANEUVERS DOWNLIST
 0344   REF   1                05,2445   02303 0          GENADR LMDSASDL           LM DESCENT AND ASCENT DOWNLIST
 0345   REF    1                 05,2446   02357 1            GENADR LMLSALDL          LM LUNAR SURFACE ALIGN DOWNLIST
R0346     -------------------------------------------------------------------------------
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R0001    PROGRAM NAME:    AGS INITIALIZATION (R47)

R0002    WRITTEN BY  :    RHODE / KILROY / FOLLETT

R0003    MOD NO. :        0
R0004    DATE    :        23 MARCH 1967
R0005    MOD BY  :        KILROY

R0006    MOD NO. :        1
R0007    DATE    :        28 OCTOBER 1967
R0008    MOD BY  :        FOLLETT

R0009    FUNCT. DESC.:    (1) TO PROVIDE THE AGS ABORT ELECTRONICS ASSEMBLY(AEA) WITH THE LEM AND CSM STATE VECTORS
R0011                     (POSITION,VELOCITY,TIME) IN LEM IMU COORDINATES BY MEANS OF THE LGC DIGITAL DOWNLINK.

R0013                     (2) TO ZERO THE ICDU, LGC AND AEA GIMBAL ANGLE COUNTERS SIMULTANEOUSLY IN ORDER TO ESTABLISH A
R0015                     COMMON ZERO REFERENCE FOR THE MEASUREMENT OF GIMBAL(EULER) ANGLES WHICH DEFINE LEM ATTITUDE
R0019                     (3) TO ESTABLISH THE GROUND ELAPSED TIME OF AEA CLOCK ZERO.(IF AN AEA CLOCK ZERO IS
R0021                     REQUESTED DURING THIS PROGRAM

R0022    LOG SECTION :    AGS INITIALIZATION

R0023    CALLING SEQ :    PROGRAM IS ENTERED WHEN ASTRONAUT KEYS V47E ON DSKY.
R0024                     R47 MAY BE CALLED AT ANY TIME EXCEPT WHEN ANOTHER EXTENDED VERB IS IN PROGRESS

R0026    SUBROUTINES
R0027    CALLED      :

R0028    NORMAL EXIT :    ENDEXT

R0029    ALARM/ABORT :    ALARM - BAD REFSMMAT - CODE:220
R0030                     OPERATOR ERROR IF V47 SELECTED DURING ANOTHER EXTENDED VERB.

R0032    ERASABLES
R0033    USED        :    SAMPTIME     (2) TIME OF :ENTER: KEYSTROKE
R0034                     AGSK         (2) GROUND ELAPSED TIME OF THE AEA CLOCK :ZERO:
R0036                     AGSBUFF    (14D) CONTAINS AGS INITIALIZATION DATA (SEE :OUTPUT: BELOW)
R0038                     AGSWORD      (1) PREVIOUS DOWNLIST SAVED HERE

 0039    REF  10  LAST  204   E4,1600                          EBANK= AGSBUFF

 0040                         40,2000                          BANK    40
 0041    REF   1              32,2000                          SETLOC R47
 0042                         32,2005                          BANK

 0043    REF   1                                               COUNT* $$/R47

 0044    REF   1              32,2005  3 4737 0  AGSINIT  CAF     REFSMBIT
 0045    REF   1              32,2006  7 0077 0           MASK    FLAGWRD3         CHECK REFSMFLG.
 0046    REF  35  LAST  191   32,2007 10 000 0            CCS     A
 0047   REF    1               32,2010  0 2017 0            TC      REDSPTEM         REFSMMAT IS OK
 0048   REF    [illegible] LAST 185    32,2011  0 5567 0            TC      ALARM            REFSMMAT IS BAD
 0049                          32,2012   00220 1            OCT     220
 0050   REF    1               32,2013  0 5472 0            TC      ENDEXT

 0061                          32,2014  0 0006 1  NEWAGS    EXTEND
 0062   REF    1               32,2015  3 0014 1            DCA     SAMPTIME         TIME OF THE :ENTER: KEYSTROKE
 0063   REF    4  LAST  204    32,2016  53'421 0            DXCH    AGSK             BECOMES NEW AEA CLOCK :ZERO:

 0064                          32,2017  0 0006 1  REDSPTEM  EXTEND
 0065   REF    5  LAST  207    32,2020  3 1421 1            DCA     AGSK
 0066   REF    2  LAST  102    32,2021  53'052 0            DXCH    DSPTEMX
 0067   REF    1               32,2022  3 2172 1  AGSDISPK  CAF     V06N16
 0068   REF    1               32,2023  0 4616 1            TC      BANKCALL         R1 = 00XXX. HRS., R2 = 000XX MIN.,
 0069   REF    1               32,2024   20334 1            CADR    GOMARKF          R3 = 0XX.XX SEC.
 0070   REF    2  LAST  207    32,2025  0 5472 0            TC      ENDEXT           TERMINATE RETURN
 0071   REF    1               32,2026  0 2036 0            TC      AGSVCALC         PROCEED   RETURN
 00711  REF   22  LAST  180    32,2027  4 4746 1            CS      BIT6             IS ENTER VIA A V32
 00712  REF   12  LAST   98    32,2030  6 0154 1            AD      MPAC
 00713                         32,2031  0 0006 1            EXTEND
 00714  REF    1               32,2032  1 2014 1            BZF     NEWAGS           YES, USE KEYSTROKE TIME FOR NEW AGSK

 0072                          32,2033  0 0006 1            EXTEND                   NO, NEW AGSK LOADED VIA V25
 0073   REF    3  LAST  207    32,2034  3 1052 1            DCA     DSPTEMX          LOADED INTO DSPTEMX BY KEYING
 0074   REF    2  LAST  207    32,2035  0 2016 1            TC      REDSPTEM -1      V25E FOLLOWED BY HRS.,MINS.,SECS.
A0075                                                                                DISPLAY THE NEW K

 0076   REF    1               32,2036  0 6037 0  AGSVCALC  TC      INTPRET
 00761                         32,2037   77614 1            SET
 00762  REF    1               32,2040   01076 1                    NODOFLAG         DONT ALLOW V37
 0077                          32,2041   77414 0            SET     EXIT
 0078   REF    1               32,2042   02076 1                    XDSPFLAG

 0079   REF    2  LAST  207    32,2043  3 2172 1            CAF     V06N16
 00795  REF    2  LAST  207    32,2044  0 4616 1            TC      BANKCALL
 00796  REF    1               32,2045   20620 1            CADR    EXDSPRET

 0082   REF    2  LAST  207    32,2046  0 6037 0            TC      INTPRET          EXTRAPOLATE LEM AND CSM STATE VECTORS
 0083                          32,2047   77634 0            RTB                      TO THE PRESENT TIME
 0084   REF    1               32,2050   21573 0                    LOADTIME         LOAD MPAC WITH TIME2,TIME1
 0085   REF    1               32,2051   34041 0            STCALL  TDEC1            CALCULATE LEM STATE VECTOR
 0086   REF    2  LAST   37    32,2052   27057 0                    LEMPREC
 0087                          32,2053   77624 1            CALL                     CALL ROUTINE TO CONVERT TO SM COORDS AND
 0088   REF    1               32,2054   64132 0                    SCALEVEC         PROVIDE PROPER SCALING
 0089   REF   11  LAST  206    32,2055   16201 0            STODL   AGSBUFF          (LEMPREC AND CSMPREC LEAVE TDEC1 IN TAT)
 0090   REF    1               32,2056   00015 0                    TAT              TAT = TIME TO WHICH RATT1 AND VATT1 ARE
 0091   REF    2  LAST  207    32,2057   34041 0            STCALL  TDEC1            COMPUTED(CSEC SINCE CLOCK START B-28).
 0092   REF    2  LAST   37    32,2060   27043 0                    CSMPREC          CALCULATE CSM STATE VECTOR FOR SAME TIME
 0093                          32,2061   77624 1            CALL
 0094   REF    2  LAST  207    32,2062   64132 0                    SCALEVEC
 0095   REF  12  LAST  207   32,2063   16207 0            STODL  AGSBUFF +6
 0096   REF   2  LAST  207   32,2064   00015 0                   TAT
 0097                        32,2065   56225 1            DSU    DDV             CALCULATE AND STORE THE TIME
 0098   REF   6  LAST  207   32,2066   02021 0                   AGSK
 0099   REF   1              32,2067   24175 1                   TSCALE
 0100   REF  13  LAST  208   32,2070   02215 0            STORE  AGSBUFF +12D
 0101                        32,2071   77776 1            EXIT

 0102   REF   1              32,2072  3 4753 1            CAF    LAGSLIST
 0103   REF   2  LAST   99   32,2073  54 332 1            TS     DNLSTCOD

 0104   REF   1              32,2074  3 2176 0            CAF    20SEC           DELAY FOR 20 SEC WHILE THE AGS
 0105   REF   3  LAST  207   32,2075  0 4616 1            TC     BANKCALL        DOWNLIST IS TRANSMITTED
 0106   REF   1              32,2076   01735 1            CADR   DELAYJOB

 0107   REF   1              32,2077  3 1324 0            CA     AGSWORD
 0108   REF   3  LAST  208   32,2100  54 332 1            TS     DNLSTCOD        RETURN TO THE OLD DOWNLIST
 0109   REF   3  LAST  166   32,2101  3 4744 1            CAF    IMUSEBIT
 0110   REF   6  LAST  185   32,2102  7 0074 0            MASK   FLAGWRD0        CHECK IMUSE FLAG.
 0111   REF  36  LAST  206   32,2103  10 000 0            CCS    A
 0112   REF   1              32,2104  0 2122 1            TC     AGSEND          IMU IS BEING USED - DO NOT ZERO
 01121  REF   1              32,2105  11 304 0  CKSTALL   CCS    IMUCADR         CHECK FOR IMU USAGE WHICH AVOIDS THE
 01122                       32,2106  1 2111 0            TCF    +3              IMUSE BIT: I.E., IMU COMPENSATION.
 01123                       32,2107  1 2115 1            TCF    +6              FREE.  GO AHEAD WITH THE IMU ZERO.
 01124                       32,2110  1 2111 0            TCF    +1
 01125  REF   1              32,2111  3 4363 0     +3     CAF    TEN             WAIT .1 SEC AND TRY AGAIN.
 01126  REF   4  LAST  208   32,2112  0 4616 1            TC     BANKCALL
 01127  REF   2  LAST  208   32,2113   01735 1            CADR   DELAYJOB
 01128  REF   1              32,2114  1 2105 0            TCF    CKSTALL

 0113   REF   5  LAST  208   32,2115  0 4616 1     +6     TC     BANKCALL        IMU IS NOT IN USE
 0114   REF   1              32,2116   16714 1            CADR   IMUZERO         SET IMU ZERO DISCRETE FOR 320MSECS
 0115   REF   6  LAST  208   32,2117  0 4616 1            TC     BANKCALL        WAIT 3SEC FOR COUNTERS TO INCREMENT
 0116   REF   1              32,2120   17716 1            CADR   IMUSTALL
 0117   REF   2  LAST  208   32,2121  0 2122 1            TC     AGSEND
 0118   REF   1              32,2122  0 5516 0  AGSEND    TC     DOWNFLAG        ALLOW V37
 0119   REF   2  LAST  207   32,2123   00054 0            ADRES  NODOFLAG

 0120   REF   1              32,2124  3 2173 0            CAF    V50N16
 0121   REF   7  LAST  208   32,2125  0 4616 1            TC     BANKCALL
 01211  REF   1              32,2126   20342 0            CADR   GOMARK3
 01212  REF   3  LAST  207   32,2127  1 5472 1            TCF    ENDEXT
 01213  REF   4  LAST  208   32,2130  1 5472 1            TCF    ENDEXT
 0122   REF   5  LAST  208   32,2131  0 5472 0            TC     ENDEXT

 0127                        32,2132   64375 1  SCALEVEC  VLOAD  MXV
 0128   REF   1              32,2133   00025 0                   VATT1
 0129   REF   4  LAST  202   32,2134   01734 0                   REFSMMAT
 0130                        32,2135   72561 0            VXSC   VSL2
 0131   REF   1              32,2136   24202 1                   VSCALE
 01311                        32,2137   53255 0            VAD     VAD               THIS SECTION ROUNDS THE VECTOR, AND
 01312  REF   1               32,2140   24204 1                    AGSRND1           CORRECTS FOR THE FACT THAT THE AGS
 01313  REF   1               32,2141   24212 0                    AGSRND2           IS A 2 S COMPLIMENT MACHINE WHILE THE
 01314                        32,2142   77634 0            RTB                       LGC IS A 1 S COMPLIMENT MACHINE.
 01315  REF   1               32,2143   21772 0                    VECSGNAG
 0132   REF   2  LAST   208   32,2144   24025 0            STOVL   VATT1
 0133   REF   1               32,2145   00017 1                    RATT1
 0134                         32,2146   74321 1            MXV     VXSC
 0135   REF   5  LAST   208   32,2147   01734 0                    REFSMMAT
 0136   REF   1               32,2150   24200 0                    RSCALE
 0137                         32,2151   53212 0            VSL8    VAD               AGAIN THIS SECTION ROUNDS. TWO VECTORS
 01371  REF   2  LAST   209   32,2152   24204 1                    AGSRND1           ARE ADDED TO DEFEAT ALSIGNAG IN THE
 01372                        32,2153   47055 1            VAD     RTB               CASE OF A HIGH-ORDER ZERO COUPLED WITH
 01373  REF   2  LAST   209   32,2154   24212 0                    AGSRND2           A LOW ORDER NEGATIVE PART.
 01374  REF   2  LAST   209   32,2155   21772 0                    VECSGNAG
 01375                        32,2156   77750 0            LXA,1
 0138   REF   3  LAST   209   32,2157   00024 1                    VATT1
 0139                         32,2160   72130 0            SXA,1   LXA,1
 0140   REF  13  LAST   207   32,2161   00155 0                    MPAC +1
 0141   REF   4  LAST   209   32,2162   00026 0                    VATT1 +2
 0142                         32,2163   72130 0            SXA,1   LXA,1
 0143   REF  1   LAST   209   32,2164   00160 0                    MPAC +4
 0144   REF   5  LAST   209   32,2165   00030 1                    VATT1 +4
 0145                         32,2166   43530 0            SXA,1   RVQ
 0146   REF  15  LAST   209   32,2167   00162 1                    MPAC +6

 0147   REF   6  LAST   183       7753          LAGSLIST =         ONE
 0148                         32,2170   00216 1 V01N14     VN      0114
 01485                        32,2171   14400 0 V50N00A    VN      5000
 0149   REF   1                   6010          V00N25     EQUALS  OCT31
 01495                        32,2172   01420 0 V06N16     VN      0616
 01496  REF   1                   4242          V00N34     EQUALS  34DEC
 01497                        32,2173   14420 1 V50N16     VN      5016
 0150                         32,2174   03100 0 TSCALE     2DEC    100B-10           CSEC TO SEC SCALE FACTOR
 0150                         32,2175   00000 1
 0151                         32,2176   03720 1 20SEC      DEC     2000
 0152                         32,2177   15077 0 RSCALE     2DEC    3.280839 B-3      METERS TO FEET SCALE FACTOR
 0152                         32,2200   05041 1
 0153                         32,2201   24402 1 VSCALE     2DEC    3.280839 E2 B-9   METERS/CS TO FEET/SEC SCALE FACTOR
 0153                         32,2202   25724 1
 01531                        32,2203   00000 1 AGSRND1    2OCT    0000060000
 01531                        32,2204   60000 1
 01532                        32,2205   00000 1            2OCT    0000060000
 01532                        32,2206   60000 1
 01533                        32,2207   00000 1            2OCT    0000060000
 01533                        32,2210   60000 1
 01534                        32,2211   00000 1 AGSRND2    2OCT    0000037777
 01534                        32,2212   37777 1
 01535                        32,2213   00000 1            2OCT    0000037777
 01535                        32,2214   37777 1
 01536                          32,2215   00000 1          2DCT    0000037777
 01536                          32,2216   37777 1
 0154   REF    1                30,2000                    SBANK= LOWSUPER         FOR SUBSEQUENT LOW 2CADRS.
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P00743
 0075                            10,2000                      BANK    10
 0076     REF   2  LAST   43     05,2000                      SETLOC FRANDRES
 0077                            05,2447                      BANK

 0078     REF   3  LAST  154     E3,1400                      EBANK= LST1

 0079     REF   2 LAST    43 TO    43:       1      1*        COUNT* $$/START          FRESH AND RESTART
 0080                            05,2447  0 0004 0  SLAP1     INHINT                   FRESH START. COMES HERE FROM PINBALL.
 0081     REF   1                05,2450  0 3107 1            TC      STARTSUB         SUBROUTINE DOES MOST OF THE WORK.

 0082     REF   1                05,2451  1 2456 0  STARTSW   TCF     SKIPSIM          PATCH....TCF STARTSIM...FOR SIMULATION
 0083     REF  22  LAST  174     05,2452  3 4736 1  STARTSIM  CAF     BIT14
 0084     REF   1                05,2453  0 5105 0            TC      FINDVAC
 0085                            05,2454   77777 0  SIM2CADR  OCT     77777            PATCH 2CADR (AND EBANK DESIGNATION) OF
 0086                            05,2455   77777 0            OCT     77777            SIMULATION START ADDRESS.

 0087     REF  15  LAST  204     05,2456  3 1036 0  SKIPSIM   CA      DSPTAB +11D
 00871    REF   1                05,2457  7 4771 0            MASK    BITS4&6          TURN OFF ALL DSPTAB +11D LAMPS
 00872    REF  15  LAST  172     05,2460  6 4735 1            AD      BIT15            EXCEPT THE GIMBAL LOCK & NO ATT ONLY ON
 0088     REF  17  LAST  211     05,2461  55'036 1            TS      DSPTAB +11D      REQUESTED FRESH START.

 0089     REF  14  LAST   87     05,2462  3 4740 0            CA      BIT12            INITIALIZE DOWNLINK ERASABLE MEMORY
 0090     REF   1                05,2463  54 333 0            TS      DUMPCNT          DUMP FOR ONE PASS.

 0093     REF   7  LAST  191     05,2464  3 4755 1            CA      ZERO
 00931    REF   2  LAST  108     05,2465  55'365 1            TS      ERCOUNT
 009315   REF   1                05,2466  54 375 1            TS      FAILREG
 00932    REF   2  LAST  211     05,2467  54 376 1            TS      FAILREG +1
 009325   REF   3  LAST  211     05,2470  54 377 0            TS      FAILREG +2
 00933    REF   2  LAST  194     05,2471  54 320 1            TS      REDOCTR

 009335   REF   1                05,2472  4 4644 1            CS      PRIO12
 00934    REF   3  LAST  160     05,2473  55'313 0            TS      DSRUPTSW

 0094     REF  23  LAST  211     05,2474  3 4736 1  DOFSTART  CAF     BIT14            INSURE ENGINE IS OFF.
 0095                            05,2475  0 0006 1            EXTEND
 0096     REF   7  LAST  130     05,2476  01 011 0            WRITE   DSALMOUT
 0097     REF   8  LAST  211     05,2477  4 4755 0            CS      ZERO
 0098     REF   1                05,2500  54 055 0            TS      THRUST

 0099     REF   1                05,2501  3 4751 0  DOFSTRT1  CAF     FOUR
 0100     REF   1                05,2502  55'273 1            TS      FCSFLAGS         INITIALIZE ATTITUDE ERROR DISPLAYS.
 0101     REF   2  LAST  174     05,2503  3 4355 0            CA      PRIO30
 0102     REF   1                05,2504  54 366 0            TS      RESTREG          SUPER BANK PRIORITY FOR DISPLAYS.

 0103     REF   9  LAST  211     05,2505  3 4755 1            CA      ZERO
 0104     REF   2  LAST  105     05,2506  55'246 1            TS      ABDELV           DAP INITIALIZATION
 0105     REF   1                05,2507  54 371 0            TS      NVSAVE
 0106     REF   1                05,2510  55'072 1            TS      EBANKTEM
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  0107   REF   6  LAST  192   05,2511  55'262 1          TS       CH5MASK
  0108   REF   5  LAST  192   05,2512  55'263 0          TS       CH6MASK
  0109   REF   7  LAST  192   05,2513  55'276 1          TS       PVALVEST         FOR RCS FAILURE MONITOR
  0110   REF   2  LAST  108   05,2514  55'360 1          TS       ERESTORE         ***** MUST NOT BE REMOVED FROM DCFSTART
  0111   REF   2  LAST  108   05,2515  55'362 0          TS       SMODE            ***** MUST NOT BE REMOVED FROM DCFSTART
  0112   REF   4  LAST  208   05,2516  54 332 1          TS       DNLSTCOD         SELECT P00 DOWNLIST
  0113   REF   2  LAST  208   05,2517  55'324 1          TS       AGSWORD          ALLOW AGS INITIALIZATION
  0114   REF   2  LAST  110   05,2520  55'501 0          TS       UPSVFLAG         ZERO UPDATE STATE VECTOR REQUEST FLAGWRD
  0115                        05,2521  0 0006 1          EXTEND
  0116   REF   1              05,2522  01 005 0          WRITE    CHAN5            TURN OFF RCS JETS.
  0117                        05,2523  0 0006 1          EXTEND
  0118   REF   1              05,2524  01 006 0          WRITE    CHAN6            TURN OFF RCS JETS.
  0119                        05,2525  0 0006 1          EXTEND
  0120   REF  13  LAST  187   05,2526  01 012 0          WRITE    CHAN12
  0121                        05,2527  0 0006 1          EXTEND
  0122   REF   1              05,2530  01 013 1          WRITE    CHAN13
  0123                        05,2531  0 0006 1          EXTEND
  0124   REF   3  LAST  175   05,2532  01 014 0          WRITE    CHAN14
  0125   REF  18  LAST  211   05,2533  4 1036 1          CS       DSPTAB +11D
  0126   REF   2  LAST  211   05,2534  7 4771 0          MASK     BITS4&6
  0127   REF  37  LAST  208   05,2535  10 000 0          CCS      A
  0128                        05,2536  0 2542 0          TC       +4
  0129   REF   3  LAST  212   05,2537  3 4771 1          CA       BITS4&6
  0130                        05,2540  0 0006 1          EXTEND                    THE IMU WAS IN COARSE ALIGN IN GIMBAL
  0131   REF  14  LAST  212   05,2541  05 012 1          WOR      CHAN12           LOCK, SO PUT IT BACK INTO COARSE ALIGN.
  0132   REF   1              05,2542  0 2643 1     +4   TC       MR.KLEAN

  0133   REF  10  LAST  211   05,2543  4 4755 0          CS       ZERO
  0134   REF   1              05,2544  55'011 1          TS       MODREG

  0135   REF   1              05,2545  3 3362 0          CAF      IM30INIF         FRESH START IMU INITIALIZATION.
  0136   REF  38  LAST  204   05,2546  55'302 0          TS       IMODES30

  0137   REF   1              05,2547  3 3067 0          CAF      MAXDB
  0138   REF   1              05,2550  55'346 0          TS       DB
  0139   REF   2  LAST  211   05,2551  3 4751 0          CAF      FOUR
  0140   REF   1              05,2552  55'325 0          TS       RATEINDX         INITIALIZE KALCMANU RATE
  0141   REF   1              05,2553  3 3063 1          CA       BOOLSTRT
  0142   REF   1              05,2554  54 111 1          TS       DAPBOOLS
  0143   REF   1              05,2555  3 5015 0          CAF      EBANK6
  0144   REF   1              05,2556  54 003 0          TS       EBANK
  0145   REF   1              E6,1400                    EBANK=   HIASCENT

 01451   REF   1              05,2557  3 3060 1          CA       STIKSTRT
 01452   REF   1              05,2560  55'444 0          TS       STIKSENS
 01453   REF   1              05,2561  3 3061 0          CA       RATESTRT
 01454   REF   2  LAST  130   05,2562  55'476 1          TS       -RATEDB
  0146   REF   1              05,2563  3 2000 0          CAF      FULLAPS          INITIALIZE MAXIMUM ASCENT MASS FOR USE
  0147   REF   2  LAST  212   05,2564  55'400 0          TS       HIASCENT           BY 1/ACCS UNTIL THE PAD LOAD IS DONE.
  0148   REF   1              05,2565  3 3064 0          CA       77001OCT            LOAD DAP FILTER GAINS PAD LOAD
 0149   REF   1                05,2566  55'403 0              TS      DKTRAP            TO BEST PRESENT ESTIMATE OF GOODIES
 0150   REF   1                05,2567  55'406 0              TS      LMTRAP         .14 DEG
 0151   REF   1                05,2570  3 3065 1              CA      60DEC
 0152   REF   1                05,2571  55'405 0              TS      DKKAOSN
 0153   REF   1                05,2572  55'410 1              TS      LMKAOSN        6 SEC GAIN FOR ALPHA
 0154   REF  11  LAST  212     05,2573  3 4755 1              CA      ZERO
 0155   REF   1                05,2574  55'407 1              TS      LMOMEGAN       UNITY GAIN
 0156   REF   2  LAST  208     05,2575  3 4363 0              CA      TEN
 0157   REF   1                05,2576  55'404 1              TS      DKOMEGAN       1 SEC GAIN FOR OMEGA
 0158   REF  16  LAST. 191     05,2577  3 4744 1              CAF     BIT8           SET DOCKED DB TO 1.4 DEG.  MAY OVERWRITE
 0159   REF   1                05,2600  55'411 0              TS      DKDB             WITH PAD LOAD.
 0160   REF   1                05,2601  3 5026 0              CAF     IM33INIT
 0161   REF  23  LAST  207     05,2602  6 4746 0              AD      BIT6           KEEP BOTH CAP AND ERROR-NEEDLES DISPLAY
 0162   REF  15  LAST  181     05,2603  55'303 1              TS      IMODES33         OFF UNTIL ICDU ZERO IS FINISHED.

 0163                          05,2604  0 0006 1              EXTEND                 INITIALIZE SWITCHES ONLY ON FRESH START.
 0164   REF   1                05,2605  3 3367 0              DCA     SWINIT
 0165   REF  17  LAST  195     05,2606  52 075 1              DXCH    STATE
 0166   REF   2  LAST  213     05,2607  3 3370 0              CA      SWINIT +2
 0167   REF  18  LAST  213     05,2610  54 076 1              TS      STATE +2
 0168   REF   2  LAST  206     05,2611  3 4737 0              CA      REFSMBIT       DO NOT ALTER REFSMFLG ON FRESH START.
 0169   REF  19  LAST  213     05,2612  7 0077 0              MASK    STATE +3
 0170   REF   3  LAST  213     05,2613  6 3371 1              AD      SWINIT +3
 0171   REF  20  LAST  213     05,2614  54 077 0              TS      STATE +3
 0172                          05,2615  0 0006 1              EXTEND
 0173   REF   4  LAST  213     05,2616  3 3373 0              DCA     SWINIT +4
 0174   REF  21  LAST  213     05,2617  52 101 0              DXCH    STATE +4
 0175                          05,2620  0 0006 1              EXTEND
 0176   REF   5  LAST  213     05,2621  3 3375 0              DCA     SWINIT +6
 0177   REF  22  LAST  213     05,2622  52 103 1              DXCH    STATE +6
 0178   REF   1                05,2623  3 4744 1              CA      SURFFBIT       DO NOT ALTER SURFFLAG ON FRESH START.
 0179   REF   1                05,2624  6 4740 0              AD      CMOONBIT                   CMOONFLG
 0180   REF   1                05,2625  6 4741 1              AD      LMOONBIT                   LMOONFLG
 0181   REF  23  LAST  213     05,2626  7 0104 0              MASK    STATE +8D
 0182   REF   6  LAST  213     05,2627  6 3376 0              AD      SWINIT +8D
 0183   REF  24  LAST  213     05,2630  54 104 0              TS      STATE +8D
 0184   REF   7  LAST  213     05,2631  3 3377 1              CA      SWINIT +9D
 0185   REF  25  LAST  213     05,2632  54 105 1              TS      STATE +9D
 0186   REF   1                05,2633  3 4737 0              CA      APSFLBIT       DO NOT ALTER APSFLAG ON FRESH START.
 0187   REF  26  LAST  213     05,2634  7 0106 1              MASK    STATE +10D
 0188   REF  [illegible]  LAST  213     05,2635  6 3400 0              AD      SWINIT +10D
 0189   REF  27  LAST  213     05,2636  54 106 1              TS      STATE +10D
 0190   REF   9  LAST  213     05,2637  3 3401 1              CAF     SWINIT +11D
 0191   REF  28  LAST  213     05,2640  54 107 0              TS      STATE +11D

 0192   REF   2  LAST  165     05,2641  0 4635 0  ENDPSTRT    TC      POSTJUMP       NOW IN ANOTHER BANK.
 0193   REF   1                05,2642   03210 1              CADR    DUMMYJOB + 2   PICKS UP AT RELINT.   (DONT ZERO NEWJOB)


 0194                          05,2643  0 0004 0  MR.KLEAN    INHINT
 0195                              05,2644  0 0006 1           EXTEND
 0196    REF   2  LAST  157        05,2645  3 4755 1           DCA     NEG0
 0197    REF   1                   05,2646  52 755 1           DXCH    -PHASE2
 0198                              05,2647  0 0006 1  P00KLEAN EXTEND
 0199    REF   3  LAST  214        05,2650  3 4755 1           DCA     NEG0
 0200    REF   1                   05,2651  52 761 0           DXCH    -PHASE4
 0201                              05,2652  0 0006 1  V37KLEAN EXTEND
 0202    REF   4  LAST  214        05,2653  3 4755 1           DCA     NEG0
 0203    REF   1                   05,2654  52 753 1           DXCH    -PHASE1
 0204                              05,2655  0 0006 1           EXTEND
 0205    REF   5  LAST  214        05,2656  3 4755 1           DCA     NEG0
 0206    REF   1                   05,2657  52 757 0           DXCH    -PHASE3
 0207                              05,2660  0 0006 1           EXTEND
 0208    REF   6  LAST  214        05,2661  3 4755 1           DCA     NEG0
 0209    REF   1                   05,2662  52 763 1           DXCH    -PHASE5
 0210                              05,2663  0 0006 1           EXTEND
 0211    REF   7  LAST  214        05,2664  3 4755 1           DCA     NEG0
 0212    REF   1                   05,2665  52 765 1           DXCH    -PHASE6
 0213    REF  14  LAST  192        05,2666  0 0002 0           TC      Q
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P0214               COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME

 0215    REF   4  LAST   211    E3,1400                        EBANK= LST1
 0217    REF   3  LAST   211    05,2667   24 320 0  GOPROG     INCR    REDOCTR            ADVANCE RESTART COUNTER.

 0218    REF  15  LAST   214    05,2670   22 002 0             LXCH    Q
 0219                           05,2671   0 0006 1             EXTEND
 0220    REF   1                05,2672   04 007 1             ROR     SUPERBNK
 0221    REF   2  LAST   195    05,2673   53'433 0             DXCH    FSBBQ
 0222    REF  19  LAST   212    05,2674   3 1036 0             CA      DSPTAB +11D
 0223    REF  15  LAST   171    05,2675   7 4750 0             MASK    BIT4
 0224                           05,2676   0 0006 1             EXTEND
 0225                           05,2677   1 2703 0             BZF     +4
 0226    REF  24  LAST   213    05,2700   6 4746 0             AD      BIT6               SET ERROR COUNTER ENABLE
 0227                           05,2701   0 0006 1             EXTEND
 0228    REF  15  LAST   212    05,2702   05 012 1             WOR     CHAN12             ISS WAS IN COARS ALIGN SO GO BACK TO
 0229    REF   1                05,2703   0 3070 0  BUTTONS    TC      LIGHTSET

R0230                                                       ERASCHK TEMPORARILY STORES THE CONTENTS OF TWO ERASABLE LOCATIONS, X
R0232                                                       AND X+1 INTO SKEEP5 AND SKEEP6. IT ALSO STORES X INTO SKEEP7 AND
R0234                                                       ERESTORE. IF ERASCHK IS INTERRUPTED BY A RESTART, C(ERESTORE) SHOULD
R0236                                                       EQUAL C(SKEEP7),AND BE A + NUMBER LESS THAN 2000 OCT. OTHERWISE
R0238                                                       C(ERESTORE) SHOULD EQUAL +0.

 0239    REF   2  LAST   157    05,2704   3 4350 0             CAF     HI5
 0240    REF   3  LAST   212    05,2705   7 1360 1             MASK    ERESTORE
 0241                           05,2706   0 0006 1             EXTEND
 0242                           05,2707   1 2711 0             BZF     +2                 IF ERESTORE NOT = +0 OR +N LESS THAN 2K,
 0243    REF   1                05,2710   1 3105 1             TCF     NONAVKEY +3        DO FRESH START - E MEMORY MIGHT BE BAD
 0244    REF   4  LAST   215    05,2711   4 1360 1             CS      ERESTORE
 0245                           05,2712   0 0006 1             EXTEND
 0246    REF   1                05,2713   1 2730 0             BZF     DORSTART           = +0 CONTINUE WITH RESTART.
 0247    REF   1                05,2714   6 1377 0             AD      SKEEP7
 0248                           05,2715   0 0006 1             EXTEND
 0249                           05,2716   1 2720 1             BZF     +2                 = SKEEP7, RESTORE E MEMORY.
 0250    REF   2  LAST   215    05,2717   1 3105 1             TCF     NONAVKEY +3        DO FRESH START - E MEMORY MIGHT BE BAD
 0251    REF   2  LAST   108    05,2720   3 1374 0             CA      SKEEP4
 0252    REF   2  LAST   212    05,2721   54 003 0             TS      EBANK              EBANK OF E MEMORY THAT WAS UNDER TEST.
 0253                           05,2722   0 0006 1             EXTEND                     (NOT DXCH SINCE THIS MIGHT HAPPEN AGAIN)
 0254    REF   2  LAST   108    05,2723   3 1376 1             DCA     SKEEP5
 0255    REF   2  LAST   215    05,2724   51'377 0             INDEX   SKEEP7
 0256                           05,2725   52 001 1             DXCH    0000               E MEMORY RESTORED.
 0257    REF  12  LAST   213    05,2726   3 4755 1             CA      ZERO
 0258    REF   5  LAST   215    05,2727   55'360 1             TS      ERESTORE
 0259    REF   2  LAST   211    05,2730   0 3107 1  DORSTART   TC      STARTSUB           DO INITIALIZATION AFTER ERASE RESTORE.

 0271    REF   1                05,2731   4 4736 0  SETINFL    CS      INTFLBIT
 0272    REF   2  LAST    81    05,2732   7 0106 1             MASK    FLGWRD10
 0273    REF   3  LAST   215    05,2733   54 106 1             TS      FLGWRD10
 0274   REF    1               05,2734   3 3364 0                 CA       9,6,4              LEAVE PROG ALARM,GIMBAL LOCK, NO ATT
 0275   REF   20  LAST   215   05,2735   7 1036 1                 MASK     DSPTAB +11D        LAMPS INTACT ON HARDWARE RESTART
 0276   REF   16  LAST   211   05,2736   6 4735 1                 AD       BIT15
 0277   REF   21  LAST   216   05,2737   57'036 0                 XCH      DSPTAB +11D
 0278   REF    1               05,2740   3 3350 1                 CAF      IFAILINH           LEAVE IMU FAILURE INHIBITS INTACT ON
 0279   REF   39  LAST   212   05,2741   7 1302 0                 MASK     IMODES30           HARDWARE RESTART. RESET ALL FAILURE
 0280   REF    1               05,2742   6 3363 1                 AD       IM30INIR           CODES.
 0281   REF   40  LAST   216   05,2743   55'302 0                 TS       IMODES30

 0282   REF    3  LAST   212   05,2744   3 1324 0                 CA       AGSWORD            BE SURE OF CORRECT DOWNLIST
 0283   REF    5  LAST   212   05,2745   54 332 1                 TS       DNLSTCOD

 0284   REF   16  LAST   215   05,2746   3 4750 1                 CA       BIT4               TURN ON THROTTLE COUNTER
 0285                          05,2747   0 0006 1                 EXTEND
 0286   REF    4  LAST   212   05,2750   05 014 1                 WOR      CHAN14             TURN ON THRUST DRIVE
 0287   REF    5  LAST   186   05,2751   4 0101 0                 CS       FLAGWRD5
 0288   REF    2  LAST   174   05,2752   7 4745 1                 MASK     ENGONBIT
 0289   REF   38  LAST   212   05,2753   10 000 0                 CCS      A
 0290                          05,2754   1 2761 1                 TCF      +5
 0291   REF   15  LAST   168   05,2755   3 4737 0                 CAF      BIT13
 0292                          05,2756   0 0006 1                 EXTEND
 0293   REF    8  LAST   211   05,2757   05 011 1                 WOR      DSALMOUT           TURN ENGINE ON
 0294   REF    1               05,2760   1 2775 1                 TCF      GOPROG3
 0295   REF   24  LAST   211   05,2761   3 4736 1      +5         CAF      BIT14
 0296                          05,2762   0 0006 1                 EXTEND
 0297   REF    9  LAST   216   05,2763   05 011 1                 WOR      DSALMOUT           TURN ENGINE OFF.
 0298   REF    2  LAST   216   05,2764   1 2775 1                 TCF      GOPROG3

 0299                          05,2765   0 0004 0  ENEMA          INHINT
 0300   REF    1               05,2766   0 3116 1                 TC       STARTSB1
 0301   REF    1               05,2767   1 2771 0                 TCF      GOPROG2A
 0302   REF    1               05,2770   0 3146 1  GOPROG2        TC       STARTSB2
 0303   REF    2  LAST   215   05,2771   0 3070 0  GOPROG2A       TC       LIGHTSET
 0304   REF    1               05,2772   4 3066 0                 CS       RSFLGBTS           CLEAR BITS 7 AND 14.
 0305   REF    4  LAST   215   05,2773   7 0106 1                 MASK     FLGWRD10
 0306   REF    5  LAST   216   05,2774   54 106 1                 TS       FLGWRD10

 0307   REF    1               05,2775   3 4756 1  GOPROG3        CAF      NUMGRPS            VERIFY PHASE TABLE AGREEMENTS
 0308   REF   16  LAST   209   05,2776   54 161 0  PCLOOP         TS       MPAC +5
 0309                          05,2777   6 0000 1                 DOUBLE
 0310                          05,3000   0 0006 1                 EXTEND
 0311   REF   39  LAST   216   05,3001   5 0000 1                 INDEX    A
 0312   REF    2  LAST   214   05,3002   3 0753 0                 DCA      -PHASE1            COMPLEMENT INTO A, DIRECT INTO L.
 0313                          05,3003   0 0006 1                 EXTEND
 0314   REF    7  LAST   182   05,3004   06 001 0                 RXOR     LCHAN              RESULT MUST BE -0 FOR AGREEMENT.
 0315   REF   40  LAST   216   05,3005   10 000 0                 CCS      A
 0316   REF    1               05,3006   1 3054 1                 TCF      PTBAD              RESTART FAILURE.
 0317   REF    2  LAST   216   05,3007   1 3054 1                 TCF      PTBAD
 0318   REF    3  LAST   216   05,3010   1 3054 1                 TCF      PTBAD
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0319   REF  17  LAST  216  05,3011  10 161 0             CCS     MPAC +5        PROCESS ALL RESTART GROUPS.
0320   REF   1             05,3012  1 2776 1             TCF     PCLOOP

0321   REF  18  LAST  217  05,3013  54 162 0             TS      MPAC +6        SET TO +0.
0322   REF   1             05,3014  0 5315 0             TC      MMDSPLAY       DISPLAY MAJOR MODE

0323                       05,3015  0 0004 0             INHINT                 RELINT DONE IN MMDSPLAY

0324   REF   1             05,3016  4 4736 0             CS      DIDFLBIT       CLEAR DIDFLAG IN ORDER TO FORCE R10 TO
0325   REF   1             05,3017  7 0075 1             MASK    FLAGWRD1       RE-INITIALIZE ITSELF IF IT HAD BEEN
0326   REF   2  LAST  217  05,3020  54 075 1             TS      FLAGWRD1       OPERATING AT THE TIME OF THE RESTART.

03262  REF   1             05,3021  4 4740 1             CS      RODFLBIT       CLEAR RODFLAG.  IF P66 IS IN OPERATION
03264  REF   3  LAST  217  05,3022  7 0075 1             MASK    FLAGWRD1             IT WILL RE-INITIALIZE ITSELF AND
03266  REF   4  LAST  217  05,3023  54 075 1             TS      FLAGWRD1             CONTINUE.

03267  REF   1             05,3024  4 4741 0             CS      P21FLBIT       CLEAR P21FLAG SO THAT P21 WILL COMPUTE
03268  REF   7  LAST  208  05,3025  7 0074 0             MASK    FLAGWRD0       NEW BASE STATE VECTORS.
03269  REF   8  LAST  217  05,3026  54 074 0             TS      FLAGWRD0

0327   REF   2  LAST  216  05,3027  3 4756 1             CAF     NUMGRPS        SEE IF ANY GROUPS RUNNING.
0328   REF  19  LAST  217  05,3030  54 161 0  NXTRST     TS      MPAC +5
0329                       05,3031  6 0000 1             DOUBLE
0330   REF  41  LAST  216  05,3032  50 000 1             INDEX   A
0331   REF   1             05,3033  10 753 1             CCS     PHASE1
0332   REF   1             05,3034  1 3036 0             TCF     PACTIVE        PNZ - GROUP ACTIVE.
0333   REF   1             05,3035  1 3043 1             TCF     PINACT         +0 - GROUP NOT RUNNING.

0334   REF  20  LAST  217  05,3036  54 154 0  PACTIVE    TS      MPAC
0335   REF  21  LAST  217  05,3037  24 154 1             INCR    MPAC           ABS OF PHASE.
0336   REF  22  LAST  217  05,3040  24 162 1             INCR    MPAC +6        INDICATE GROUP DEMANDS PRESENT.
0337   REF   1             05,3041  3 3062 0             CA      PACTCADR
0338   REF   1             05,3042  0 4622 0             TC      SWCALL         MUST RETURN TO SWRETURN.

0339   REF  23  LAST  217  05,3043  10 161 0  PINACT     CCS     MPAC +5        PROCESS ALL RESTART GROUPS.
0340   REF   1             05,3044  1 3030 0             TCF     NXTRST

0341   REF  24  LAST  217  05,3045  10 162 0             CCS     MPAC +6        NO, CHECK PHASE ACTIVITY FLAG
0342   REF   1             05,3046  1 2641 1             TCF     ENDRSTRT       PHASE ACTIVE
0343   REF  17  LAST  215  05,3047  3 4735 1             CAF     BIT15          IS MODE -0
0344   REF   2  LAST  212  05,3050  7 1011 1             MASK    MODREG
0345                       05,3051  0 0006 1             EXTEND
0346   REF   1             05,3052  1 6001 1             BZF     GOTOPOOH       NO
0347   REF   2  LAST  217  05,3053  1 2641 1             TCF     ENDRSTRT       YES
0348   REF   9  LAST  207  05,3054  0 5567 0  PTBAD      TC      ALARM          SET ALARM TO SHOW PHASE TABLE FAILURE.
0349                       05,3055   01107 0             OCT     1107

0350   REF   1             05,3056  1 2501 0             TCF     DOFSTRT1

R0351  ******** ****** ******
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R0352
R0353   DO NOT USE GOPROG2 OR ENEMA WITHOUT CONSULTING POOH PEOPLE
R0354
 0355   REF  16  LAST  216       4737              OCT10000 =        BIT13
 0356   REF   3  LAST  211       4355              OCT30000 =        PRIO30
 0357                         05,3057   77777 1  OCT7777  OCT      7777
 03571                        05,3060   32321 0  STIKSTRT DEC      0.825268         20 D/S MAXIMUM COMMANDED RATE
 03572                        05,3061   77445 1  RATESTRT DEC      -218
 0358   REF   1               05,3062   03526 0  FACTCADR CADR     RESTARTS
 0359                         05,3063   21312 1  BOOLSTRT OCT      21312
 0360                         05,3064   77001 0  77001OCT OCT      77001            .14 DEG SCALED AT 4.5 DEG
 0361                         05,3065   00074 1  60DEC    DEC      60
 0363                         05,3066   20100 1  RSFLGBTS OCT      20100
 03631                        05,3067   03434 1  MAXDB    OCTAL    03434            5 DEG ATTITUDE DEADBAND, SCALED AT 45.

 0364   REF  13  LAST  166    05,3070  3 4747 1  LIGHTSET CAF      BIT5             CHECK FOR MARK REJECT AND ERROR RESET
 0365                         05,3071  0 0006 1           EXTEND
 0366   REF   1               05,3072  02 016 1           RAND     NAVKEYIN
 0367                         05,3073  0 0006 1           EXTEND
 0368   REF   3  LAST  215    05,3074  1 3102 0           BZF      NONAVKEY         NO MARK REJECT
 0369                         05,3075  0 0006 1           EXTEND
 0370   REF   1               05,3076  00 015 0           READ     MNKEYIN          CHECK IF KEYS 2M AND 5M ON
 0371   REF   1               05,3077  6 3361 0           AD       -ELR             MAIN DSKY KEYCODE(BITS 1-5)
 0372                         05,3100  0 0006 1           EXTEND
 0373                         05,3101  1 3103 1           BZF      +2

 0374   REF  16  LAST  215    05,3102  0 0002 0  NONAVKEY TC       Q

 0375   REF   3  LAST  215    05,3103  0 3107 1           TC       STARTSUB
 0376   REF   1               05,3104  1 2474 0           TCF      DOFSTART
 03762  REF   4  LAST  218    05,3105  0 3107 1     +3    TC       STARTSUB
 03764  REF   2  LAST  217    05,3106  1 2501 0           TCF      DOFSTRT1         DO FRESH START BUT DON'T TOUCH ENGINE
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P0377              INITIALIZATION COMMON TO BOTH FRESH START AND RESTART.

 0378   REF   5  LAST  192   E6,1537                         EBANK=  AOSQ
 0379   REF   1              05,3107  3 3351 0  STARTSUB CAF     LDNPHAS1     SET POINTER SO NEXT 20MS DOWNRUPT WILL
 0380   REF   2  LAST   99   05,3110  54 335 0           TS      DNTMGOTO     CAUSE THE CURRENT DOWNLIST TO BE
A0381                                                                         INTERRUPTED AND START SENDING FROM THE
A0382                                                                         BEGINNING OF THE CURRENT DOWNLIST.
 0383   REF  25  LAST  215   05,3111  3 4746 0           CAF     BIT6
 0384                        05,3112  0 0006 1           EXTEND
 0385   REF   3  LAST  182   05,3113  02 033 0           RAND    CHAN33
 0386   REF   1              05,3114  6 3365 1           AD      RMODINIT
 0387   REF  15  LAST  195   05,3115  54 110 0           TS      RADMODES

 0388  *REF   2  LAST  171   05,3116  3 4733 1  STARTSB1 CAF     POSMAX
 0389   REF   1              05,3117  54 026 1           TS      TIME3
 0390   REF   1              05,3120  6 7746 0           AD      MINUS2
 0391   REF   4  LAST  160   05,3121  54 027 0           TS      TIME4
 0392   REF   1              05,3122  6 7747 1           AD      NEGONE
 0393   REF   1              05,3123  54 030 0           TS      TIME5

 0394  *REF   2  LAST  212   05,3124  3 5015 0           CAF     EBANK6
 0395   REF   3  LAST  215   05,3125  54 003 0           TS      EBANK

 0396   REF  17  LAST  218   05,3126  4 4737 1           CS      BIT13        CAUSE DAPIDLER TO CALL 1/ACCS
 03961  REF   2  LAST  211   05,3127  7 1273 1           MASK    RCSFLAGS
 0397   REF   3  LAST  219   05,3130  55'273 1           TS      RCSFLAGS     ZERO BIT 13
 03971  REF   3  LAST  219   05,3131  3 4733 1           CAF     POSMAX       DISABLE TIME6 CLOCK.  JUST IN CASE A T6
 03972  REF   1              05,3132  55'466 0           TS      T6NEXT         RUPT IS ALREADY IN THE PRIORITY CHAIN,
 03973                       05,3133  0 0006 1           EXTEND                 ENSURE THAT IT'S INPUTS WILL RENDER IT
 03974  REF   2  LAST  212   05,3134  03 013 0           WAND    CHAN13         INEFFECTUAL.
 0398   REF  13  LAST  215   05,3135  3 4755 1           CAF     ZERO
 0399   REF   1              05,3136  55'465 0           TS      NXT6ADR
 0400   REF   3  LAST  130   05,3137  55'472 0           TS      NEXTP

 0401   REF   1              05,3140  4 4751 1           CS      ACCSOKAY
 0402   REF   2  LAST  212   05,3141  7 0111 1           MASK    DAPBOOLS
 0403   REF   3  LAST  219   05,3142  54 111 1           TS      DAPBOOLS

 0404                        05,3143  0 0006 1           EXTEND               SET T5RUPT FOR DAPIDLER PROGRAM.
 0405   REF   1              05,3144  3 3347 1           DCA     IDLEADR
 0406   REF   2  LAST  153   05,3145  53'275 1           DXCH    T5ADR

 0407   REF   1              05,3146  3 3360 1  STARTSB2 CAF     OCT30001     DURING SOFTWARE RESTART, DO NOT DISTURB
 0408                        05,3147  0 0006 1           EXTEND               ENGINE ON, OFF AND ISS WARNING.
 0409   REF  10  LAST  216   05,3150  03 011 1           WAND    DSALMOUT

 04092  REF   1              05,3151  4 4743 1           CS      READRBIT     CLEAR READRFLG FOR R29.
 04093  REF   2  LAST  206   05,3152  7 0077 0           MASK    FLAGWRD3
 04094  REF   3  LAST  219   05,3153  54 077 0           TS      FLAGWRD3
 0410   REF   4  LAST  219   05,3154  4 0077 0        CS      FLAGWRD3     DURING SOFTWARE RESTART,CLEAR TURNON,
 0411   REF   1              05,3155  7 4741 0        MASK    NR29FBIT     REPOSITION,CDU ZERO AND REMODE BITS
 0412                        05,3156  0 0006 1        EXTEND               IN RADMODES,SINCE TASKS ASSOCIATED
 0413                        05,3157  1 3161 0        BZF     +2           WITH THESE BITS HAVE BEEN KILLED
 0414   REF  16  LAST  179   05,3160  3 4742 1        CAF     BIT10        ALSO IF R29 HAD BEEN REQUESTED,
 0415   REF   1              05,3161  6 3354 0        AD      OCT32001     (NOR29FLG = 0) CLEAR BIT 10 RADMODES
 0416                        05,3162  4 0000 0        COM                  TO MAKE R29 FORGET IT HAD STARTED
 0417   REF  16  LAST  219   05,3163  7 0110 0        MASK    RADMODES     DESIGNATING
 0418   REF  17  LAST  220   05,3164  54 110 0        TS      RADMODES
 0419   REF   1              05,3165  3 3356 1        CAF     OCT27470     DURING SOFTWARE RESTART, DO NOT DISTURB
 0420                        05,3166  0 0006 1        EXTEND               IMU FLAGS. (COURSE ALIGN ENABLE, ZERO
 0421   REF  16  LAST  215   05,3167  03 012 1        WAND    CHAN12       IMU CDUS, ENABLE IMU COUNTER) AND GIMBAL
A0422                                                                      TRIM DRIVES. LEAVE RR LOCKON ENABLE
A0423                                                                      ALONE.

 04232  REF   2  LAST  186   05,3170  4 4750 0        CS      NORRMBIT     ENABLE R25.
 04234  REF   6  LAST  216   05,3171  7 0101 0        MASK    FLAGWRD5
 04236  REF   7  LAST  220   05,3172  54 101 0        TS      FLAGWRD5

 04237  REF   1              05,3173  4 4741 0        CS      R77FLBIT     CLEAR R77FLAG
 04238  REF   8  LAST  220   05,3174  7 0101 0        MASK    FLAGWRD5
 04239  REF   9  LAST  220   05,3175  54 101 0        TS      FLAGWRD5
 0424   REF   1              05,3176  3 3357 0        CAF     OCT74160     DURING SOFTWARE RESTART, DO NOT DUSTURB
 0425                        05,3177  0 0006 1        EXTEND               TELEMETRY FLAGS, RESET TRAP FLAGS, AND
 0426   REF   3  LAST  219   05,3200  03 013 0        WAND    CHAN13       ENABLE T6RUPT FLAG.

 0427   REF  15  LAST  211   05,3201  3 4740 0        CAF     BIT12        REENABLE RUPT10 (RUPT QUICKLY
 0428                        05,3202  0 0006 1        EXTEND                 RESUMES EXCEPT DURING P64)
 0429   REF   4  LAST  220   05,3203  05 013 0        WOR     CHAN13

 0430   REF  26  LAST  219   05,3204  3 4746 0        CAF     BIT6         DURING SOFTWARE RESTART, DO NOT DISTURB
 0431                        05,3205  0 0006 1        EXTEND               GYRO ENABLE FLAG.
 0432   REF   5  LAST  216   05,3206  03 014 1        WAND    CHAN14

 0433   REF   5  LAST  215   E3,1400                  EBANK=  LST1
 0434   REF   1              05,3207  3 5007 0        CAF     STARTEB
 0435   REF   4  LAST  219   05,3210  54 003 0        TS      EBANK        SET FOR E3

 0436   REF   1              05,3211  3 4734 0        CAF     NEG1/2       INITIALIZE WAITLIST DELTA-TS.
 0437   REF   6  LAST  220   05,3212  55'407 1        TS      LST1 +7
 0438   REF   7  LAST  220   05,3213  55'406 0        TS      LST1 +6
 0439   REF   8  LAST  220   05,3214  55'405 0        TS      LST1 +5
 0440   REF   9  LAST  220   05,3215  55'404 1        TS      LST1  +4
 0441   REF  10  LAST  220   05,3216  55'403 0        TS      LST1  +3
 0442   REF  11  LAST  220   05,3217  55'402 1        TS      LST1  +2
 0443   REF  12  LAST  220   05,3220  55'401 1        TS      LST1  +1
 0444   REF  13  LAST  220   05,3221  55'400 0        TS      LST1

 0445   REF   1              05,3222  4 5236 1        CS      ENDTASK
 0446   REF   1              05,3223  55'410 1        TS      LST2
 0447   REF   2  LAST  220   05,3224  55'412 0          TS     LST2 +2
 0448   REF   3  LAST  221   05,3225  55'414 0          TS     LST2 +4
 0449   REF   4  LAST  221   05,3226  55'416 1          TS     LST2 +6
 0450   REF   5  LAST  221   05,3227  55'420 1          TS     LST2 +8D
 0451   REF   6  LAST  221   05,3230  55'422 0          TS     LST2 +10D
 0452   REF   7  LAST  221   05,3231  55'424 0          TS     LST2 +12D
 0453   REF   8  LAST  221   05,3232  55'426 1          TS     LST2 +14D
 0454   REF   9  LAST  221   05,3233  55'430 0          TS     LST2 +16D
 0455   REF   2  LAST  220   05,3234  4 5237 0          CS     ENDTASK +1
 0456   REF  10  LAST  221   05,3235  55'411 0          TS     LST2 +1
 0457   REF  11  LAST  221   05,3236  55'413 1          TS     LST2 +3
 0458   REF  12  LAST  221   05,3237  55'415 1          TS     LST2 +5
 0459   REF  13  LAST  221   05,3240  55'417 0          TS     LST2 +7
 0460   REF  14  LAST  221   05,3241  55'421 0          TS     LST2 +9D
 0461   REF  15  LAST  221   05,3242  55'423 1          TS     LST2 +11D
 0462   REF  16  LAST  221   05,3243  55'425 1          TS     LST2 +13D
 0463   REF  17  LAST  221   05,3244  55'427 0          TS     LST2 +15D
 0464   REF  18  LAST  221   05,3245  55'431 1          TS     LST2 +17D

 0465   REF  14  LAST  219   05,3246  4 4755 0          CS     ZERO             MAKE ALL EXECUTIVE REGISTER SETS
 0466   REF   1              05,3247  54 167 0          TS     PRIORITY         AVAILABLE.
 0467   REF   2  LAST  221   05,3250  54 203 1          TS     PRIORITY +12D
 0468   REF   3  LAST  221   05,3251  54 217 1          TS     PRIORITY +24D
 0469   REF   4  LAST  221   05,3252  54 233 1          TS     PRIORITY +36D
 0470   REF   5  LAST  221   05,3253  54 247 1          TS     PRIORITY +48D
 0471   REF   6  LAST  221   05,3254  54 263 1          TS     PRIORITY +60D
 0472   REF   7  LAST  221   05,3255  54 277 1          TS     PRIORITY +72D
 0473   REF   8  LAST  221   05,3256  54 313 1          TS     PRIORITY +84D

 0474   REF  10  LAST  211   05,3257  55'313 0          TS     DSRUPTSW
 0475   REF   1              05,3260  54 067 1          TS     NEWJOB           SHOWS NO ACTIVE JOBS.

 0476   REF   1              05,3261  3 3353 1          CAF    VAC1ADRC         MAKE ALL VAC AREAS AVAILABLE.
 0477   REF   1              05,3262  54 400 1          TS     VAC1USE
 0478   REF   1              05,3263  6 3355 1          AD     LTHVACA
 0479   REF   1              05,3264  54 454 0          TS     VAC2USE
 0480   REF   2  LAST  221   05,3265  6 3355 1          AD     LTHVACA
 0481   REF   1              05,3266  54 530 0          TS     VAC3USE
 0482   REF   3  LAST  221   05,3267  6 3355 1          AD     LTHVACA
 0483   REF   1              05,3270  54 604 1          TS     VAC4USE
 0484   REF   4  LAST  221   05,3271  6 3355 1          AD     LTHVACA
 0485   REF   1              05,3272  54 660 0          TS     VAC5USE

 0486   REF   3  LAST  213   05,3273  3 4363 0          CAF    TEN
 0487   REF  25  LAST  217   05,3274  54 154 0  DSPOFF  TS     MPAC             R1,R2,R3).
 0489   REF  16  LAST  220   05,3275  4 4740 1          CS     BIT12
 0490   REF  26  LAST  221   05,3276  50 154 1          INDEX  MPAC
 0491   REF  22  LAST  216   05,3277  55'023 0          TS     DSPTAB
 0492   REF  27  LAST  221   05,3300  10 154 0          CCS    MPAC
 0493   REF   1              05,3301  1 3274 1          TCF    DSPOFF
 0494   REF    1                05,3302  55'326 0             TS        DELAYLOC
 0495   REF    2  LAST   222    05,3303  55'327 1             TS        DELAYLOC +1
 0496   REF    3  LAST   222    05,3304  55'330 1             TS        DELAYLOC +2
 0497   REF    1                05,3305  55'074 1             TS        R1SAVE
 0498   REF    1                05,3306  54 045 1             TS        INLINK
 0499   REF    7  LAST   157    05,3307  54 776 0             TS        DSPCNT
 0500   REF    1                05,3310  55'042 1             TS        CADRSTOR
 0501   REF    1                05,3311  55'013 0             TS        REQRET
 0502   REF    1                05,3312  55'015 0             TS        CLPASS
 0503   REF    1                05,3313  55'012 1             TS        DSPLOCK
 0504   REF    1                05,3314  55'020 0             TS        MONSAVE         KILL MONITOR
 0505   REF    1                05,3315  55'021 1             TS        MONSAVE1
 0506   REF    1                05,3316  55'001 0             TS        VERBREG
 0507   REF    1                05,3317  55'002 0             TS        NOUNREG
 0508   REF    1                05,3320  55'043 0             TS        DSPLIST
 0509   REF    1                05,3321  55'312 1             TS        MARKSTAT
 0510   REF    1                05,3322  55'044 1             TS        EXTVBACT        MAKE EXTENDED VERBS AVAILABLE
 0511   REF    2  LAST   208    05,3323  55'304 0             TS        IMUCADR
 0512   REF    1                05,3324  55'305 1             TS        OPTCADR
 0513   REF    1                05,3325  55'306 1             TS        RADCADR
 0514   REF    2  LAST   106    05,3326  55'307 0             TS        ATTCADR
 0515   REF    1                05,3327  55'314 1             TS        LGYRO
 0516   REF    1                05,3330  54 100 1             TS        FLAGWRD4        KILL INTERFACE DISPLAYS
 0517   REF    1                05,3331  3 4760 1             CAF       NOUTCON
 0518   REF    5  LAST   160    05,3332  55'016 0             TS        NOUT

 0519   REF    7  LAST   209    05,3333  4 4753 0             CS        ONE
 0520   REF    1                05,3334  55'100 0             TS        SAMPLIM
 0521   REF   27  LAST   220    05,3335  3 4746 0             CAF       BIT6
 0522   REF   17  LAST   213    05,3336  7 1303 1             MASK      IMODES33        LEAVE BIT 6 UNCHANGED
 0523   REF    2  LAST   213    05,3337  6 5026 0             AD        IM33INIT        NO PIP OR TM FAILS.BIT6=0 IN THIS WORD.
 0524   REF   18  LAST   222    05,3340  55'303 1             TS        IMODES33

 0525   REF    1                05,3341  3 3352 0             CAF       LESCHK          SELF CHECK GO-TO REGISTER.
 0526   REF    2  LAST   108    05,3342  55'361 0             TS        SELFRET

 0527   REF    1                05,3343  4 4360 1             CS        VD1
 0528   REF    2  LAST   158    05,3344  54 777 1             TS        DSPCOUNT

 0529   REF   17  LAST   218    05,3345  0 0002 0             TC        Q
 0530   REF    6  LAST   219    E6,1537                       EBANK=    AOSQ
 0531   REF    1                05,3346   02024 0  IDLEADR    2CADR     DAPIDLER
 0531   REF    1                05,3347   34066 0

 0532                           05,3350   00435 0  IFAILINH   OCT       435
 0533   REF    1                05,3351   03515 0  LDNPHAS1   GENADR    DNPHASE1
 0534   REF    1                05,3352   03336 1  LESCHK     GENADR    SELFCHK
 0535   REF    2  LAST   221    05,3353   00400 0  VAC1ADRC   ADRES     VAC1USE
 0536                           05,3354   32001 1  OCT32001   OCT       32001
 0537                           05,3355   00054 0  LTHVACA    DEC       44
 0538                           05,3356   27470 1  OCT27470 OCT     27470
 0539                           05,3357   74160 0  OCT74160 OCT     74160
 0540                           05,3360   30001 0  OCT30001 OCT     30001
 0541   REF    1                   5007            STARTEB  EQUALS  EBANK3
 0542   REF    1                   4756            NUMGRPS  EQUALS  FIVE
 0543                           05,3361   77755 0  -ELR     OCT     -22              -ERROR LIGHT RESET KEY CODE.
 0544                           05,3362   37411 1  IM30INIF OCT     37411            INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
 0545                           05,3363   37000 0  IM30INIR OCT     37000
 0546   REF    2  LAST   181       5026            IM33INIT =       PRIO16           NO PIP OR TM FAIL SIGNALS.
 0547                           05,3364   00450 0  9,6,4    OCT     450
 0548                           05,3365   00102 1  RMODINIT OCT     00102
 0549                           05,3366   00000 1  SWINIT   OCT     0
 0550                           05,3367   00000 1           OCT     0
 0551                           05,3370   00000 1           OCT     0
 0552                           05,3371   02000 0           OCT     02000            BIT 11 = NOR29FLG
 0553                           05,3372   00000 1           OCT     0
 0554                           05,3373   00000 1           OCT     0
 0555                           05,3374   00000 1           OCT     0
 0556                           05,3375   00100 0           OCT     00100

 0557                           05,3376   00000 1           OCT     0
 0558                           05,3377   00000 1           OCT     0
 0559                           05,3400   00000 1           OCT     0
 0560                           05,3401   40000 0           OCT     40000            BIT 15 = LPBYPASS.
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P0561   PROGRAM NAME     GOTOPOOH                   ASSEMBLY       SUNDANCE
R0562   LOG SECTION      FRESH START AND RESTART

R0563   FUNCTIONAL DESCRIPTION

R0564          FLASH V 37 ON DSKY %MM CHANGE REQUEST "

R0565   INPUT/OUTPUT INFORMATION

R0566          A. CALLING SEQUENCE        TC GOTOPOOH

R0567          B. ERASABLE INITIALIZATION        NONE

R0568          C. OUTPUT FLASH V 37 ON DSKY

R0569          D. DEBRIS        L

R0570   PROGRAM ANALYSIS

R0571          A. SUBROUTINES CALLED PRIODSPR,  LINUS

R0572          B. NORMAL EXIT        TCF ENDOFJOB

R0573          C. ALARM AND ABORT EXITS        NONE

 0574                              6001                          BLOCK   03
 0575   REF   2  LAST   40         6000                          SETLOC  FFTAG5
 0576                              6001                          BANK

 0577   REF   1                                                  COUNT*  $$/P00
 0578   REF   1                    6001  3 4764 0  GOTOPOOH CAF     OCT33             4.33SPOT FOR GOPOOFIX
 0579   REF  13  LAST  192         6002  54 001 1               TS      L
 0580                              6003  4 0000 0               COM
 0581   REF   2  LAST  214         6004  52 761 0               DXCH    -PHASE4

 0582   REF   3  LAST  213         6005  0 4635 0               TC      POSTJUMP
 0583   REF   1                    6006   10024 0               CADR    GOPOOFIX
 0584                              6007   00024 1  OCT24        MM      20
 0585                              6010   00031 0  OCT31        MM      25

 0586                           20,2004                          BANK    20
 0587   REF   1                 04,2000                          SETLOC  VERB37
 0588                           04,2024                          BANK

 0589   REF   1                                                  COUNT*  $$/P00            VERB 37 AND P00 IN BANK 4.
 0590   REF   2  LAST  208      04,2024  0 5516 0  GOPOOFIX TC      DOWNFLAG          ALLOW X-AXIS OVERRIDE
 0591   REF   1                 04,2025   00311 1               ADRES   XOVINFLG

 0592   REF   3  LAST  224      04,2026  0 5516 0               TC      DOWNFLAG          INSURE THAT ULLAGE IS OFF
 0593   REF   1                 04,2027   00314 1               ADRES   ULLAGFLG
 05935 REF    1                04,2030  0 5476 1               TC       CLEARMRK +2     RELEASE MARK DISPLAY SYSTEM.
 0594  REF    1                04,2031  3 2037 1               CAF      V37N99
 0595  REF    8  LAST  208     04,2032  0 4616 1               TC       BANKCALL
 0596  REF    1                04,2033   20476 0               CADR     GOFLASH
 0597                          04,2034  1 2031 0               TCF      -3
 0598                          04,2035  1 2031 0               TCF      -4
 0599                          04,2036  1 2031 0               TCF      -5

 0600                          04,2037   11343 0   V37N99      VN       3799
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R0601    PROGRAM NAME    V37                     ASSEMBLY      SUNDANCE

R0602    LOG SECTION     FRESH START AND RESTART

R0603    FUNCTIONAL DESCRIPTION

R0604          1. CHECK IF NEW PROGRAM ALLOWED. IF BIT 1 OF FLAGWRD2(NODOFLAG) IS SET, AN ALARM 1520 IS CALLED.
R0606          2. CHECK FOR VALIDITY OF PROGRAM SELECTED. IF AN INVALID PROGRAM  IS SELECTED, THE OPERATOR ERROR LIGHT IS
R0608             SET AND CURRENT ACTIVITY, IF ANY, CONTINUES.
R0609          3. SERVICER IS TERMINATED IF IT HAS BEEN RUNNING.
R0610          4. INSTALL IS EXECUTED TO AVOID INTERRUPTING INTEGRATION.
R0611          5. THE ENGINE IS TURNED OFF AND THE DAP IS INITIALIZED FOR COAST.
R0612          6. TRACK AND UPDATE FLAGS ARE SET TO ZERO.
R0613          7. DISPLAY SYSTEM IS RELEASED.
R0614          8. THE FOLLOWING ARE PERFORMED FOR EACH OF THE THREE CASES.
R0615             A. PROGRAM SELECTED IS P00.
R0616                1. RENDEZVOUS AND P25 FLAGS ARE RESET.(KILL P20 AND P25)
R0617                2. STATINT1      IS SCHEDULED BY SETTING RESTART GROUP 2.
R0618                3. MAJOR MODE 00 IS STORED IN THE MODE REGISTER(MODREG).
R0619                4. SUPERBANK 3 IS SELECTED.
R0620                5. NODOFLAG IS RESET.
R0621                6. ALL RESTART GROUPS EXCEPT GROUP 2 ARE CLEARED. CONTROL ISTRANSFERRED TO RESTART PROGRAM (GOPROG2)
R0623                   WHICH CAUSES ALL CURRENT ACTIVITY TO BE DISCONTINUED AND A 9 MINUTE INTEGRATION CYCLE TO BE
R0625                   INITIATED.
R0626             B. PROGRAM SELECTED IS P20 OR P25.
R0627                1. IF THE CURRENT MAJOR MODE IS THE SAME AS THE SELECTED NEWPROGRAM, THE PROGRAM IS RE-INITIALIZED
R0629                   VIA V37XEQ, ALL RESTART GROUPS, EXCEPT GROUP 4 ARE CLEARED.
R0631                2. IF THE CURRENT MAJOR MODE IS NOT EQUAL TO THE NEW REQUEST, A CHECK IS MADE TO SEE IF THE REQUEST-
R0633                   ED MAJOR MODE HAS BEEN RUNNING IN THE BACKGROUND,
R0634                   AND IF IT HAS, NO NEW PROGRAM IS SCHEDULED, THE EXISTING
R0635                   P20 OR P25 IS RESTARTED TO CONTINUE, AND ITS M M IS SET.
R0636                3. CONTROL IS TRANSFERRED TO GOPROG2.
R0637             C. PROGRAM SELECTED IS NEITHER P00,P20, NOR P25
R0638                1. V37XEQ IS SCHEDULED (AS A JOB) BY SETTING RESTART GROUP 4
R0639                2. ALL CURRENT ACTIVITY EXCEPT RENDEZVOUS AND TRACKING IS DISCONTINUED BY CLEARING ALL RESTART
R0641                   GROUPS. IF THE RENDEZVOUS OR THE P25 FLAG IS ON, GROUP 2 IS NOT CLEARED, ALLOWING THESE PROGRAMS
R0643                   TO CONTINUE.

R0644    INPUT/OUTPUT INFORMATION

R0645          A. CALLING SEQUENCE

R0646             CONTROL IS DIRECTED TO V37 BY THE VERBFAN ROUTINE.
R0647                VERBFAN GOES TO C(VERBTAB+C(VERBREG)). VERB 37 = MMCHANG.
R0648                MMCHANG EXECUTES A   TC POSTJUMP, CADR V37.

R0649          B. ERASABLE INITIALIZATION       NONE

R0650
R0651          C. OUTPUT
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R0652                  MAJOR MODE CHANGE

R0653             C. DEBRIS
R0654                MMNUMBER, MPAC +1, MINDEX, BASETEMP +C(MINDEX), FLAGWRD0, FLAGWRD1, FLAGWRD2, MODREG, GOLOC -1,
R0656                GOLOC, GOLOC +1, GOLOC +2, BASETEMP, -PHASE2, PHASE2, -PHASE4

R0657       PROGRAM ANALYSIS

R0658             A. SUBROUTINES CALLED
R0659                ALARM, RELDSP, PINBRNCH, INTSTALL, ENGINOF2, ALLCOAST, V37KLEAN, GOPROG2, FALTON, FINDVAC, SUPERSW,
R0661                DSPMM

R0662             B. NORMAL EXIT         TC ENDOFJOB

R0663             C. ALARMS        1520 (MAJOR MODE CHANGE NOT PERMITTED)

 0664   REF   1             04,2040  54 775 0  V37       TS      MMNUMBER           SAVE MAJOR MODE
 0665   REF   4  LAST  218  04,2041  3 0355 0            CAF     PRIO30             RESTART AT PINBALL PRIORITY
 0666   REF   2  LAST  211  04,2042  54 366 0            TS      RESTREG

 0667   REF  41  LAST  216  04,2043  3 1302 1            CA      IMODES30           IS IMU BEINB INITIALIZED
 0668   REF  28  LAST  222  04,2044  7 4746 1            MASK    BIT6
 0669   REF  42  LAST  217  04,2045  10 000 0            CCS     A
 0670   REF   1             04,2046  1 2065 1            TCF     CANTR00

 0671   REF   2  LAST  227  04,2047  4 0775 0            CS      MMNUMBER           IS P70 REQUESTED?
 0672   REF   1             04,2050  6 2400 1            AD      DEC70
 0673                       04,2051  0 0006 1            EXTEND
 0674   REF   1             04,2052  1 2373 0            BZF     SETUP70            YES
 0675   REF   8  LAST  222  04,2053  6 4753 1            AD      ONE                IS P71 REQUESTED?
 0676                       04,2054  0 0006 1            EXTEND
 0677   REF   1             04,2055  1 2372 1            BZF     SETUP71            YES

 0678   REF   3  LAST  227  04,2056  3 0775 1            CA      MMNUMBER           IS NEW REQUEST P00
 0679                       04,2057  0 0006 1            EXTEND
 0680   REF   1             04,2060  1 2107 1            BZF     ISSERVON           YES, CHECK SERVICER STATUS

 0681   REF   3  LAST  165  04,2061  4 0076 1            CS      FLAGWRD2           NO, IS NODO V37 FLAG SET
 0682   REF   1             04,2062  7 4753 0            MASK    NODOBIT
 0683   REF  43  LAST  227  04,2063  10 000 0            CCS     A
 0684   REF   1             04,2064  1 2072 1            TCF     CHECKTAB           NO
 0685   REF  10  LAST  217  04,2065  0 5567 0  CANTR00   TC      ALARM
 0686                       04,2066   01520 1            OCT     1520

 0687   REF   1             04,2067  0 4457 0  V37BAD    TC      RELDSP             RELEASES DISPLAY FROM ASTRONAUT

 0688   REF   4  LAST  224  04,2070  0 4635 0            TC      POSTJUMP           BRING BACK LAST NORMAL DISPLAY IF THERE
 0689   REF   1             04,2071   21050 1            CADR    PINBRNCH           WAS ONE. OTHERWISE DO AN EOJ.

 0690   REF   1             04,2072  3 2477 1  CHECKTAB  CA      NOV37MM            INDEX FOR MM TABLES.
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0691  REF  28  LAST  221   04,2073  54 155 1  AGAINMM  TS      MPAC +1
0692  REF  29  LAST  228   04,2074  50 155 0           NDX     MPAC +1
0693  REF   1              04,2075  3 2441 1           CA      PREMM1      OBTAIN WHICH MM THIS IS FOR
0694  REF   1              04,2076  7 6074 0           MASK    LOW7
0695                       04,2077  4 0000 0           COM
0696  REF   4  LAST  227   04,2100  6 0775 1           AD      MMNUMBER
0697  REF  44  LAST  227   04,2101  10 000 0           CCS     A
0698  REF  30  LAST  228   04,2102  10 155 1           CCS     MPAC +1     IF GR, SEE IF ANYMORE IN LIST
0699  REF   1              04,2103  1 2073 0           TCF     AGAINMM     YES, GET NEXT ONE
0700  REF   1              04,2104  1 2322 1           TCF     V37NONO     LAST TIME OR PASSED MM

0701  REF  31  LAST  228   04,2105  3 0155 0           CA      MPAC +1
0702  REF   1              04,2106  54 774 1           TS      MINDEX      SAVE INDEX FOR LATER

0703  REF   2  LAST  186   04,2107  4 0103 1  ISSERVON CS      FLAGWRD7    V37 FLAG SET - I.E. IS SERVICER GOING
0704  REF   1              04,2110  7 4746 1           MASK    V37FLBIT
0705  REF  45  LAST  228   04,2111  10 000 0           CCS     A
0706  REF   1              04,2112  1 2134 1           TCF     CANV37      NO

0707  REF   4  LAST  224   04,2113  0 5516 0           TC      DOWNFLAG    YES,TURN OFF THE AVERAGE FLAG AND
0708  REF   1              04,2114   00163 0           ADRES   AVEGFLAG    WAIT FOR SERVICER TO RETURN TO CANV37.

0709  REF   1              04,2115  3 2366 0           CAF     V37RETAD
0710  REF   1              04,2116  54 1260 0          TS      OUTROUTE

0711  REF   1              04,2117  1 5155 1           TCF     ENDOFJOB

0712  REF   9  LAST  217   04,2120  4 0074 0  V37RET   CS      FLAGWRD0    IS P20 OR P22 RUNNING?
0713  REF   2  LAST  185   04,2121  7 4745 1           MASK    RNDVZBIT
0714  REF  46  LAST  228   04,2122  10 000 0           CCS     A
0715                       04,2123  1 2125 1           TCF     +2          NO. CHECK FOR P25.
0716  REF   1              04,2124  1 2132 1           TCF     2.7SPT      YES.  DO 2.7SPOT
0717  REF  10  LAST  228   04,2125  4 0074 0           CS      FLAGWRD0    IS P25 RUNNING?
0718  REF   1              04,2126  7 4743 1           MASK    P25FLBIT
0719  REF  47  LAST  228   04,2127  10 000 0           CCS     A
0720  REF   1              04,2130  3 2367 1  2.0SPT   CA      OCT37667
0721  REF  14  LAST  218   04,2131  6 4747 1  2.11SPT  AD      BIT5
0722  REF   1              04,2132  6 2370 1  2.7SPT   AD      OCT40072
0723  REF   1              04,2133  0 5357 0           TC      PHSCHNGA

0724  REF  15  LAST  221   04,2134  3 4755 1  CANV37   CAF     ZERO
0725                       04,2135  0 0006 1           EXTEND
0726  REF   2  LAST  215   04,2136  01 007 1           WRITE   SUPERBNK

0727  REF   1              04,2137  3 2365 0           CAF     ROOAD
0728  REF   1              04,2140  54 374 0           TS      TEMPFLSH

0729  REF   1              04,2141  0 5353 1           TC      PHASCHNG
0730                       04,2142   00014 1           OCT     14
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 0731   REF   3  LAST  207   04,2143  0 6037 0  R00       TC      INTPRET

 0732                        04,2144   77624 1            CALL                     WAIT FOR INTEGRATION TO FINISH
 0733   REF   1              04,2145   27414 0                    INTSTALL
 0734                        04,2146   77776 1  DUMMYAD   EXIT

 0735   REF   5  LAST  228   04,2147  0 5516 0            TC      DOWNFLAG
 0736   REF   1              04,2150   00124 0            ADRES   3AXISFLG         RESET 3-AXIS FLAG

 0737   REF   1              04,2151  3 4735 1            CAF     LRBYBIT          CLEAN UP THE R12 FLAGWORD.
 0738   REF   1              04,2152  54 107 0            TS      FLGWRD11

 07382  REF   6  LAST  229   04,2153  0 5516 0            TC      DOWNFLAG         INSURE THAT THE R04FLAG IS CLEAR.
 07384  REF   2  LAST   71   04,2154   00063 1            ADRES   R04FLAG

 07386  REF   7  LAST  229   04,2155  0 5516 0            TC      DOWNFLAG         INSURE MUNFLAG IS CLEAR.
 07388  REF   1              04,2156   00141 0            ADRES   MUNFLAG

 0739   REF   8  LAST  229   04,2157  0 5516 0            TC      DOWNFLAG         ALLOW X-AXIS OVERRIDE.
 0740   REF   2  LAST  224   04,2160   00311 1            ADRES   XOVINFLG
 0741   REF   5  LAST  228   04,2161  10 775 0            CCS     MMNUMBER         IS THIS A POOH REQUEST
 0742   REF   1              04,2162  1 2310 0            TCF     NOUVEAU          NO, PICK UP NEW PROGRAM

 0743   REF   2  LAST  227   04,2163  0 4457 0  POOH      TC      RELDSP           RELEASE DISPLAY SYSTEM

 0744   REF   1              04,2164  3 5017 1            CAF     PRIO5            SET VARIABLE RESTART PRIORITY FOR
 0745   REF   1              04,2165  55'056 1            TS      PHSPRDT2         P00 INTEGRATION.

 0746   REF   1              04,2166  0 6011 1            TC      CLRADMOD         CLRADMOD DOES AN INHINT.

 0747   REF   2  LAST  227   04,2167  4 4753 0            CS      NODOBIT          TURN OFF NODOFLAG.
 0748   REF   4  LAST  227   04,2170  7 0076 1            MASK    FLAGWRD2
 0749   REF   5  LAST  229   04,2171  54 076 1            TS      FLAGWRD2

 0750   REF   2  LAST  223   04,2172  3 4756 1            CA      FIVE             SET RESTART FOR STATEINT1
 0751   REF  14  LAST  224   04,2173  54 001 1            TS      L
 0752                        04,2174  4 0000 0            COM
 0753   REF   2  LAST  214   04,2175  52 755 1            DXCH    -PHASE2

 0754   REF   1              04,2176  4 2371 1            CS      OCT700           TURN OFF P20,P25,IMU IN USE FLAG
 0755   REF  11  LAST  228   04,2177  7 0074 0            MASK    FLAGWRD0
 0756   REF  12  LAST  229   04,2200  54 074 0            TS      FLAGWRD0                             RENDFLG

 0757   REF   1              04,2201  3 4755 1            CAF     DNLADP00

 0758   REF   6  LAST  216   04,2202  54 332 1  SEUDOP00  TS      DNLSTCOD         SET UP APPROPRIATE DOWNLIST CODE
 0759   REF   4  LAST  216   04,2203  55'324 1            TS      AGSWORD           (CURRENT LIST WILL BE COMPLETED BEFORE
A0760                                                                                NEW ONE IS STARTED)
 0761   REF   6  LAST  176   04,2204  0 4674 0            TC      IBNKCALL
 0762   REF   1              04,2205   75555 0            CADR    ENGINOF1
 0763    REF   7  LAST  229    04,2206   0 4674 0             TC       IBNKCALL       INSURE ALLCOAST.
 0764    REF   1               04,2207    40204 0             CADR     ALLCOAST       DOES A RESTORDB.

 0765    REF   1               04,2210   4 4775 1             CS       OCT120         TURN OFF TRACK, UPDATE FLAGS
 0766    REF   2  LAST  211    04,2211   55'072 1             TS       EBANKTEM
 0767    REF   5  LAST  217    04,2212   7 0075 1             MASK     FLAGWRD1
 0768    REF   6  LAST  230    04,2213   54 075 1             TS       FLAGWRD1

 0769    REF   8  LAST  230    04,2214   0 4674 0             TC       IBNKCALL       KILL GROUPS 1,3,5,6
 0770    REF   1               04,2215    12652 0             CADR     V37KLEAN

 0771    REF   6  LAST  229    04,2216   10 775 0             CCS      MMNUMBER       IS IT POOH
 0772    REF   1               04,2217   1 2226 1             TCF      RENDVOO        NO
 0773    REF   9  LAST  230    04,2220   0 4674 0   GOMOD     TC       IBNKCALL       REDUNDANT EXCEPT FOR GROUP 4
 0774    REF   1               04,2221    12647 1             CADR     POOKLEAN

 0775    REF   7  LAST  230    04,2222   3 0775 1             CA       MMNUMBER
 0776    REF   3  LAST  217    04,2223   55'011 1             TS       MODREG

 0777    REF   5  LAST  227    04,2224   0 4635 0   GOGOPROG  TC       POSTJUMP
 0778    REF   1               04,2225    12770 1             CADR     GOPROG2

 0779    REF   4  LAST  230    04,2226   4 1011 1   RENDVOO   CS       MODREG         IS CURRENT PROGRAM 22
 0780    REF   1               04,2227   6 2326 1             AD       OCT26
 0781                          04,2230   0 0006 1             EXTEND
 0782    REF   1               04,2231   1 2250 0             BZF      RESET22        YES - CLEAR RENDEZVOUS FLAG


 0783    REF   8  LAST  230    04,2232   4 0775 0             CS       MMNUMBER       IS NEW PROGRAM P22
 0784    REF   2  LAST  230    04,2233   6 2326 1             AD       OCT26
 0785                          04,2234   0 0006 1             EXTEND
 0786    REF   2  LAST  230    04,2235   1 2250 0             BZF      RESET22


 0787    REF   1               04,2236   6 7746 0             AD       NEG2           IS NEW PROGRAM = P20 OR P25
 0788                          04,2237   0 0006 1             EXTEND
 0789    REF   1               04,2240   1 2262 1             BZF      RENDNOO        YES
 0790    REF   3  LAST  229    04,2241   6 4756 1             AD       FIVE           25
 0791                          04,2242   0 0006 1             EXTEND
 0792    REF   2  LAST  230    04,2243   1 2262 1             BZF      RENDNOO        YES

 0793    REF   1               04,2244   3 2324 0             CA       OCT500         NO, IS EITHER P20 OR P25 RUNNING
 0794    REF  13  LAST  229    04,2245   7 0074 0             MASK     FLAGWRD0
 0795    REF  48  LAST  228    04,2246   10 000 0             CCS      A
 0796    REF   1               04,2247   1 2257 1             TCF      POOFIZZ        YES, LEAVE GROUP 2 TO PICK UP P20 OR P25

 0797    REF   2  LAST  229    04,2250   4 2371 1   RESET22   CS       OCT700         CLEAR RENDEZVOUS,P25
 0798    REF  14  LAST  230    04,2251   7 0074 0             MASK     FLAGWRD0       AND IMU IN USE FLAGS
 0799    REF  15  LAST  230    04,2252   54 074 0             TS       FLAGWRD0
 0800    REF   2  LAST  229    04,2253   0 6011 1             TC       CLRADMOD
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0801                          04,2254  0 0006 1  KILL2    EXTEND                    NO, KILL 2
0802  REF   8  LAST  214      04,2255  3 4755 1           DCA     NEGO
0803  REF   3  LAST  229      04,2256  52 755 1           DXCH    -PHASE2

0804  REF   1                 04,2257  3 2364 1  POOFIZZ  CAF     V37QCAD           RESTART POINT FOR V37XEQ
0805  REF   2  LAST  228      04,2260  54 374 0           TS      TEMPFLSH

0806  REF   1                 04,2261  1 2224 0           TCF     GOGOPROG

0807  REF   5  LAST  230      04,2262  4 1011 1  RENDNOO  CS      MODREG
0808  REF   1                 04,2263  6 6007 0           AD      OCT24
0809                          04,2264  0 0006 1           EXTEND
0810  REF   1                 04,2265  1 2254 1           BZF     KILL2             P20 OR P25 ON TOP OF P20 OR P25 -

0811  REF   4  LAST  230      04,2266  6 4756 1           AD      FIVE
0812                          04,2267  0 0006 1           EXTEND
0813  REF   2  LAST  231      04,2270  1 2254 1           BZF     KILL2

0814  REF   2  LAST  230      04,2271  3 2324 0           CA      OCT500
0815  REF  16  LAST  230      04,2272  7 0074 0           MASK    FLAGWRD0
0816  REF   9  LAST  230      04,2273  6 0775 1           AD      MMNUMBER
0817                          04,2274  4 0000 0           COM
0818  REF   1                 04,2275  6 2327 0           AD      P20REG            IS IT 20 AND IS RENDEZVOUS FLAG ON
0819                          04,2276  0 0006 1           EXTEND
0820  REF   1                 04,2277  1 2304 0           BZF     STATQUO           YES
0821  REF   1                 04,2300  6 2325 1           AD      OCT305            IS IT 25 AND IS P25 BIT ON
0822                          04,2301  0 0006 1           EXTEND
0823  REF   2  LAST  231      04,2302  1 2304 0           BZF     STATQUO           YES, LEAVE AS IS
0824  REF   3  LAST  231      04,2303  1 2254 1           TCF     KILL2

0825  REF   7  LAST  230      04,2304  4 0075 1  STATQUO  CS      FLAGWRD1          SET TRACKFLAG
0826  REF   2  LAST  230      04,2305  7 4775 1           MASK    OCT120                UPDATE FLAG
0827  REF   8  LAST  231      04,2306  26 075 1           ADS     FLAGWRD1

0828  REF   1                 04,2307  1 2220 1           TCF     GOMOD

0829  REF   3  LAST  231      04,2310  3 2324 0  NOUVEAU  CAF     OCT500            IS P20 OR P25 FLAG SET
0830  REF  17  LAST  231      04,2311  7 0074 0           MASK    FLAGWRD0
0831  REF  49  LAST  230      04,2312  10 000 0           CCS     A
0832                          04,2313  1 2316 0           TCF     +3                YES
0833  REF   9  LAST  229      04,2314  0 5516 0           TC      DOWNFLAG          NO,RESET IMUINUSE FLAG
0834  REF   1                 04,2315   00007 0           ADRES   IMUSE

0835  REF   2  LAST  228      04,2316  50 774 0           INDEX   MINDEX
0836  REF   1                 04,2317  3 2500 0           CAF     DNLADMM1          OBTAIN APPROPRIATE DOWNLIST ADDRESS

0837                          04,2320  0 0004 0           INHINT
0838  REF   1                 04,2321  1 2202 1           TCF     SEUDOP00

0839  REF   1                 04,2322  0 4364 1  V37NONO  TC      FALTON            COME HERE IF MM REQUESTED DOESNT EXIST
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0840   REF   1               04,2323  1 2067 0           TCF      V37BAD

0841   REF  17  LAST  216       4750           OCT00010 EQUALS   BIT4
0842                         04,2324   00500 1 OCT500   OCT      500        BITS 7 AND 9
0843                         04,2325   00305 1 OCT305   OCT      305
0844                         04,2326   00026 0 OCT26    OCT      26
0845                         04,2327   00124 0 P20REG   OCT      124

0846                         04,2330  0 0004 0 V37XEQ   INHINT
0847   REF   3  LAST  231    04,2331  50 774 0          INDEX    MINDEX
0848   REF   2  LAST  228    04,2332  3 2441 1          CAF      PREMM1     OBTAIN PRIO, EBANK, AND MM
0849   REF   1               04,2333  55'060 1          TS       MMTEMP
0850   REF   1               04,2334  54 020 1          TS       CYR        SHIFT RIGHT TO BITS 14 - 10

0851   REF   2  LAST  232    04,2335  3 0020 0          CA       CYR
0852   REF   1               04,2336  7 7725 1          MASK     PRIO37
0853   REF   1               04,2337  55'062 0          TS       PHSPRDT4   PRESET GROUP 4 RESTART PRIORITY
0854   REF   1               04,2340  54 063 0          TS       NEWPRIO    STORE PRIO FOR SPVAC

0855   REF   2  LAST  232    04,2341  3 1060 0          CA       MMTEMP     OBTAIN EBANK - BITS 8, 9, 10 OF MMTEMP.
0856                         04,2342  0 0006 1          EXTEND
0857   REF  17  LAST  213    04,2343  7 4744 0          MP       BIT8
0858   REF   1               04,2344  7 4757 1          MASK     LOW3
0859   REF  15  LAST  229    04,2345  54 001 1          TS       L

0860   REF   4  LAST  232    04,2346  50 774 0          INDEX    MINDEX
0861   REF   1               04,2347  3 2403 1          CAF      FCADRMM1
0862   REF   1               04,2350  55'061 0          TS       BASETEMP   MAKE BBCON BY ADDING HI5 OF FCADR
0863   REF   3  LAST  215    04,2351  7 4350 1          MASK     HI5
0864   REF  16  LAST  232    04,2352  26 001 1          ADS      L

0865   REF   2  LAST  232    04,2353  3 1061 1          CA       BASETEMP   OBTAIN GENADR PORTION OF 2CADR.
0866   REF   1               04,2354  7 5012 0          MASK     LOW10
0867   REF  15  LAST  165    04,2355  6 4741 1          AD       BIT11

0868   REF   1               04,2356  0 5116 1          TC       SPVAC

0869   REF   3  LAST  232    04,2357  3 1060 0 V37XEQC  CA       MMTEMP     UPON RETURN FROM FINDVAC PLACE THE
0870   REF   2  LAST  228    04,2360  7 6074 0          MASK     LOW7       NEW MM IN MODREG (THE LOW 7 BITS OF
0871   REF   1               04,2361  0 5314 1          TC       NEWMODEA   PHSPRDT1)

0872   REF   3  LAST  229    04,2362  0 4457 0          TC       RELDSP     RELEASE DISPLAY
0873   REF   2  LAST  228    04,2363  0 5155 0          TC       ENDOFJOB   AND EXIT

0874   REF   1                  5660           NEG7     EQUALS   OCT77770

0875   REF   1                  1060           MMTEMP   EQUALS   PHSPRDT3
0876   REF   1                  1061           BASETEMP EQUALS   TBASE4
0877   REF   1               04,2364   10333 0 V37QCAD  CADR     V37XEQ +3
0878   REF   1               04,2365   10146 0 ROOAD    CADR     DUMMYAD
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 0879   REF    1                04,2366   10120 0  V37RETAD CADR     V37RET
 0880                           04,2367   37667 1  OCT37667 OCT      37667
 0881                           04,2370   40072 0  OCT40072 OCT      40072
 0882                           04,2371   00700 0  OCT700   OCT      700
R0883
 0884   REF    1                04,2372  3 6245 1  SETUP71  CAF      THREE
 0885   REF   18  LAST   222    04,2373  54 002 1  SETUP70  TS       Q
 0886                           04,2374  0 0006 1           EXTEND
 0887   REF    1                04,2375  3 2402 0           DCA      P70CADR
 0888   REF   19  LAST   233    04,2376  6 0002 0           AD       Q
 0889                           04,2377  52 006 0           DTCB

 0890                           04,2400   00106 0  DEC70    DEC      70
 0891   REF    3  LAST   147    E7,1520                     EBANK=   R
 0892   REF    1                04,2401   02072 0  P70CADR  2CADR    P70
 0892   REF    1                04,2402   42067 0
R0893   FOR VERB 37 TWO TABLES ARE MAINTAINED. EACH TABLE HAS AN ENTRY FOR EACH
R0894   MAJOR MODE THAT CAN BE STARTED FROM THE KEYBOARD. THE ENTRIES ARE PUT
R0895   INTO THE TABLE WITH THE ENTRY FOR THE HIGHEST MAJOR MODE COMING FIRST,

R0896   TO THE LOWEST MAJOR MODE WHICH IS THE LAST ENTRY IN EACH TABLE.

R0897            THE FCADRMM TABLE CONTAINS THE FCADR OF THE STARTING JOB OF
R0898   THE MAJOR MODE.    FOR EXAMPLE,

A0899                                              FCADRMM1 FCADR    P79             START OF P 79
A0900                                                       FCADR    PROG18          START OF P 18
A0901                                                       FCADR    P01             START OF P 01

R0902   NOTE,    THE FIRST ENTRY MUST BE LABLED FCADRMM1.
R0903   ----

 0904   REF    1                04,2403   71526 0  FCADRMM1 FCADR    P79
 0905   REF    1                04,2404   71274 0           FCADR    P78
 0906   REF    1                04,2405   26207 0           FCADR    P76
 0907   REF    1                04,2406   72731 1           FCADR    P75
 0908   REF    1                04,2407   72547 1           FCADR    P74
 0909   REF    1                04,2410   72220 1           FCADR    P73
 0910   REF    1                04,2411   72031 0           FCADR    P72
 0911   REF    1                04,2412   62144 1           FCADR    LANDJUNK
 0912   REF    1                04,2413   64776 0           FCADR    P63LM
 0913   REF    1                04,2414   33314 1           FCADR    P57
 0914   REF    1                04,2415   32050 0           FCADR    PROG52
 0915   REF    1                04,2416   31427 1           FCADR    P51
 0916   REF    1                04,2417   75436 1           FCADR    P47LM
 0917   REF    1                04,2420   75410 0           FCADR    P42LM
 0918   REF    1                04,2421   75272 1           FCADR    P41LM
 0919   REF    1                04,2422   75147 1           FCADR    P40LM
 0920   REF    1                04,2423   71521 1           FCADR    P39
 0921   REF    1                04,2424   71271 0           FCADR    P38
 0922    REF    1                 04,2425    72725 1               FCADR   P35
 0923    REF    1                 04,2426    72545 0               FCADR   P34
 0924    REF    1                 04,2427    72216 1               FCADR   P33
 0925    REF    1                 04,2430    72027 1               FCADR   P32
 0926    REF    1                 04,2431    72450 0               FCADR   P31
 0927    REF    1                 04,2432    72000 1               FCADR   P30
 0928    REF    1                 04,2433    50404 1               FCADR   PROG25
 0929    REF    1                 04,2434    50000 1               FCADR   PROG22
 0930    REF    1                 04,2435    51505 0               FCADR   PROG21
 0931    REF    1                 04,2436    50000 1               FCADR   PROG20
 0932    REF    1                 04,2437    60061 0               FCADR   P12LM
 0933    REF    1                 04,2440    77655 1               FCADR   P06
R0934              THE PREMM TABLE CONTAINS THE E-BANK,MAJOR MODE, AND PRIORITY
R0935    INFORMATION, IT IS IN THE FOLLOWING FORM,

R0936              PPP PPE EEM MMM MMM

R0937              WHERE THE 7 M BITS CONTAIN THE MAJOR MODE NUMBER
R0938                        3 E BITS CONTAIN THE E-BANK NUMBER
R0939                        5 P BITS CONTAIN THE PRIORITY AT WHICH THE JOB IS
R0940                           TO BE STARTED

R0941              FOR EXAMPLE,

A0942                                                   PREMM1      OCT     67213               PRIORITY      33
A0943                                                                                           E-BANK         5
A0944                                                                                           MAJOR MODE    11
A0945                                                               OCT     25437               PRIORITY      12
A0946                                                                                           E-BANK         6
A0947                                                                                           MAJOR MODE    31

R0948    NOTE,     THE FIRST ENTRY MUST BE LABELED PREMM1
 0949                             04,2441    27717 0   PREMM1      OCT     27717               MM 79   EBANK 7   PRIO 13
 0950                             04,2442    27716 1               OCT     27716               MM 78   EBANK 7   PRIO 13
 0951                             04,2443    27714 0               OCT     27714               MM 76   EBANK 7   PRIO 13
 0952                             04,2444    27713 1               OCT     27713               MM 75   EBANK 7   PRIO 13
 0953                             04,2445    27712 0               OCT     27712               MM 74   EBANK 7   PRIO 13
 0954                             04,2446    27711 0               OCT     27711               MM 73   EBANK 7   PRIO 13
 0955                             04,2447    27710 1               OCT     27710               MM 72   EBANK 7   PRIO 13
 0956                             04,2450    27704 1               OCT     27704               MM 68   EBANK 7   PRIO 13
 0957                             04,2451    27677 1               OCT     27677               MM 63   EBANK 7   PRIO 13
 0958                             04,2452    27271 0               OCT     27271               MM 57   EBANK 5   PRIO 13
 0959                             04,2453    27264 1               OCT     27264               MM 52   EBANK 5   PRIO 13
 0960                             04,2454    27263 0               OCT     27263               MM 51   EBANK 5   PRIO 13
 0961                             04,2455    27657 0               OCT     27657               MM 47   EBANK 7   PRIO 13
 0962                             04,2456    27652 0               OCT     27652               MM 42   EBANK 7   PRIO 13
 0963                             04,2457    27651 0               OCT     27651               MM 41   EBANK 7   PRIO 13
 0964                             04,2460    27650 1               OCT     27650               MM 40   EBANK 7   PRIO 13
 0965                             04,2461    27647 1               OCT     27647               MM 39   EBANK 7   PRIO 13
 0966                             04,2462    27646 0               OCT     27646               MM 38   EBANK 7   PRIO 13
 0967                             04,2463   27643 0            OCT      27643           MM 35   EBANK 7   PRIO 13
 0968                             04,2464   27642 1            OCT      27642           MM 34   EBANK 7   PRIO 13
 0969                             04,2465   27641 1            OCT      27641           MM 33   EBANK 7   PRIO 13
 0970                             04,2466   27640 0            OCT      27640           MM 32   EBANK 7   PRIO 13
 0971                             04,2467   27637 0            OCT      27637           MM 31   EBANK 7   PRIO 13
 0972                             04,2470   27636 1            OCT      27636           MM 30   EBANK 7   PRIO 13
 0973                             04,2471   27631 0            OCT      27631           MM 25   EBANK 7   PRIO 13
 0974                             04,2472   27626 0            OCT      27626           MM 22   EBANK 7   PRIO 13
 0975                             04,2473   27625 0            OCT      27625           MM 21   EBANK 7   PRIO 13
 0976                             04,2474   27624 1            OCT      27624           MM 20   EBANK 7   PRIO 13
 0977                             04,2475   27614 1            OCT      27614           MM 12   EBANK 7   PRIO 13
 0978                             04,2476   27006 1            OCT      27006           MM 06   EBANK 4   PRIO 13
R0979   NOTE,    THE FOLLOWING CONSTANT IS THE NUMBER OF ENTRIES IN EACH OF
R0980   ----     THE ABOVE LISTS-1(IE, THE NUMBER OF MAJOR MODES(EXCEPT P00)
R0981            THAT CAN BE CALLED FROM THE KEYBOARD MINUS ONE)

 0982                             04,2477   00035 1  NOV37MM  DEC      29              MM'S -1

 0983   REF   1                   04,2500   00002 0  DNLADMM1 ADRES    RENDEZVU        P79
 0984   REF   2  LAST  235        04,2501   00002 0           ADRES    RENDEZVU        P78
 0985   REF   3  LAST  235        04,2502   00002 0           ADRES    RENDEZVU
 0986   REF   4  LAST  235        04,2503   00002 0           ADRES    RENDEZVU        P75
 0987   REF   5  LAST  235        04,2504   00002 0           ADRES    RENDEZVU        P74
 0988   REF   6  LAST  235        04,2505   00002 0           ADRES    RENDEZVU        P73
 0989   REF   7  LAST  235        04,2506   00002 0           ADRES    RENDEZVU        P72
 0990   REF   1                   04,2507   00004 0           ADRES    DESASCNT        P68
 0991   REF   2  LAST  235        04,2510   00004 0           ADRES    DESASCNT        P63
 0992   REF   1                   04,2511   00005 1           ADRES    LUNRSALN        P57
 0993   REF   1                   04,2512   00000 1           ADRES    COSTALIN        P52
 0994   REF   2  LAST  235        04,2513   00000 1           ADRES    COSTALIN        P51
 0995   REF   1                   04,2514   00003 1           ADRES    ORBMANUV        P47
 0996   REF   2  LAST  235        04,2515   00003 1           ADRES    ORBMANUV        P42
 0997   REF   3  LAST  235        04,2516   00003 1           ADRES    ORBMANUV        P41
 0998   REF   4  LAST  235        04,2517   00003 1           ADRES    ORBMANUV        P40
 0999   REF   8  LAST  235        04,2520   00002 0           ADRES    RENDEZVU        P39
 1000   REF   9  LAST  235        04,2521   00002 0           ADRES    RENDEZVU        P38
 1001   REF  10  LAST  235        04,2522   00002 0           ADRES    RENDEZVU        P35
 1002   REF  11  LAST  235        04,2523   00002 0           ADRES    RENDEZVU        P34
 1003   REF  12  LAST  235        04,2524   00002 0           ADRES    RENDEZVU        P33
 1004   REF  13  LAST  235        04,2525   00002 0           ADRES    RENDEZVU        P32
 1005   REF  14  LAST  235        04,2526   00002 0           ADRES    RENDEZVU        P31LM
 1006   REF  15  LAST  235        04,2527   00002 0           ADRES    RENDEZVU        P30
 1007   REF  16  LAST  235        04,2530   00002 0           ADRES    RENDEZVU        P25
 1008   REF   2  LAST  235        04,2531   00005 1           ADRES    LUNRSALN        P22
 1009   REF  17  LAST  235        04,2532   00002 0           ADRES    RENDEZVU        P21
 1010   REF  18  LAST  235        04,2533   00002 0           ADRES    RENDEZVU        P20
 1011   REF   3  LAST  235        04,2534   00004 0           ADRES    DESASCNT        P12
 1012   REF   3  LAST  235        04,2535   00000 1           ADRES    COSTALIN        P06
 1013   REF  16  LAST  228           4755            DNLADP00 =        ZERO
 1014                                0000            COSTALIN =        0
 1015                            0001            AGSUPDAT =       1
 1016                            0002            RENDEZVU =       2
 1017                            0003            ORBMANUV =       3
 1018                            0004            DESASCNT =       4
 1019                            0005            LUNRSALN =       5
 1020                         13,2026                      BANK    13
 1021   REF   2  LAST   46    13,2000                      SETLOC  INTINIT
 1022                         13,2026                      BANK

 1023   REF   2 LAST   46 TO   46:      2     2*           COUNT*  $$/INTIN

 1024   REF   2  LAST  110    E3,1554                      EBANK=  PRECTCSM

R1025   THIS ROUTINE DOES THE P00 INTEGRATION

 1026                         13,2026  43014 0  STATEUP    SET     BCF           EXTRAPOLATE CM STATE VECTOR
 1027   REF   1               13,2027  01474 1                     VINTFLAG
 1028   REF   1               13,2030  04347 0                     SURFFLAG      ALSO 6X6 W-MATRIX IF LM ON LUNAR
 1029   REF   1               13,2031  26036 0                     DOINT              SURFACE AND W-MATRIX VALID
 1030                         13,2032  43014 0             BOF     SET                FOR RENDEZVOUS NAVIGATION.
 1031   REF   1               13,2033  02756 1                     RENDWFLG
 1032   REF   2  LAST  236    13,2034  26036 0                     DOINT
 1033   REF   1               13,2035  01476 0                     DIMOFLAG
 1034                         13,2036  45014 0  DOINT      CLEAR   CALL
 1035   REF   1               13,2037  01667 1                     PRECIFLG      ENGAGES 4-TIME STEP LOGIC IN INTEGRATION
 1036   REF   1               13,2040  27134 1                     INTEGRV       WHEN MODREG = 0

 1037                         13,2041  71214 0             BON     DLOAD
 1038   REF   2  LAST  236    13,2042  04307 1                     SURFFLAG
 1039   REF   1               13,2043  26063 0                     NO-INT
 1040   REF   3  LAST  111    13,2044  01571 0                     TETCSM
 1041   REF   3  LAST  207    13,2045  34041 0             STCALL  TDEC1
 1042   REF   2  LAST  229    13,2046  27414 0                     INTSTALL
 1043                         13,2047  45014 0             CLEAR   CALL          EXTRAPOLATE LM STATE VECTOR
 1044   REF   2  LAST  236    13,2050  01674 0                     VINTFLAG
 1045   REF   1               13,2051  26644 0                     SETIFLGS
 1046                         13,2052  77614 1             BOF                   ALSO 9X9 W-MATRIX IF W IS VALID
 1047   REF   2  LAST  236    13,2053  02756 1                     RENDWFLG
 1048   REF   1               13,2054  26060 0                     DOINT2
 1049                         13,2055  43014 0             SET     SET
 1050   REF   2  LAST  236    13,2056  01476 0                     DIMOFLAG
 1051   REF   1               13,2057  01475 0                     D6OR9FLG
 1052                         13,2060  45014 0  DOINT2     SET     CALL
 1053   REF   2  LAST  236    13,2061  01467 0                     PRECIFLG      DISENGAGE 4 TIME STEP LOGIC IN INTEG.
 1054   REF   2  LAST  236    13,2062  27134 1                     INTEGRV
 1055                         13,2063  77614 1  NO-INT     CLRGO
 1056   REF   3  LAST  208    13,2064  01236 1                     NODOFLAG
 1057   REF   1               13,2065  26632 1                     ENDINT
```

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R1058    THISVINT IS CALLED BY MIDTOAV1 AND2

 1059                          13,2066   43414 1  THISVINT CLEAR  RVQ
 1060   REF   3  LAST  236     13,2067   01674 0                  VINTFLAG
```

```
R0001   RESTART TABLES

R0002   ------------------

R0003   THERE ARE TWO FORMS OF RESTART TABLES FOR EACH GROUP.  THEY ARE KNOWN AS THE EVEN RESTART TABLES AND THE ODD
R0005   RESTART TABLES.  THE ODD TABLES HAVE ONLY ONE ENTRY OF THREE LOCATIONS WHILE THE EVEN TABLES HAVE TWO ENTRIES
R0007   EACH USING THREE LOCATIONS. THE INFORMATION AS TO WHETHER IT IS A JOB, WAITLIST, OR A LONGCALL IS GIVEN BY THE
R0009   WAY THINGS ARE PUT INTO THE TABLES.
R0010         A JOB HAS ITS PRIORITY STORED IN PRDTTAB OF THE CORRECT PHASE SPOT - A POSITIVE PRIORITY INDICATES A
R0012   FINDVAC JOB, A NEGATIVE PRIORITY A NOVAC.  THE 2CADR OF THE JOB IS STORED IN THE CADRTAB.
R0014   FOR EXAMPLE,

A0015                                               5.7SPOT  OCT     23000
A0016                                                        2CADR   SOMEJOB

R0017   A RESTART OF GROUP 5 WITH PHASE SEVEN WOULD THEN CAUSE SOMEJOB TO BE RESTARTED AS A FINDVAC WITH PRIORITY 23.

A0019                                               5.5SPOT  OCT     -23000
A0020                                                        2CADR   ANYJOB

R0021   HERE A RESTART OF GROUP 5 WITH PHASE 7 WOULD CAUSE ANYJOB TO BE RESTARTED AS A NOVAC WITH PRIORITY 23.
R0023   A LONGCALL HAS ITS GENADR OF ITS 2CADR STORED NEGATIVELY AND ITS BBCON STORED POSITIVELY.  IN ITS PRDTTAB IS
R0025   PLACED THE LOCATION OF A DP REGISTER THAT CONTAINS THE DELTA TIME THAT LONGCALL HAD BEEN ORIGINALLY STARTED
R0027   WITH.  EXAMPLE,

A0028                                               3.6SPOT  GENADR DELTAT
A0029                                                       -GENADR LONGTASK
A0030                                                        BBCON  LONGTASK

A0031                                                        OCT     31000
A0032                                                        2CADR   JOBAGAIN

R0033   THIS WOULD START UP LONGTASK AT THE APPROPRIATE TIME, OR IMMEDIATELY IF THE TIME HAD ALREADY PASSED. IT SHOULD
R0035   BE NOTED THAT IF DELTAT IS IN A SWITCHED E BANK, THIS INFORMATOIN SHOULD BE IN THE BBCON OFTHE 2CADR OF THE
R0037   TASK.  FROM ABOVE, WE SEE THAT THE SECOND PART OF THIS PHASE WOULD BE STARTED AS A JOB WITH A PRIORITY OF 31.

R0039   WAITLIST CALLS ARE IDENTIFIED BY THE FACT THAT THEIR 2CADR IS STORED NEGATIVELY. IF PRDTTAB OF THE PHASE SPOT
R0041   IS POSITIVE, THEN IT CONTAINS THE DELTA TIME, IF PRDTTAB IS NEGATIVE THEN IT IS THE -GENADR OF AN ERASABLE
R0043   LOCATION CONTAINING THE DELTA TIME, THAT IS, THE TIME IS STORED INDIRECTLY.  IT SHOULD BE NOTED AS ABOVE, THAT
R0045   IF THE TIME IS STORED INDIRECTLY, THE BBCON MUST CONTAIN THE NECESSARY E BANK INFORMATION IF APPLICABLE.  WITH
R0047   WAITLIST WE HAVE ONE FURTHER OPTION, IF -0 IS STORED IN PRDTTAB, IT WILL CAUSE AN IMMEDIATE RESTART OF THE
R0049   TASK.  EXAMPLES,

A0050                                                        OCT     77777           THIS WILL CAUSE AN IMMEDIATE RESTART
A0051                                                       -2CADR   ATASK           OF THE TASK :ATASK:

A0052                                                        DEC     200             IF THE TIME OF THE 2 SECONDS SINCE DUMMY
A0053                                                       -2CADR   DUMMY           WAS PUT ON WAITLIST IS UP, IT WILL BEGIN
A0054                                                                                IN 10 MS, OTHERWISE IT WILL BEGIN WHEN
A0055                                                                                IT NORMALLY WOULD HAVE BEGUN.
```

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A0056                                                      -GENADR DTIME             WHERE DTIME CONTAINS THE DELTA TIME
A0057                                                      -2CADR  TASKTASK          OTHERWISE THIS IS AS ABOVE

R0058  *****    NOW THE TABLES THEMSELVES *****

 0059                       01,2002                         BANK    01
 0060  REF    1             01,2000                         SETLOC  RESTART
 0061                       01,2002                         BANK

 0062                       01,2000               PRDTTAB   EQUALS 12000            USED TO FIND THE PRIORITY OR DELTATIME
 0063                       01,2001               CADRTAB   EQUALS 12001            THIS AND THE NEXT RELATIVE LOC CONTAIN
A0064                                                                               RESTART 2CADR

 0065  REF    1                                             COUNT* $$/RSTAB          TABLES IN BANK 1.
 0066  REF    1             01,2002  0 0010 0     SIZETAB   TC      1.2SPOT -12006
 0067  REF    1             01,2003  0 0020 0               TC      1.3SPOT -12004
 0068  REF    1             01,2004  0 0010 0               TC      2.2SPOT -12006
 0069  REF    1             01,2005  0 0023 0               TC      2.3SPOT -12004
 0070  REF    1             01,2006  0 0010 0               TC      3.2SPOT -12006
 0071  REF    1             01,2007  0 0053 1               TC      3.3SPOT -12004
 0072  REF    1             01,2010  0 0057 0               TC      4.2SPOT -12006
 0073  REF    1             01,2011  0 0067 0               TC      4.3SPOT -12004
 0074  REF    1             01,2012  0 0142 0               TC      5.2SPOT -12006
 0075  REF    1             01,2013  0 0160 0               TC      5.3SPOT -12004
 0076  REF    1             01,2014  0 0010 0               TC      6.2SPOT -12006
 0077  REF    1             01,2015  0 0171 0               TC      6.3SPOT -12004
 0078                       01,2016    21000 1    1.2SPOT   OCT     21000            A DUMMY EXAMPLE TO BE REPLACED AS SOON
 0079  REF   29  LAST  213    0074                          EBANK=  STATE
 0080  REF    3  LAST  232  01,2017    05155 0              2CADR   ENDOFJOB         AS THERE IS A LEGITIMATE 1.2SPOT
 0080                       01,2020    04060 0
 0081                       01,2021    00144 0              DEC     100
 0082  REF   30  LAST  239    0074                          EBANK=  STATE
 0083  REF    3  LAST  166  01,2022    05261 1              2CADR   TASKOVER
 0083                       01,2023    04060 0
R0084  ANY MORE GROUP 1.EVEN RESTART VALUES SHOULD GO HERE

 0085  REF    2  LAST  147  01,2024    76300 0    1.3SPOT  -GENADR SAVET-30
 0086  REF    2  LAST  147  E7,1515                         EBANK=  DVCNTR
 0087  REF    1             01,2025    75431 0             -2CADR   ULLGTASK
 0087  REF    1             01,2026    03710 1
R0088  ANY MORE GROUP 1.ODD RESTART VALUES SHOULD GO HERE

 0089  REF    2  LAST  239  01,2016               2.2SPOT   EQUALS 1.2SPOT
R0090  ANY MORE GROUP 2.EVEN RESTART VALUES SHOULD GO HERE

 0091  REF    1             01,2027    02630 0    2.3SPOT   GENADR 600SECS
 0092  REF    1             01,2030    75173 0             -GENADR STATEINT
 0093  REF    3  LAST  236  E3,1554                         EBANK=  RRECTCSM
 0094  REF    2  LAST  239  01,2031    26063 0              BBCON   STATEINT
 0095                                 01,2032   05000 1  2.5SPOT   OCT      05000
 0096      REF    4   LAST   239      E3,1554                      EBANK=  RRECTCSM
 0097      REF    1                   01,2033   02613 1            2CADR   STATINT1
 0097      REF    1                   01,2034   26063 0
 0098                                 01,2035   02734 0  2.7SPOT   DEC      1500
 0099      REF    3   LAST   187      E7,1456                      EBANK=  LOSCOUNT
 0100      REF    1                   01,2036   75533 0           -2CADR   P20LEMC1
 0100      REF    1                   01,2037   27710 1

 0101                                 01,2040   14000 1  2.11SPOT OCT      14000
 0102      REF    3   LAST   146      E7,1762                      EBANK=  P21TIME
 0103      REF    1                   01,2041   02416 0            2CADR   P25LEM1
 0103      REF    1                   01,2042   50067 0
 0104                                 01,2043   10000 0  2.13SPOT OCT      10000
 0105      REF    4   LAST   240      E7,1456                      EBANK=  LOSCOUNT
 0106      REF    1                   01,2044   02217 1            2CADR   RELINUS
 0106      REF    1                   01,2045   54067 1
 0107                                 01,2046   26000 0  2.15SPOT OCT      26000
 0108      REF    5   LAST   240      E7,1456                      EBANK=  LOSCOUNT
 0109      REF    1                   01,2047   02653 0            2CADR   R22RSTRT
 0109      REF    1                   01,2050   50067 0
 0110                                 01,2051   77777 0  2.17SPOT OCT      77777
 0111      REF    1                   E7,1700                      EBANK=  VGPREV
 0112      REF    1                   01,2052   75440 0           -2CADR   RED02.17
 0112      REF    1                   01,2053   03710 1
 0113                                 01,2054   00031 0  2.21SPOT DEC      25
 0114      REF    3   LAST   239      E7,1515                      EBANK=  DVCNTR
 0115      REF    1                   01,2055   75771 1           -2CADR   R10,R11
 0115      REF    1                   01,2056   35710 1
R0116      ANY MORE GROUP 2.ODD RESTART VALUES SHOULD GO HERE.

 0117      REF    3   LAST   239      01,2016                3.2SPOT   EQUALS 1.2SPOT
R0118      ANY MORE GROUP 3.EVEN RESTART VALUES SHOULD GO HERE

 0119      REF    1                   01,2057   76355 0  3.3SPOT  -GENADR  ZOOMTIME
 0120      REF    4   LAST   240      E7,1515                      EBANK=  DVCNTR
 0121      REF    1                   01,2060   75755 1           -2CADR   ZOOM
 0121      REF    1                   01,2061   41710 1
 01212                                01,2062   20000 0  3.5SPOT   OCT      20000
 01214     REF    3   LAST   200      E7,1453                      EBANK=  TTOGO
 01216     REF    1                   01,2063   02540 1            2CADR   S40.13
 01216     REF    1                   01,2064   56067 0
R0122      ANY MORE GROUP 3.ODD RESTART VALUES SHOULD GO HERE

 0123                                 01,2065   04704 0  4.2SPOT   DEC      2500
 0124      REF    4   LAST   240      E7,1453                      EBANK=  TTOGO
 0125      REF    1                   01,2066   75425 0           -2CADR   TIG-5
 0125      REF    1                   01,2067   03710 1
 0126                                 01,2070   77777 0            OCT      77777
 0127      REF    5   LAST   240      E7,1453                      EBANK=  TTOGO
 0128    REF    1                01,2071    75435 1           -2CADR   RED04.2
 0128    REF    1                01,2072    03710 1
R0129    ANY MORE GROUP 4.EVEN RESTART VALUES SHOULD GO HERE

 0130                            01,2073    25000 0  4.3SPOT   OCT      25000
 0131    REF    5  LAST  240     E7,1515                       EBANK=   DVCNTR
 0132    REF    1                01,2074    03540 0            2CADR    GOABORT
 0132    REF    1                01,2075    64067 1
 0133                            01,2076    00062 0  4.5SPOT   DEC      50
 0134    REF    6  LAST  240     E7,1453                       EBANK=   TTOGO
 0135    REF    1                01,2077    75215 0           -2CADR    ULLAGOFF
 0135    REF    1                01,2100    03710 1
 0136                            01,2101    00764 1  4.7SPOT   DEC      500
 0137    REF    6  LAST  241     E7,1515                       EBANK=   DVCNTR
 0138    REF    1                01,2102    75374 0           -2CADR    TIG-0
 0138    REF    1                01,2103    03710 1

 0139    REF    3  LAST  194     01,2104    76260 1  4.11SPOT-GENADR TGO +1
 0140    REF    7  LAST  241     E7,1515                       EBANK=   DVCNTR
 0141    REF    1                01,2105    74235 0           -2CADR    ENGOFTSK
 0141    REF    1                01,2106    03710 1
 0142                            01,2107    12000 1  4.13SPOT OCT       12000
 0143    REF    2  LAST  139     E7,1462                       EBANK=   TRKMKCNT
 0144    REF    1                01,2110    03223 1            2CADR    POSTBURN
 0144    REF    1                01,2111    74067 0

 0145                            01,2112    00764 1  4.15SPOT DEC       500
 0146    REF    7  LAST  241     E7,1453                       EBANK=   TTOGO
 0147    REF    1                01,2113    75501 1           -2CADR    TIG-30
 0147    REF    1                01,2114    03710 1
 0148                            01,2115    77777 0  4.17SPOT OCT       77777
 0149    REF    8  LAST  241     E7,1515                       EBANK=   DVCNTR
 0150    REF    2  LAST  240     01,2116    75425 0           -2CADR    TIG-5
 0150                            01,2117    03710 1
 0151                            01,2120    13000 0  4.21SPOT OCT       13000
 0152    REF    3  LAST  124     E5,1730                       EBANK=   STAR
 0153    REF    1                01,2121    03020 0            2CADR    P51.1 +1
 0153    REF    1                01,2122    30065 1
 0154                            01,2123    77777 0  4.23SPOT OCT       77777
 0155    REF    9  LAST  241     E7,1515                       EBANK=   DVCNTR
 0156    REF    1                01,2124    75351 1           -2CADR    IGNITION
 0156    REF    1                01,2125    03710 1
 0157    REF    3  LAST  239     01,2126    01477 1  4.25SPOT GENADR    SAVET-30
 0158    REF    1                01,2127    75537 1           -GENADR   TIG-35
 0159    REF    4  LAST  241     E7,1477                       EBANK=   SAVET-30
 0160    REF    2  LAST  241     01,2130    74067 0            BBCON    TIG-35

 0161                            01,2131    52777 1  4.27SPOT OCT       52777
 0162    REF   10  LAST  241     E7,1515                       EBANK=   DVCNTR
 0163    REF    1                01,2132    02073 1            2CADR    P70A
 0163    REF    1                01,2133    42067 0
 0164                        01,2134   52777 1  4.31SPOT OCT      52777
 0165   REF  11  LAST  241   E7,1515                     EBANK=   DVCNTR
 0166   REF   1              01,2135   02076 1           2CADR    P71A
 0166   REF   1              01,2136   42067 0
 0167                        01,2137   46777 1  4.33SPOT OCT      46777
 0168   REF  12  LAST  242   E7,1515                     EBANK=   DVCNTR
 0169   REF   2  LAST  224   01,2140   02024 0           2CADR    GOPOOFIX
 0169                        01,2141   10067 1
 0170                        01,2142   46777 1  4.35SPOT OCT      46777
 0171   REF  13  LAST  242   E7,1515                     EBANK=   DVCNTR
 0172   REF   1              01,2143   05665 1           2CADR    GOPOODOO
 0172   REF   1              01,2144   04067 1
 0173                        01,2145   52777 1  4.37SPOT OCT      52777
 0174   REF   1              E7,1455                     EBANK=   WHICH
 0175   REF   1              01,2146   02571 0           2CADR    COMFAIL
 0175   REF   1              01,2147   74067 0
R0176   ANY MORE 4.ODD RESTART VALUES SHOULD GO HERE.

 0177                        01,2150   22000 1  5.2SPOT  OCT      22000
 0178   REF  14  LAST  242   E7,1515                     EBANK=   DVCNTR
 0179   REF   1              01,2151   02461 0           2CADR    NORMLIZE
 0179   REF   1              01,2152   46067 1
 0180                        01,2153   00310 0           DEC      200
 0181   REF  15  LAST  242   E7,1515                     EBANK=   DVCNTR
 0182   REF   1              01,2154   74163 0          -2CADR    REREADAC
 0182   REF   1              01,2155   01710 0

 0183                        01,2156   00310 0  5.4SPOT  DEC      200
 0184   REF  16  LAST  242   E7,1515                     EBANK=   DVCNTR
 0185   REF   2  LAST  242   01,2157   74163 0          -2CADR    REREADAC
 0185                        01,2160   01710 0

 0186                        01,2161   20000 0           OCT      20000
 0187   REF  17  LAST  242   E7,1515                     EBANK=   DVCNTR
 0188   REF   1              01,2162   02206 1           2CADR    SERVICER
 0188   REF   1              01,2163   66067 0
R0189   ANY MORE GROUP 5.EVEN RESTART VALUES SHOULD GO HERE

 0190                        01,2164   00310 0  5.3SPOT  DEC      200
 0191   REF  18  LAST  242   E7,1515                     EBANK=   DVCNTR
 0192   REF   3  LAST  242   01,2165   74163 0          -2CADR    REREADAC
 0192                        01,2166   01710 0

 0193                        01,2167   77777 0  5.5SPOT  OCT      77777
 0194   REF  19  LAST  242   E7,1515                     EBANK=   DVCNTR
 0195   REF   1              01,2170   74324 1          -2CADR    REDO5.5
 0195   REF   1              01,2171   01710 0

 0196                        01,2172   77777 0  5.7SPOT  OCT      77777
 0197   REF  20  LAST  242   E7,1515                     EBANK=   DVCNTR
 0198    REF    1                01,2173   74361 0            -2CADR   BIBIBIAS
 0198    REF    1                01,2174   01710 0
R0199    ANY MORE GROUP 5.ODD RESTART VALUES SHOULD GO HERE

 0200    REF    4  LAST   240    01,2016             6.2SPOT   EQUALS 1.2SPOT
 0201                            01,2175   00144 0   6.3SPOT   DEC      100
 0202    REF    6  LAST   202    E7,1441                       EBANK=  TIG
 0203    REF    1                01,2176   75060 0            -2CADR   CLOKTASK
 0203    REF    1                01,2177   03716 1

 0204                            01,2200   30000 1   6.5SPOT   OCT      30000           PROTECT INCREMENTING OF TIME2,TIME1 BY
 0205    REF    2  LAST   112    F3,1706                       FBANK=  TEPHEM          P27(UPDATE PROGRAM) VIA V70 OR V73.
 0206    REF    1                01,2201   03601 0             2CADR   TIMEDIDF
 0206    REF    1                01,2202   10063 0
 0207                            01,2203   17000 1   6.7SPOT   OCT      17000
 0208    REF    2  LAST   240    E7,1700                       EBANK=  VGPREV
 0209    REF    1                01,2204   03350 1             2CADR   RED06.7
 0209    REF    1                01,2205   74067 0
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0001                        12,2000                              BANK    12
0002    REF   1             07,2000                              SETLOC  AOTMARK1
0003                        07,2000                              BANK

0004    REF   2  LAST  145  E7,1551                              EBANK=  XYMARK
0005    REF   1                                                  COUNT*  $$/MARK

0006                        07,2000  0 0004 0  AOTMARK   INHINT
0007    REF   2  LAST  222  07,2001  11'312 1            CCS     MARKSTAT         SEE IF AOTMARK BUSY
0008                        07,2002  0 2004 1            TC      +2               MARK SYSTEM BUSY-DO ALARM
0009    REF   1             07,2003  0 2006 0            TC      EXTVBCHK
0010    REF   1             07,2004  0 5652 0            TC      POODOO
0011                        07,2005   00105 0            OCT     00105

0013    REF   2  LAST  169  07,2006  3 6242 0  EXTVBCHK  CAF     SIX              SEE IF EXT. VERB WORKING
0014    REF   2  LAST  222  07,2007  7 1044 1            MASK    EXTVBACT
0015    REF  50  LAST  231  07,2010  10 000 0            CCS     A
0016    REF   1             07,2011  1 2044 1            TCF     MKABORT          YES-ABORT

0017    REF  20  LAST  184  07,2012  3 4752 0            CAF     BIT2             NO-DISALLOW SOME EXTENDED VERB ACTION
0018    REF   3  LAST  244  07,2013  27'044 1            ADS     EXTVBACT         BIT2 RESET IN ENDMARK
0019    REF   3  LAST  222  07,2014  10 400 1  MKVAC     CCS     VAC1USE          LOOK FOR A VAC AREA-DO ABORT IF
0020    REF   1             07,2015  1 2031 0            TCF     MKVACFND         NONE AVAILABLE
0021    REF   2  LAST  221  07,2016  10 454 0            CCS     VAC2USE
0022    REF   2  LAST  244  07,2017  1 2031 0            TCF     MKVACFND
0023    REF   2  LAST  221  07,2020  10 530 0            CCS     VAC3USE
0024    REF   3  LAST  244  07,2021  1 2031 0            TCF     MKVACFND
0025    REF   2  LAST  221  07,2022  10 604 1            CCS     VAC4USE
0026    REF   4  LAST  244  07,2023  1 2031 0            TCF     MKVACFND
0027    REF   2  LAST  221  07,2024  10 660 0            CCS     VAC5USE
0028    REF   5  LAST  244  07,2025  1 2031 0            TCF     MKVACFND
0029    REF   1             07,2026  52 134 0            DXCH    BUF2
00292   REF   1             07,2027  0 5716 1            TC      BAILOUT1         ALL VAC AREAS OCCUPIED - ABORT.
0030                        07,2030   01207 0            OCT     01207

0031    REF   3  LAST  187  07,2031  6 4752 0  MKVACFND  AD      TWO
0032    REF   3  LAST  244  07,2032  55'312 1            TS      MARKSTAT         STORE VAC ADR IN LOW 9 OF MARKSTAT

0033    REF  17  LAST  235  07,2033  3 4755 1            CAF     ZERO
0034    REF   4  LAST  244  07,2034  51'312 0            INDEX   MARKSTAT
0035                        07,2035  53'777 0            TS      0 -1             ZERO IN VACUSE REG TO SHOW VAC  OCCUPIED

0036    REF   2  LAST  181  07,2036  3 5025 0            CAF     PRIO15
0037    REF   2  LAST  211  07,2037  0 5105 0            TC      FINDVAC          SET UP JOB FOR GETDAT
0038    REF   3  LAST  244  E7,1551                      EBANK=  XYMARK
0039    REF   1             07,2040   02063 0            2CADR   GETDAT
0039    REF   1             07,2041   16067 1

0040                        07,2042  0 0003 1            RELINT
0041    REF   1             07,2043  1 4631 0            TCF     SWRETURN
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 0042    REF    2  LAST  244    07,2044  52 134 0  MKABORT  DXCH    BUF2
 00422   REF    2  LAST  244    07,2045  0 5716 1           TC      BAILOUT1          CONFLICT WITH EXTENDED VERB
 0043                           07,2046   01211 1           OCT     01211

 0044    REF   18  LAST  244    07,2047  3 4755 1  MKRELEAS CAF     ZERO
 0045    REF    5  LAST  244    07,2050  57 312 0           XCH     MARKSTAT          SET MARKSTAT TO ZERO
 0046    REF    1               07,2051  7 5004 1           MASK    LOW9              PICK UP VAC AREA ADR
 0047    REF   51  LAST  244    07,2052  10 000 0           CCS     A
 0048    REF   52  LAST  245    07,2053  50 000 1           INDEX   A
 0049                           07,2054  54 000 0           TS      0                 SHOW MKVAC AREA AVAILABLE
 0050    REF    9  LAST  227    07,2055  3 4753 1           CAF     ONE
 0051    REF   10  LAST  230    07,2056  0 4674 0           TC      IBNKCALL
 0052    REF    1               07,2057   17665 1           CADR    GOODEND           GO WAKE UP CALLING JOB
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L          AOTMARK                                                                                   USER'S PAGE NO.   3      E7 S3

 00521  REF  19  LAST  245   07,2060  3 4755 1  KILLAOT   CAF     ZERO
 00522  REF   4  LAST  244   07,2061  55'044 1            TS      EXTVBACT     TERMINATE AOTMARK-ALLOW EXT VERB
 00523  REF   2  LAST  217   07,2062  0 6001 0            TC      GOTOPOOH
 0053   REF   6  LAST  245   07,2063  4 1312 1  GETDAT    CS      MARKSTAT     SET BIT12 TO DISCOURAGE MARKRUPT
 00531  REF  17  LAST  221   07,2064  7 4740 1            MASK    BIT12          BIT12 RESET AT GETMARK
 00532  REF   7  LAST  246   07,2065  27'312 1            ADS     MARKSTAT

 00533  REF   1              07,2066  3 2330 0            CAF     V01N71       DISPLAY DETENT AND STAR CODE
 0054   REF   9  LAST  225   07,2067  0 4616 1            TC      BANKCALL
 0055   REF   2  LAST  207   07,2070   20334 1            CADR    GOMARKF

 0056   REF   1              07,2071  1 2060 1            TCF     KILLAOT      V34-DOES GOTOPOOH
 0057   REF   1              07,2072  1 2074 1            TCF     DODAT        V33-PROCEED-USE THIS STAR FOR MARKS
 0058   REF   2  LAST  244   07,2073  1 2063 1  ENTERDAT  TCF     GETDAT       ENTER-REDISPLAY STAR CODE

 0069   REF   1              07,2074  3 7744 1  DODAT     CAF     HIGH9        PICK DETENT CODE FROM BITS7-9 OF AOTCODE
 0070   REF   2  LAST  196   07,2075  7 0735 1            MASK    AOTCODE      AND SEE IF CODE 1 TO 6
 0071                        07,2076  0 0006 1            EXTEND
 0072   REF  16  LAST  164   07,2077  7 4743 1            MP      BIT9
 0073   REF   4  LAST  244   07,2100  55'551 0            TS      XYMARK       STORE DETENT

 0074                        07,2101  0 0006 1            EXTEND
 0075   REF   3  LAST  246   07,2102  6 2063 0            BZMF    GETDAT       COAS CALIBRATION CODE-NO GOOD HERE

 0076   REF   1              07,2103  6 5660 1            AD      NEG7         SEE IF DETENT 7 FOR COAS
 0077                        07,2104  0 0006 1            EXTEND
 0078   REF   1              07,2105  1 2107 1            BZF     CODE7

 00785  REF   1              07,2106  1 2123 1            TCF     CODE1TO6

 0079   REF   1              07,2107  3 2331 1  CODE7     CAF     V06N87*      CODE 7, COAS SIGHTING, GET OPTIC AXIS
 0080   REF  10  LAST  246   07,2110  0 4616 1            TC      BANKCALL     AZ AND EL OF SIGHTING DEVICE FROM ASTRO
 0081   REF   3  LAST  246   07,2111   20334 1            CADR    GOMARKF

 0082   REF   2  LAST  246   07,2112  1 2060 1            TCF     KILLAOT      V34-DOES GOTOPOOH
 0083                        07,2113  1 2115 1            TCF     +2           PROCEED
 0084   REF   2  LAST  246   07,2114  1 2107 1            TCF     CODE7        ON ENTER, RECYCLE
 00841                       07,2115  0 0006 1            EXTEND
 0085   REF   2  LAST  108   07,2116  3 1350 0            DCA     AZ           PICK UP AZ AND EL IN SP 2S COMP
 0086   REF   1              07,2117  50 120 1            INDEX   FIXLOC
 0087                        07,2120  52 011 0            DXCH    8D           STORE IN 8D AND 9D OF LOCAL VAC
 0095   REF  20  LAST  246   07,2121  3 4755 1            CAF     ZERO         BACKUP SYSTEM TO BE USED
 0096   REF   1              07,2122  1 2137 1            TCF     COASCODE     ZERO APPARENT ROTATION

 0097   REF   5  LAST  246   07,2123  51'551 1  CODE1TO6  INDEX   XYMARK       INDEX AOT POSITION BY DET CODE
 0098   REF   1              07,2124  3 1411 1            CA      AOTEL -1
 0099   REF   2  LAST  246   07,2125  50 120 1            INDEX   FIXLOC
 0100                        07,2126  54 011 0            TS      9D           STORE ELEVATION IN VAC+9D

 0101   REF   6  LAST  246   07,2127  51'551 1            INDEX   XYMARK       INDEX DET CODE 1,2 OR 3
 0102   REF    2  LAST  154   07,2130   3 1403 1           CA      AOTAZ -1
 0103   REF    3  LAST  246   07,2131  50  120 1           INDEX   FIXLOC
 0104                         07,2132  54  010 1           TS      8D                STORE AZIMUTH IN VAC+8D

 0105   REF    3  LAST  247   07,2133   3 1405 1           CA      AOTAZ +1          COMPENSATION FOR APPARENT ROTATION OF
 0106                         07,2134   0 0006 1           EXTEND                    AOT FIELD OF VIEW IN LEFT AND RIGTHT
 0107   REF    4  LAST  247   07,2135   5 0120 1           INDEX   FIXLOC            DETENTS IS STORED IN VAC +10D IN SP
 0108                         07,2136  20  010 1           MSU     8D                PRECISION ONES COMPLEMENT
 0109   REF    5  LAST  247   07,2137  50  120 1 COASCODE  INDEX   FIXLOC
 0110                         07,2140  54  012 0           TS      10D               ROT ANGLE

 0111   REF    4  LAST  229   07,2141   0 6037 0           TC      INTPRET           COMPUTE Y AND Y PLANE VECTORS
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R0112    THE OPTAXIS SUBROUTINE COMPUTES THE X AND Y MARK PLANE VECS AND
R0113    AND ROTATES THEM THRU THE APPARENT FIELD OF VIEW ROTATION UNIQUE TO AOT
R0114    OPTAXIS USES OANB TO COMPUTE THE OPTIC AXIS
R0115     INPUT-AZIMUTH ANGLE IN SINGLE PREC AT CDU SCALE IN 8D OF JOB VAC
R0116           ELEVATION ANGLE IN SINGLE PREC AT CDU SCALE IN 9D OF JOB VAC
R0117           ROTATION ANGLE IN SINGLE PREC 1S COMP SCALED BY PI IN 10D OF VAC
R0118     OUTPUT-OPTIC AXIS VEC IN NB COORDS IN SCAXIS
R0119            X-MARK PLANE 1/4VEC IN NB COORDS AT 18D OF JOB VAC
R0120            Y-MARK PLANE 1/4VEC IN NB COORDS AT 12D OF JOB VAC

 0121                         07,2142   77624 1  OPTAXIS  CALL                          GO COMPUTE OA AND X AND Y PLANE VECS
 0122    REF    1             07,2143   10536 0                  OANB
 0123                         07,2144   70535 0           SLOAD  SR1                    LOAD APP ROTATION IN ONES COMP
 0124                         07,2145   00013 0                  10D                    RESCALE BY 2PI
 0125                         07,2146   73406 1           PUSH   SIN                    1/2SIN(ROT)  0-1
 0126                         07,2147   71525 0           PDDL   COS
 0127                         07,2150   74206 0           PUSH   VXSC                   1/2COS(ROT)  2-3
 0128                         07,2151   00023 0                  18D
 0129                         07,2152   74325 0           PDDL   VXSC                   1/4COS(ROT)UYP   4-9
 0130                         07,2153   00001 0                  0
 0131                         07,2154   00031 0                  24D                    1/4SIN(ROT)UXP
 0132                         07,2155   45445 0           BVSU   STADR                  UP 4-9
 0133                         07,2156   63762 1           STODL  12D                    YPNB=1/4(COS(ROT)UYP-SIN(ROT)UXP)
 0134                         07,2157   65361 0           VXSC   PDDL                   UP 2-3  UP 0-1  FOR EXCHANGE
 0135                         07,2160   00031 0                  24D                    1/4COS(ROT)UXP  PUSH 0-5
 0137                         07,2161   53361 0           VXSC   VAD                    1/4SIN(ROT)UYP
 0138                         07,2162   00023 0                  18D                    UP 0-5
 01381                        07,2163   77626 0           STADR
 0139                         07,2164   53754 1           STOVL  18D                    XPNB=1/4(COS(ROT)UXP+SIN(ROT)UYP)
 0140    REF    1             07,2165   24007 0                  LO6ZEROS               INITIALIZE AVE STAR VEC ACCUMULATOR
 0141    REF    [illegible]  LAST  124  07,2166   02715 0           STORE  STARAD +6
 0142                         07,2167   77776 1           EXIT
 0143    REF    1             07,2170   1 2202 1          TCF    GETMKS
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R0144    THE CANB SUBROUTINE COMPUTES THE OPTIC AXIS OF THE SIGHTING INSTRUMENT
R0145    FROM AZIMUTH AND ELEVATION INPUT FROM THE ASTRONAUT.
R0146        INPUT- AZIMUTH ANGLE IN SINGLE PREC 2S COMP IN 8D OF JOB VAC
R0147                 ELEVATION ANGLE IN SINGLE PREC 2S COMP IN 9D OF VAC
R0148        OUTPUT-OPTIC AXIS IN NB COORDS. IN SCAXIS
R0149                 X-PLANE 1/2VEC IN NB COORDS AT 24D OF VAC
R0150                 Y-PLANE 1/2VEC IN NB COORDS AT 18D OF VAC

 01501                        05,3402                     BANK    05
 01502  REF    1              04,2000                     SETLOC  AOTMARK2
 01504                        04,2536                     BANK

 01506  REF    1                                          COUNT*  $$/MARK

 0151                         04,2536   44001 0  CANB     SETPD   STO
 0152                         04,2537   00001 0                   0
 0153   REF    2  LAST  123   04,2540   02736 1                   GCTR          STORE RETURN
 0154                         04,2541   47135 0           SLOAD   RTB
 0155                         04,2542   00012 1                   9D            PICK UP SP ELV
 0156   REF    1              04,2543   21576 0                   CDULOGIC
 0157                         04,2544   71406 0           PUSH    COS
 0158                         04,2545   73525 1           PDDL    SIN           1/2COS(ELV)  PD 0-1
 01581                        04,2546   77626 0           STADR
 0159   REF    4  LAST  146   04,2547   60012 1           STODL   SCAXIS        OAX=1/2SIN(ELV)
 0160                         04,2550   00011 1                   8D            PICK UP AZ SP
 0161                         04,2551   77634 0           RTB
 0162   REF    2  LAST  249   04,2552   21576 0                   CDULOGIC
 0163                         04,2553   71406 0           PUSH    COS
 0164                         04,2554   00025 0           STORE   20D           STORE UYP(Y) 20-21
 0165                         04,2555   73525 1           PDDL    SIN           1/2COS(AZ) PD 2-3
 0166                         04,2556   57406 1           PUSH    DCOMP         PUSH 1/2SIN(AZ) 4-5
 0167                         04,2557   14027 1           STODL   22D           STORE UYP(Z) 22-23
 0168   REF    2  LAST  248   04,2560   24007 0                   L06ZEROS
 0169                         04,2561   14023 0           STODL   18D           STORE UYP(X) 18-19   UP 4-5
 0170                         04,2562   72405 0           DMP     SL1
 0171                         04,2563   00001 0                   0
 0172   REF    5  LAST  249   04,2564   17767 1           STODL   SCAXIS +2     OAY=1/2COS(ELV)SIN(AZ)
 0173                         04,2565   72405 0           DMP     SL1           UP 2-3
 0174                         04,2566   77626 0           STADR                 UP 0-1
 0175   REF    6  LAST  249   04,2567   50006 1           STOVL   SCAXIS +4     OAZ=1/2COS(ELV)COS(AZ)
 0176                         04,2570   00023 0                   18D           LOAD UYP VEC
 0177                         04,2571   53435 0           VXV     UNIT
 0178   REF    7  LAST  249   04,2572   03765 0                   SCAXIS        UXP VEC=UYP X OA
 0179                         04,2573   00031 0           STORE   24D           STORE UXP
 0180                         04,2574   77650 1           GOTO
 0181   REF    3  LAST  249   04,2575   02736 1                   GCTR
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P0182       SURFSTAR COMPUTES A STAR VECTOR IN SM COORDINATES FOR LUNAR
R0183       SURFACE ALIGNMENT AND EXITS TO AVEIT TO AVERAGE STAR VECTORS.
R0184       GIVEN X-MARK PLANE 1/4 VEC IN NB AT 18D OF LOCAL VAC
R0185             Y-MARK PLANE 1/4 VEC IN NB AT 12D OF LOCAL VAC
R0186             CURSOR SP 2COMP AT POSITION 1 OF INDEXED MARKVAC
R0187             SPIRAL SP 2COMP AT POSITION 3 OF INDEXED MARKVAC
R0188             CDUY,Z,X AT POSITIONS 0,2,4 OF INDEXED MARKVAC
 0189                             15,2000                       BANK    15
 0190     REF    1                15,2000                       SETLOC P50S
 0191                             15,2000                       BANK
 0192     REF    1                                              COUNT* $$/R59

 01921                            15,2000   77773 1  SURFSTAR VLOAD*
 01922                            15,2001   00001 0                 0,1              PUT X-MARK CDUS IN CDUSPOT FOR TRG*NBSM
 01923    REF         LAST  101   15,2002   00767 1                 STORE   CDUSPOT
 0193                             15,2003   47133 0                 SLOAD* RTB
 0194                             15,2004   00002 0                         1,1              PICK UP YROT
 0195     REF    3    LAST  249   15,2005   21576 0                         CDULOGIC
 0196                             15,2006   00031 0                 STORE   24D              STORE CURSOR FOR SPIRAL COMP (REVS)
 01961                            15,2007   77654 0                 BZE
 01962    REF    1                15,2010   16171 1                         YZCHK            IF YROT ZERO-SEE IF SROT ZERO
 0197                             15,2011   71406 0  JUSTZY         PUSH    COS
 0198                             15,2012   73525 1                 PDDL    SIN              1/2COS(YROT) 0-1
 0199                             15,2013   65361 0                 VXSC    PDDL             UP 0-1  1/8SIN(YROT)UXP  0-5
 0200                             15,2014   00023 0                         18D
 0201                             15,2015   52361 1                 VXSC    VSU              UP   0-5
 02011                            15,2016   00015 0                         12D              UYP
 0202                             15,2017   47256 0                 UNIT    VXV
 0203     REF         LAST  249   15,2020   03765 0                         SCAXIS
 0204                             15,2021   41456 0                 UNIT    PUSH
 0205                             15,2022   47133 0                 SLOAD* RTB
 0206                             15,2023   00004 0                         3,1              PICK UP SPIRAL
 0207     REF    4    LAST  250   15,2024   21576 0                         CDULOGIC
 0208                             15,2025   00033 1                 STORE   25D              STORE SPIRAL (REVS)
 0209                             15,2026   43225 0                 DSU     DAD
 0210                             15,2027   00031 0                         24D
 0211     REF    1                15,2030   32047 0                         ABOUTONE
 0212                             15,2031   77605 1                 DMP
 0213     REF    1                15,2032   32466 1                         DP1/12
 0214                             15,2033   00033 1                 STORE   26D              SEP=(360 + SPIRAL - CURSOR)/12
 0215                             15,2034   74356 1                 SIN     VXSC             UP  0-5
 0216                             15,2035   65372 1                 VSL1    PDDL             1/2SIN(SEP)(UPP X OA)  0-5
 0217                             15,2036   00033 1                         26D
 0218                             15,2037   74346 0                 COS     VXSC
 0219     REF         LAST  250   15,2040   03765 0                         SCAXIS
 0220                             15,2041   53372 1                 VSL1    VAD              UP  0-5
 0221                             15,2042   45056 0  JUSTOA         UNIT    CALL
 0222     REF    1                15,2043   47664 0                         TRG*NBSM
 0224                             15,2044   34031 1                 STCALL 24D               STAR VEC IN SM
 0225     REF    1                15,2045   16276 0                         AVEIT            GO AVERAGE
 0226                          15,2046   37777 1  ABOUTONE 2DEC    .99999999
 0226                          15,2047   37775 0
 0227   REF    1               15,2465            DP1/12   EQUALS DEG30            .08333333
 0228                          07,2171                     BANK   7
 0229   REF    2  LAST  244    07,2000                     SETLOC AOTMARK1
 0230                          07,2171                     BANK
 0231   REF    2 LAST  244 TO  249:    121   121*          COUNT* $$/MARK
 02311                         07,2171   53133 0  YZCHK    SLOAD* BZE              YROT ZERO AND IF SROT ZERO FORCE STAR
 02312                         07,2172   00004 0                  3,1              ALONG OPTIC AXIS
 02313  REF    1               07,2173   16177 1                  YSZERO
 02314                         07,2174   52145 0           DLOAD  GOTO
 02315                         07,2175   00031 0                  24D
 02316  REF    1               07,2176   32011 0                  JUSTZY           SROT NOT ZERO-CONTINUE NORMALLY
 02317                         07,2177   52175 0  YSZERO   VLOAD  GOTO
 02318  REF   10  LAST  250    07,2200   03765 0                  SCAXIS
 02319  REF    1               07,2201   32042 0                  JUSTOA
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P0232   THE GETMKS ROUTINE INITIALIZES THE SIGHTING MARK PROCEDURE

 0233   REF  21  LAST  246   07,2202  3 4755 1  GETMKS    CAF    ZERO        INITIALIZE MARK ID REGISTER AND MARK CNT
 0234   REF   7  LAST  246   07,2203  55'551 0            TS     XYMARK
 0235   REF   2  LAST  145   07,2204  55'550 1            TS     MARKCNTR
 0236   REF   2  LAST  245   07,2205  3 5004 0            CAF    LOW9        ZERO BITS10 TO 15 RETAINING MKVAC ADR
 0237   REF   8  LAST  246   07,2206  7 1312 1            MASK   MARKSTAT
 0238   REF   9  LAST  252   07,2207  55'312 1            TS     MARKSTAT
 0241   REF   1              07,2210  3 2621 0            CAF    MKVB54*     DISPLAY VB54 INITIALLY
 0242   REF  11  LAST  246   07,2211  0 4616 1  PASTIT    TC     BANKCALL
 0243   REF   1              07,2212   20345 1            CADR   GOMARK4

 0244   REF   3  LAST  246   07,2213  1 2060 1            TCF    KILLAOT     V34-DOES GOTOPOOH
 0245   REF   1              07,2214  1 2216 1            TCF    MARKCHEX    VB33-PROCEED, GOT MARKS, COMPUTE LOS
 0246   REF   4  LAST  246   07,2215  1 2063 1            TCF    GETDAT      ENTER-RECYCLE TO V01N71

 0251   REF  10  LAST  252   07,2216  4 1312 1  MARKCHEX  CS     MARKSTAT    SET BIT12 TO DISCOURAGE MARKRUPT
 0252   REF  1[illegible]  LAST  246   07,2217  7 4740 1            MASK   BIT12
 0253   REF  11  LAST  252   07,2220  27'312 1            ADS    MARKSTAT
 0254   REF   3  LAST  252   07,2221  7 5004 1            MASK   LOW9
 0255   REF   8  LAST  252   07,2222  55'551 0            TS     XYMARK      JAM MARK VAC ADR IN XYMARK FOR AVESTAR
 0256   REF  22  LAST  252   07,2223  3 4755 1            CAF    ZERO
 0257   REF   2  LAST  145   07,2224  55'552 0            TS     MKDEX       SET MKDEX ZERO FOR LOS VEC CNTR
 0258   REF  12  LAST  252   07,2225  3 1312 0            CA     MARKSTAT
 0259   REF   1              07,2226  7 5015 1            MASK   PRIO3       SEE IF LAST MK PARI COMPLETE
 0260   REF  17  LAST  232   07,2227  54 001 1            TS     L
 0261   REF   2  LAST  252   07,2230  3 5015 0            CAF    PRIO3       BITS10 AND 11
 0262                        07,2231  0 0006 1            EXTEND
 0263   REF   8  LAST  216   07,2232  06 001 0            RXOR   LCHAN
 0264                        07,2233  0 0006 1            EXTEND
 0265   REF   1              07,2234  1 2241 0            BZF    AVESTAR     LAST PAIR COMPLETE-GO COMPUTE LOS
 0266   REF   3  LAST  252   07,2235  11'550 1  CNTCHK    CCS    MARKCNTR    NO PAIR SHOWING-SEE IF PAIR IN HOLD
 0267                        07,2236  1 2240 1            TCF    +2          PAIR BURIED-DECREMENT COUNTER
 0268   REF   1              07,2237  1 2325 0            TCF    MKALARM     NO PAIR-ALARM
 0269   REF   4  LAST  252   07,2240  55'550 1            TS     MARKCNTR    STORE DECREMENTED COUNTER

 0270   REF  19  LAST  252   07,2241  3 4740 0  AVESTAR   CAF    BIT12       INITIALIZE MKDEX FOR STAR LOS COUNTER
 0271   REF   3  LAST  252   07,2242  27'552 0            ADS    MKDEX       MKDEX WAS INITIALIZED ZERO IN MARKCHEX
 0272   REF   5  LAST  252   07,2243  4 1550 1            CS     MARKCNTR
 0273                        07,2244  0 0006 1            EXTEND
 0274   REF   3  LAST  244   07,2245  7 6242 1            MP     SIX         GET C(L) = - 6 MARKCNTR
 0275   REF   9  LAST  252   07,2246  4 1551 0            CS     XYMARK
 0276   REF  18  LAST  252   07,2247  6 0001 0            AD     L           ADD - MARK VAC ADR SET IN MARKCHEX
 0277   REF   6  LAST  247   07,2250  50 120 1            INDEX  FIXLOC
 0278   REF   1              07,2251  54 046 1            TS     X1          JAM - CDU ADR OF X-MARK IN X1

 0279   REF   7  LAST  252   07,2252  3 0120 1            CA     FIXLOC      SET PD POINTER TO ZERO
 0280   REF   1              07,2253  54 166 1            TS     PUSHLOC

 0281   REF   5  LAST  247   07,2254  0 6037 0            TC     INTPRET
 0282                       07,2255   76614 0             BON     VLOAD*
 0283  REF    3  LAST  236  07,2256   04307 1                     SURFFLAG        IF ON SURFACE COMPUTE VEC AT SURFSTAR
 0284  REF    1             07,2257   32000 0                     SURFSTAR
 0285                       07,2260   00002 0                     1,1             PUT Y-MARK CDUS IN CDUSPOT FOR TRG*NBSM
 0286  REF    5  LAST  250  07,2261   24767 1             STOVL   CDUSPOT
 0287                       07,2262   00015 0                     12D             LOAD Y-PLANE VECTOR IN NB
 0288                       07,2263   77624 1             CALL
 0289  REF    2  LAST  250  07,2264   47664 0                     TRG*NBSM        CONVERT IT TO STABLE MEMBER
 0290                       07,2265   76606 0             PUSH    VLOAD*
 0291                       07,2266   00001 0                     0,1             PUT X-MARK CDUS IN CDUSPOT FOR TRG*NBSM
 0292  REF    6  LAST  253  07,2267   24767 1             STOVL   CDUSPOT
 0293                       07,2270   00023 0                     18D             LOAD X-PLANE VECTOR IN NB
 0294                       07,2271   77624 1             CALL
 0295  REF    3  LAST  253  07,2272   47664 0                     TRG*NBSM        CONVERT IT TO STABLE-MEMBER
 0296                       07,2273   53435 0             VXV     UNIT            UNIT(XPSM * YPSM)
 0297                       07,2274   77626 0             STADR
 0298                       07,2275   77746 1             STORE   24D

 0301                       07,2276   63335 1  AVEIT      SLOAD   PDVL            N(NUMBER OF VECS) IN 0-1
 0302  REF    4  LAST  252  07,2277   03553 1                     MKDEX
 0303                       07,2300   00031 0                     24D             LOAD CURRENT VECTOR
 0304                       07,2301   70322 0             VSR3    V/SC
 0305                       07,2302   00001 0                     0
 0306                       07,2303   14031 0             STODL   24D             VEC/N
 0307                       07,2304   00001 0                     0
 0308                       07,2305   56225 1             DSU     DDV
 0309  REF    1             07,2306   16623 1                     DP1/8           (N-1)/N
 0310                       07,2307   53361 0             VXSC    VAD
 0311  REF    9  LAST  248  07,2310   02715 0                     STARAD +6       ADD VEC TO PREVIOUSLY AVERAGED VECTOR
 0312                       07,2311   00031 0                     24D             (N-1)/N AVESTVEC + VEC/N
 0313  REF   10  LAST  253  07,2312   02715 0             STORE   STARAD +6       AVERAGE STAR VECTOR
 0314  REF    4  LAST  196  07,2313   02767 0             STORE   STARSAV2
 0315                       07,2314   77776 1             EXIT
 0316  REF    6  LAST  252  07,2315   11550 1             CCS     MARKCNTR        SEE IF ANOTHER MARK PAIR IN MKVAC
 0317  REF    2  LAST  252  07,2316  1 2240 1             TCF     AVESTAR -1      THERE IS-GO GET IT-DECREMENT COUNTER
 0318  REF    5  LAST  231  07,2317  3 4756 1  ENDMARKS   CAF     FIVE            NO MORE MARKS-TERMINATE AOTMARK
 0319                       07,2320  0 0004 0             INHINT
 0320  REF    7  LAST  187  07,2321  0 5203 0             TC      WAITLIST
 0321  REF   10  LAST  252  E7,1551                       EBANK=  XYMARK
 0322  REF    1             07,2322   02047 0             2CADR   MKRELEAS
 0322  REF    1             07,2323   16067 1

 0323  REF    1             07,2324  0 5472 0             TC      ENDMARK

 0324  REF   11  LAST  227  07,2325  0 5567 0  MKALARM    TC      ALARM           NOT A PAIR TO PROCESS-DO GETMKS
 0325                       07,2326   00111 0             OCT     111
 0326  REF    2  LAST  248  07,2327  1 2202 1             TCF     GETMKS

 0327                       07,2330   00307 0  V01N71     VN      171
 0328                       07,2331   01527 0  V06N87*    VN      687
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P0329    MARKRUPT IS ENTERED FROM INTERUPT LEAD-INS AND PROCESSES CHANNEL 16
P0330    CAUSED BY X,Y MARK OR MARK REJECT OR BY THE RATE OF DESCENT SWITCH

 0331    REF    2  LAST  155    07,2332  54 016 1  MARKRUPT TS       BANKRUPT
 0332    REF    1               07,2333  3 0033 1           CA       CDUY              STORE CDUS AND TIME NOW-THEN SEE IF
 0333    REF    5  LAST  137    07,2334  54 063 0           TS       ITEMP3            WE NEED THEM
 0334    REF    4  LAST  188    07,2335  3 0034 0           CA       CDUZ
 0335    REF    3  LAST   95    07,2336  54 064 1           TS       ITEMP4
 0336    REF    5  LAST  195    07,2337  3 0032 0           CA       CDUX
 0337    REF    2  LAST   95    07,2340  54 065 0           TS       ITEMP5
 0338                           07,2341  0 0006 1           EXTEND
 0339    REF    7  LAST  204    07,2342  3 0025 0           DCA      TIME2
 0340    REF    4  LAST  137    07,2343  52 062 1           DXCH     ITEMP1
 0341    REF   20  LAST  233    07,2344  56 002 0           XCH      Q
 0342    REF    2  LAST  155    07,2345  54 012 0           TS       QRUPT

 0343    REF    1               07,2346  3 2624 0           CAF      OCT34             SEE IF X OR Y MARK OR MKREJECT
 0344                           07,2347  0 0006 1           EXTEND
 0345    REF    2  LAST  218    07,2350  02 016 1           RAND     NAVKEYIN
 0346    REF   53  LAST  245    07,2351  10 000 0           CCS      A
 0347                           07,2352  1 2354 0           TCF      +2                ITS A LIVE ONE-SEE IF ITS WANTED
 0348    REF    1               07,2353  1 2404 1           TCF      SOMEKEY           ITS SOME OTHER KEY

 0349    REF   20  LAST  252    07,2354  3 4740 0           CAF      BIT12             ARE WE ASKING FOR A MARK
 0350    REF   13  LAST  252    07,2355  7 1312 1           MASK     MARKSTAT
 0351    REF   54  LAST  254    07,2356  10 000 0           CCS      A
 0352    REF    8  LAST  150    07,2357  0 5270 1           TC       RESUME            DONT WANT MARK OR MKREJECT-DO NOTHING

 0353    REF   14  LAST  254    07,2360  11 312 1           CCS      MARKSTAT          ARE MARKS BEING ACCEPTED
 0354    REF    1               07,2361  1 2365 1           TCF      FINDKEY           THEY ARE-WHICH ONE IS IT
 0355    REF   12  LAST  253    07,2362  0 5567 0           TC       ALARM             MARKS NOT BEING ACCEPTED-DO ALARM
 0356                           07,2363   00112 0           OCT      112
 0357    REF    9  LAST  254    07,2364  0 5270 1           TC       RESUME

 0358    REF   15  LAST  228    07,2365  3 4747 1  FINDKEY  CAF      BIT5              SEE IF MARK REJECT
 0359                           07,2366  0 0006 1           EXTEND
 0360    REF    3  LAST  254    07,2367  02 016 1           RAND     NAVKEYIN
 0361    REF   55  LAST  254    07,2370  10 000 0           CCS      A
 0362    REF    1               07,2371  1 2461 1           TCF      MKREJ             ITS A MARK REJECT

 0363    REF   13  LAST  232    07,2372  3 4750 1           CAF      BIT4              SEE IF Y MARK
 0364                           07,2373  0 0006 1           EXTEND
 0365    REF    4  LAST  254    07,2374  02 016 1           RAND     NAVKEYIN
 0366    REF   56  LAST  254    07,2375  10 000 0           CCS      A

 0367    REF    1               07,2376  1 2422 0           TCF      YMKRUPT           ITS A Y MARK

 0368    REF   13  LAST   88    07,2377  3 4751 0           CAF      BIT3              SEE IF X MARK
 0369                           07,2400  0 0006 1           EXTEND
 0370    REF    5  LAST  254    07,2401  02 016 1           RAND     NAVKEYIN
 0371    REF  57  LAST  254   07,2402  10 000 0            CCS     A
 0372    REF   1              07,2403  1 2416 1            TCF     XMKRUPT       ITS A X MARK

 0373    REF   1              07,2404  3 4776 0  SOMEKEY   CAF     OCT140        NOT MARK OR MKREJECT-SEE IF DESCENT BITS
 0374                         07,2405  0 0006 1            EXTEND
 0375    REF   6  LAST  254   07,2406  02 016 1            RAND    NAVKEYIN
 0376                         07,2407  0 0006 1            EXTEND
 0377                         07,2410  1 2413 1            BZF     +3            IF NO BITS

 0378    REF   6  LAST  230   07,2411  0 4635 0            TC      POSTJUMP      IF DESCENT BITS
 0379    REF   1              07,2412   40115 0            CADR    DESCBITS

 0380    REF  13  LAST  254   07,2413  0 5567 0            TC      ALARM         NO INBITS IN CHANNEL 16
 0381                         07,2414   00113 1            OCT     113

 0382    REF  10  LAST  254   07,2415  0 5270 1            TC      RESUME

 0383    REF  23  LAST  252   07,2416  3 4755 1  XMKRUPT   CAF     ZERO
 0384    REF  13  LAST  168   07,2417  54 070 1            TS      RUPTREG1      SET X MARK STORE INDEX TO ZERO
 0385    REF  17  LAST  220   07,2420  3 4742 1            CAF     BIT10
 0386                         07,2421  1 2425 1            TCF     +4
 0387    REF  10  LAST  245   07,2422  3 4753 1  YMKRUPT   CAF     ONE
 0388    REF  14  LAST  255   07,2423  54 070 1            TS      RUPTREG1      SET Y MARK STORE INDEX TO ONE
 0389    REF  16  LAST  232   07,2424  3 4741 1            CAF     BIT11
 0390    REF  11  LAST  253   07,2425  55'551 0            TS      XYMARK        SET MARK IDENTIFIATION

 03901   REF   1              07,2426  0 2514 0            TC      MARKTYPE      SEE IF SURFACE MARK
 03902   REF   1              07,2427  1 2521 1            TCF     SURFSTOR      SURFACE MARK-JUST STORE CDUS

 0391    REF  25  LAST  216   07,2430  3 4736 1            CAF     BIT14         GOT A MARK-SEE IF MARK PAIR MADE
 0392    REF  15  LAST  254   07,2431  7 1312 1            MASK    MARKSTAT
 0393                         07,2432  0 0006 1            EXTEND
 0394    REF   1              07,2433  1 2444 0            BZF     VERIFYMK      NOT A PAIR, NORMAL PROCEDURE
 0395    REF   7  LAST  253   07,2434  4 1550 1            CS      MARKCNTR      GOT A PAIR, SEE IF ANOTHER CAN BE MADE
 0396    REF   3  LAST  212   07,2435  6 4751 0            AD      FOUR          IF SO, INCREMENT POINTER,CLEAR BITS10,11
 0397                         07,2436  0 0006 1            EXTEND
 0398    REF   1              07,2437  6 2454 0            BZMF    5MKALARM      HAVE FIVE MARK PAIRS-DONT ALLOW MARK
 0399    REF   8  LAST  255   07,2440  25'550 0            INCR    MARKCNTR      OK FOR ANOTHER PAIR, INCR POINTER
 0400    REF   1              07,2441  4 7711 0            CS      PRIO23        CLEAR BITS10,11,14 FOR NEXT PAIR
 0401    REF  16  LAST  255   07,2442  7 1312 1            MASK    MARKSTAT
 0402    REF  17  LAST  255   07,2443  55'312 1            TS      MARKSTAT

 0403    REF  12  LAST  255   07,2444  3 1551 1  VERIFYMK  CA      XYMARK
 0404    REF  18  LAST  255   07,2445  7 1312 1            MASK    MARKSTAT
 0405    REF  58  LAST  255   07,2446  10 000 0            CCS     A
 0406                         07,2447  1 2451 1            TCF     +2            THIS MARK NOT DESIRED
 0407    REF   1              07,2450  1 2526 0            TCF     VACSTOR       MARK DESIRED - STORE CDUS
 0408    REF  14  LAST  255   07,2451  0 5567 0            TC      ALARM
 0409                         07,2452   00114 0            OCT     114
 0410    REF  11  LAST  255   07,2453  0 5270 1            TC      RESUME        RESUME-DISPLAY UNCHANGED-WAIT FOR ACTION
 0411   REF  15  LAST  255   07,2454  0 5567 0  5MKALARM TC       ALARM           ATTEMPTING TO MAKE MORE THAN 5 MK PAIRS
 0412                        07,2455   00107 1           OCT      107
 04121  REF   2  LAST  255   07,2456  0 2514 0           TC       MARKTYPE        SEE IF SURFACE MARK
 04122  REF   1              07,2457  1 2627 1           TCF      DSPV6N79        IT IS
 0413   REF  12  LAST  255   07,2460  0 5270 1           TC       RESUME          DONT CHANGE DISPLAY-DO NOTHING
 0414   REF   3  LAST  256   07,2461  0 2514 0  MKREJ     TC     MARKTYPE       SEE IF SURFACE
 04141  REF   1              07,2462  1 2507 0            TCF    SURFREJ        SURFACE-JUST CHECK MARK COUNTER

 04142  REF   3  LAST  252   07,2463  3 5015 0            CAF    PRIO3          INFLIGHT-SEE IF MARKS MADE
 0415   REF  19  LAST  255   07,2464  7 1312 1            MASK   MARKSTAT
 0416   REF  59  LAST  255   07,2465  10 000 0            CCS    A
 0417   REF   1              07,2466  1 2472 0            TCF    REJECT         MARKS MADE-REJECT ONE
 0418   REF  16  LAST  256   07,2467  0 5567 0  REJALM    TC     ALARM          NO MARK TO REJECT-BAD PROCEDURE-ALARM
 0419                        07,2470   00115 1            OCT    115
 0420   REF  13  LAST  256   07,2471  0 5270 1            TC     RESUME         DESIRED ACTION DISPLAYED

 0421   REF   5  LAST  227   07,2472  4 4355 1  REJECT    CS     PRIO30         ZERO BIT14,SHOW REJ.,SEE IF MARK SINCE
 0422   REF  20  LAST  257   07,2473  7 1312 1            MASK   MARKSTAT       LAST REJECT
 0423   REF  18  LAST  219   07,2474  6 4737 0            AD     BIT13
 0424   REF  21  LAST  257   07,2475  57'312 0            XCH    MARKSTAT
 0425   REF  19  LAST  257   07,2476  7 4737 1            MASK   BIT13
 0426   REF  60  LAST  257   07,2477  10 000 0            CCS    A
 0427   REF   1              07,2500  1 2505 1            TCF    REJECT2        ANOTHER REJECT SET BIT 10+11 TO ZERO

 0428   REF  13  LAST  255   07,2501  4 1551 0            CS     XYMARK         MARK MADE SINCE REJECT-REJECT MARK IN 1D
 0429   REF  22  LAST  257   07,2502  7 1312 1  RENEWMK   MASK   MARKSTAT
 0430   REF  23  LAST  257   07,2503  55'312 1            TS     MARKSTAT
 0431   REF   1              07,2504  1 2577 1            TCF    REMARK         GO REQUEST NEW MARK ACTION

 0432   REF   4  LAST  257   07,2505  4 5015 1  REJECT2   CS     PRIO3          ON SECOND REJECT-DISPLAY VB53 AGAIN
 0433   REF   1              07,2506  1 2502 0            TCF    RENEWMK

 04331  REF   9  LAST  255   07,2507  11'550 1  SURFREJ   CCS    MARKCNTR       IF MARK DECREMENT COUNTER
 04332                       07,2510  1 2512 1            TCF    +2
 04333  REF   1              07,2511  1 2467 1            TCF    REJALM         NO MARKS TO REJECT-ALARM
 04334  REF  10  LAST  257   07,2512  55'550 1            TS     MARKCNTR
 04335  REF  14  LAST  257   07,2513  0 5270 1            TC     RESUME
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R0434

R0435    MARKTYPE TESTS TO SEE IF LEM ON LUNAR SURFACE. IF IT IS RETURN TO LOC+1

 0436    REF   1              07,2514   4 0104 0  MARKTYPE CS      FLAGWRD8         SURFFLAG*******TEMPORARY*****
 0437    REF  18  LAST  232   07,2515   7 4744 0           MASK    BIT8
 0438    REF  61  LAST  257   07,2516  10 000 0            CCS     A
 0439    REF  21  LAST  254   07,2517  24 002 0            INCR    Q                IF SURFACE MARK REUTNR TO LOC +1
 0440    REF  22  LAST  258   07,2520   0 0002 0           TC      Q                IF INFLIGHT MARK RETURN TO LOC +2

 04401   REF  24  LAST  255   07,2521   3 4755 1  SURFSTOR CAF     ZERO             FOR SURFACE MARK ZERO MARK KIND INDEX
 04402   REF  15  LAST  255   07,2522  54 070 1            TS      RUPTREG1

 04403   REF  24  LAST  257   07,2523   4 1312 1           CS      MARKSTAT         SET BITS10,11 TO SHOW SURFACE MARK
 04404   REF   5  LAST  257   07,2524   7 5015 1           MASK    PRIO3            FOR MARKCHEX
 04405   REF  25  LAST  258   07,2525  27'312 1            ADS     MARKSTAT

 0441    REF   4  LAST  252   07,2526   3 5004 0  VACSTOR  CAF     LOW9
 0442    REF  26  LAST  258   07,2527   7 1312 1           MASK    MARKSTAT         STORE MARK VAC ADR IN RUPTREG2
 0443    REF   6  LAST  171   07,2530  54 071 0            TS      RUPTREG2
 0444                         07,2531   0 0006 1           EXTEND
 0445    REF   5  LAST  254   07,2532   3 0062 0           DCA     ITEMP1           PICK UP MARKTIME
 0446    REF   1              07,2533  53'562 0            DXCH    TSIGHT           STORE LAST MARK TIME
 0447    REF  11  LAST  257   07,2534   3 1550 0           CA      MARKCNTR         6 X MARKCNTR FOR STORE INDEX
 0448                         07,2535   0 0006 1           EXTEND
 0449    REF   4  LAST  252   07,2536   7 6242 1           MP      SIX
 0450    REF   1  LAST  252   07,2537  56 001 0            XCH     L                GET INDEX FROM LOW ORDER PART
 0451    REF   7  LAST  258   07,2540   6 0071 1           AD      RUPTREG2         SET CDU STORE INDEX TO MARKVAC
 04511   REF  16  LAST  258   07,2541  26 070 1            ADS     RUPTREG1         INCREMENT VAC PICKUP BY MARK FOR FLIGHT
 0452    REF   5  LAST  253   07,2542  55'552 0            TS      MKDEX            STORE HERE IN CASE OF SURFACE MARK
 0453    REF   6  LAST  254   07,2543   3 0063 1           CA      ITEMP3
 0454    REF  17  LAST  258   07,2544  50 070 0            INDEX   RUPTREG1
 0455                         07,2545  54 000 0            TS      0                STORE CDUY
 0456    REF   4  LAST  254   07,2546   3 0064 0           CA      ITEMP4
 0457    REF  18  LAST  258   07,2547  50 070 0            INDEX   RUPTREG1
 0458                         07,2550  54 002 1            TS      2                STORE CDUZ
 0459    REF   3  LAST  254   07,2551   3 0065 1           CA      ITEMP5
 0460    REF  19  LAST  258   07,2552  50 070 0            INDEX   RUPTREG1
 0461                         07,2553  54 004 1            TS      4                STORE CDUX
 04611   REF   4  LAST  257   07,2554   0 2514 0           TC      MARKTYPE         IF SURFACE MARK-JUST DO SURFJOB
 04612   REF   1              07,2555   1 2604 0           TCF     SURFJOB

 0462    REF  20  LAST  257   07,2556   3 4737 0           CAF     BIT13            CLEAR BIT13 TO SHOW MARK MADE
 0463    REF  14  LAST  257   07,2557   6 1551 1           AD      XYMARK           SET MARK ID IN MARKSTAT
 0464                         07,2560   4 0000 0           COM
 0465    REF  27  LAST  258   07,2561   7 1312 1           MASK    MARKSTAT
 0466    REF  15  LAST  258   07,2562   6 1551 1           AD      XYMARK
 0467    REF  28  LAST  258   07,2563  55'312 1            TS      MARKSTAT
 0468    REF   6  LAST  258   07,2564   7 5015 1           MASK    PRIO3            SEE IF X, Y MARK MADE
 0469    REF  20  LAST  258   07,2565  54 001 1            TS      L
 0470    REF   7  LAST  258    07,2566  3 5015 0          CA      PRIO3
 0471                          07,2567  0 0006 1          EXTEND
 0472    REF   9  LAST  252    07,2570  06 001 0          RXOR    LCHAN
 0473    REF  62  LAST  258    07,2571  10 000 0          CCS     A
 0474    REF   2  LAST  257    07,2572  1 2577 1          TCF     REMARK           NOT PAIR YET, DISPLAY MARK ACTION
 0475    REF  29  LAST  258    07,2573  4 1312 1          CS      MARKSTAT         MARK PAIR COMPLETE-SET BIT14
 0476    REF  26  LAST  255    07,2574  7 4736 0          MASK    BIT14
 0477    REF  30  LAST  259    07,2575  2 7312 1          ADS     MARKSTAT
 0478    REF   3  LAST  259    07,2576  1 2577 1          TCF     REMARK           GO DISPLAY V54
 0481    REF    8  LAST  259   07,2577  3 5015 0  REMARK    CAF     PRIO3            BITS 10 AND 11
 0482    REF   31  LAST  259   07,2600  7 1312 1            MASK    MARKSTAT
 0483                          07,2601  0 0006 1            EXTEND
 0484    REF   29  LAST  227   07,2602  7 4746 1            MP      BIT6             SHIFT MARK IDS TO BE 0 TO 3 FOR INDEX
 0485    REF    6  LAST  258   07,2603  55'552 0            TS      MKDEX            STORE VERB INDEX
 0486    REF    3  LAST  244   07,2604  3 5025 0  SURFJOB   CAF     PRIO15
 0487    REF    3  LAST  192   07,2605  0 5072 1            TC      NOVAC            ENTER JOB TO CHANGE DISPLAY TO
 0488    REF   16  LAST  258   E7,1551                      EBANK=  XYMARK           REQUEST NEXT ACTION
 0489    REF    1              07,2606   02611 0            2CADR   CHANGEVB
 0489    REF    1              07,2607   16067 1

 0490    REF   15  LAST  257   07,2610  0 5270 1            TC      RESUME

 0491    REF    5  LAST  258   07,2611  0 2514 0  CHANGEVB  TC      MARKTYPE
 0492    REF    2  LAST  256   07,2612  1 2627 1            TCF     DSPV6N79         SURFACE-DISPLAY V 06 N 79
 0493    REF    7  LAST  260   07,2613  51'552 1            INDEX   MKDEX            INFLIGHT-PICK UP MARK VB INDEX
 0494    REF    1              07,2614  3 2616 1            CAF     MKVB54
 04941   REF    1              07,2615  0 2211 1            TC      PASTIT           PASTE UP NEXT MK VERB DISPLAY

R0496    THE FOUR MKVBS ARE INDEXED-THEIR ORDER CANNOT BE CHANGED

 0497                          07,2616   15507 1  MKVB54    VN      5471             MAKE X OR Y MARK
 0498                          07,2617   15307 1  MKVB53    VN      5371             MAKE Y MARK
 0499                          07,2620   15107 0  MKVB52    VN      5271             MAKE X MARK
 0500                          07,2621   15507 1  MKVB54*   VN      5471             MAKE X OR Y MARK
 0501                          07,2622   04000 0  DP1/8     2DEC    .125
 0501                          07,2623   00000 1
 0502                          07,2624   00034 0  OCT34     OCT     34
 0503                          07,2625   01507 1  V06N71    VN      671
 05031                         07,2626   01517 0  V06N79*   VN      679
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P0504    ROUTINE TO REQUEST CURSOR AND SPIRAL MEASUREMENTS
 0505    REF    1                                            COUNT*  $$/R59

 0506    REF    1                07,2627  3 2624 1  DSPV6N79 CAF     V06N79*              CURSOR-SPIRAL DISPLAY
 0507    REF   12  LAST  252     07,2630  0 4616 1           TC      BANKCALL
 0508    REF    4  LAST  246     07,2631   20334 1           CADR    GOMARKF

 0509    REF    4  LAST  252     07,2632  1 2060 1           TCF     KILLAOT              V34-DOES GOTOPOOH
 0510    REF    1                07,2633  1 2641 1           TCF     SURFEND              V33-PROCEED, END MARKING
 0511    REF   30  LAST  260     07,2634  3 4746 0           CAF     BIT6                 IF V32(OCT40) IN MPAC DO RECYCLE
 05111   REF   32  LAST  228     07,2635  7 0154 0           MASK    MPAC                 OTHERWISE IT IS LOAD VB ENTER SO
 05112   REF   63  LAST  259     07,2636 10 0000 0           CCS     A                    RE-DISPLAY V06N79
 05113   REF    1                07,2637  1 2645 0           TCF     SURFAGAN             VB32-RECYCLE
 05114   REF    3  LAST  260     07,2640  1 2627 1           TCF     DSPV6N79             ENTER

 0512    REF   27  LAST  259     07,2641  4 4736 0  SURFEND  CS      BIT14                SET BIT14 TO SHOW MARK END
 0513    REF   32  LAST  260     07,2642  7 1312 1           MASK    MARKSTAT
 05131   REF   28  LAST  261     07,2643  6 4736 1           AD      BIT14
 0514    REF   33  LAST  261     07,2644 55'312 1            TS      MARKSTAT

 0515    REF    1                07,2645  3 1236 1  SURFAGAN CA      CURSOR
 0516    REF    8  LAST  260     07,2646 51'552 1            INDEX   MKDEX                HOLDS VAC AREA POINTER FOR SURF MARKING
 0517                            07,2647 54 0001 1           TS      1                    STORE CURSOR SP 2COMP
 0518    REF    1                07,2650  3 1240 0           CA      SPIRAL
 0519    REF    9  LAST  261     07,2651 51'552 1            INDEX   MKDEX
 0520                            07,2652 54 0003 0           TS      3                    STORE SPIRAL

 0521    REF   34  LAST  261     07,2653  4 1312 1           CS      MARKSTAT             IF BIT 14 SET-END MARKING
 0522    REF   29  LAST  261     07,2654  7 4736 0           MASK    BIT14
 0523                            07,2655  0 0006 1           EXTEND
 0524    REF    2  LAST  252     07,2656  1 2216 1           BZF     MARKCHEX
 0525    REF   12  LAST  258     07,2657  3 1550 0           CA      MARKCNTR             THIS IS RECYCLE-SEE IF 5 MARKS ALREADY
 0526    REF   11  LAST  255     07,2660  6 4753 1           AD      ONE
 0527                            07,2661  4 0000 0           COM
 0528    REF    6  LAST  253     07,2662  6 4756 1           AD      FIVE
 0529                            07,2663  0 0006 1           EXTEND
 0530    REF    2  LAST  255     07,2664  6 2454 0           BZMF    5MKALARM             CANT RECYCLE-TO MANY MARKS-ALARM
 0531    REF   13  LAST  261     07,2665 25'550 0            INCR    MARKCNTR             OF FOR RECYCLE-INCR COUNTER
 0532    REF    3  LAST  253     07,2666  1 2205 0           TCF     GETMKS +3            GO DISPLAY MARK VB
 0001                            07,2667                             BANK     7
 0002   REF    1                 43,2000                             SETLOC EXTVERBS
 0003                            43,2000                             BANK

 0004   REF    3  LAST   196     E5,1737                             EBANK=  OGC

 0005   REF    1                                                     COUNT* $$/EXTVB
P0006   FAN-OUT

 0007   REF   33  LAST   261     43,2000  50 154 1   GOEXTVB   INDEX   MPAC        VERB-40 IS IN MPAC
 0008   REF    1                 43,2001  0 2002 1             TC      LST2FAN     FAN AS BEFORE.

 0009   REF    1                 43,2002  0 2130 1   LST2FAN   TC      VBZERO      VB40 ZERO (USED WITH NOUN 20 OR 72 ONLY)
 0010   REF    1                 43,2003  0 2171 1             TC      VBCOARK     VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A0011                                                                                                               72 ONLY)
 0012   REF    1                 43,2004  0 2330 0             TC      IMUFINEK    VB42 FINE ALIGN IMU
 0013   REF    1                 43,2005  0 2707 0             TC      IMUATTCK    VB43  LOAD IMU ATTITUDE ERROR METERS.
 0014   REF    1                 43,2006  0 2302 1             TC      RRDESEND    VB44 TERMINATE CONTINUOUS DESIGNATE
 0015   REF    1                 43,2007  0 2120 0             TC      ALM/END     VB45 SPARE
 0016   REF    2  LAST   262     43,2010  0 2120 0             TC      ALM/END     VB46 SPARE
 0017   REF    1                 43,2011  0 2367 1             TC      V47TXACT    VB47 AGS INITIALIZATION
 0018   REF    1                 43,2012  0 3135 0             TC      DAPDISP     VB48  LOAD A/P DATA
 0019   REF    1                 43,2013  1 3015 1             TCF     CREWMANU    VB49 START AUTOMATIC ATTITUDE MANEUVER
 0020   REF    1                 43,2014  0 2361 1             TC      GOLOADLV    VB50 PLEASE PERFORM
 0021   REF    3  LAST   262     43,2015  0 2120 0             TC      ALM/END     VB51 SPARE
 0022   REF    2  LAST   262     43,2016  0 2361 1             TC      GOLOADLV    VB52 PLEASE MARK X - RETICLE.
 0023   REF    3  LAST   262     43,2017  0 2361 1             TC      GOLOADLV    VB53 PLEASE MARK Y - RETICLE.
 0024   REF    4  LAST   262     43,2020  0 2361 1             TC      GOLOADLV    VB54 PLEASE MARK X OR Y - RETICLE
 0025   REF    1                 43,2021  0 2401 0             TC      ALINTIME    VB55 ALIGN TIME
 0026   REF    1                 43,2022  0 3024 1             TC      TRMTRACK    VB56 TERMINATE TRACKING - P20 + P25
 0027   REF    1                 43,2023  0 2322 0             TC      LRON        VB57 PERMIT  LANDING RADAR UPDATES
 0028   REF    1                 43,2024  0 2325 1             TC      LROFF       VB58 INHIBIT LANDING RADAR UPDATES
 0029   REF    4  LAST   262     43,2025  0 2120 0             TC      ALM/END     VB59 SPARE
 0030   REF    1                 43,2026  0 2151 0             TC      LRPOS2K     VB60 COMMAND LR TO POSITION 2.
 0031   REF    1                 43,2027  0 2163 1             TC      DAPATTER    VB61 DISPLAY DAP ATTITUDE ERROR
 0032   REF    1                 43,2030  0 2166 1             TC      TOTATTER    VB62 DISPLAY TOTAL ATTITUDE ERROR
 0033   REF    1                 43,2031  0 2414 1             TC      R04         VB63 SAMPLE RADAR ONCE PER SECOND
 0034   REF    1                 43,2032  0 2700 1             TC      VB64        VB64 CALCULATE,DISPLAY S-BAND ANT ANGLES
 0035   REF    1                 43,2033  0 3221 0             TC      SNUFFOUT    VB65 DISABLE U,V JETS DURING DPS BURNS.
 0036   REF    1                 43,2034  0 3142 0             TC      ATTACHED    VB66 ATTACHED   MOVE THIS TO OTHER STATE
 0037   REF    1                 43,2035  0 3213 1             TC      V67         VB67 W MATRIX MONITOR
 0038   REF    5  LAST   262     43,2036  0 2120 0             TC      ALM/END     VB68 SPARE
 0039   REF    1                 43,2037  0 2037 1   VERB69    TC      VERB69      VB69 FORCE A HARDWARE RESTART
 0040   REF    1                 43,2040  0 3724 0             TC      V70UPDAT    VB70 UPDATE LIFTOFF TIME.
 0041   REF    1                 43,2041  0 3726 1             TC      V71UPDAT    VB71 UNIVERSAL UPDATE - BLOCK ADDRESS.
 0042   REF    1                 43,2042  0 3730 0             TC      V72UPDAT    VB72 UNIVERSAL UPDATE - SINGLE ADDRESS.
 0043   REF    1                 43,2043  0 3732 1             TC      V73UPDAT    VB73 UPDATE AGC TIME (OCTAL).
 0044   REF    1                 43,2044  0 3045 0             TC      DNEDUMP     VB74 INITIALIZE DOWN-TELEMETRY PROGRAM
A0045                                                                                       FOR ERASABLE DUMP.
 0046   REF    1                 43,2045  0 3224 0             TC      OUTSNUFF    VB75 ENABLE U,V JETS DURING DPS BURNS.
 0047    REF    1                  43,2046   0 3001 0             TC       MINIMP           VB76 MINIMUM IMPULSE MODE
 0048    REF    1                  43,2047   0 3006 1             TC       NOMINIMP         VB77 RATE COMMAND MODE
 0049    REF    1                  43,2050   0 2404 0             TC       R77              VB78 START LR SPURIOUS RETURN TEST
 0050    REF    1                  43,2051   0 2617 0             TC       R77END           VB79 TERMINATE LR SPURIOUS RETURN TEST
 0051    REF    1                  43,2052   0 3051 0             TC       LEMVEC           VB80 UPDATE LEM STATE VECTOR
 0052    REF    1                  43,2053   0 3054 0             TC       CSMVEC           VB81 UPDATE CSM STATE VECTOR
 0053    REF    1                  43,2054   0 2746 0             TC       V82PERF          VB82 REQUEST ORBIT PARAM DISPLAY (R30)
 0054    REF    1                  43,2055   0 2756 1             TC       V83PERF          VB83 REQUEST REND PARAM DISPLAY (R31)
 0055    REF    6  LAST   262      43,2056   0 2120 0             TC       ALM/END          VB84 SPARE
 0056    REF    1                  43,2057   0 3227 0             TC       VERB85           VB85 DISPLAY RR LOS AZ AND ELEV
 0057    REF    7  LAST   263      43,2060   0 2120 0             TC       ALM/END          VB86 SPARE
 0058    REF    8  LAST   263      43,2061   0 2120 0             TC       ALM/END          VB87 SPARE
 0059    REF    9  LAST   263      43,2062   0 2120 0             TC       ALM/END          VB88 SPARE
 0060    REF    1                  43,2063   0 2764 0             TC       V89PERF          VB89 ALIGN XORZ LEM AXIS ALONG LOS (R63)
 0061    REF    1                  43,2064   0 2773 0             TC       V90PERF          VB90 OUT OF PLANE RENDEZVOUS DISPLAY
 0062    REF    1                  43,2065   0 3100 0             TC       GCSHOSUM         VB91 DISPLAY BANK SUM.
 0063    REF    1                  43,2066   0 3064 0             TC       SYSTEST          VB92 OPERATE IMU PERFORMANCE TEST.
 0064    REF    1                  43,2067   0 3073 0             TC       WMATRXNG         VB93 CLEAR RENDWFLG
 0065    REF   10  LAST   263      43,2070   0 2120 0             TC       ALM/END          VB94 SPARE
 0066    REF    1                  43,2071   0 3061 0             TC       UPDATOFF         VB95 NO STATE VECTOR UPDATE ALLOWED
 0067    REF    1                  43,2072   0 3206 0             TC       VERB96           VB96 INTERRUPT INTEGRATION AND GO TO P00
 0068    REF    5  LAST   262      43,2073   0 2361 1             TC       GOLOADLV         VB97 PLEASE VERIFY ENGINE FAILURE
 0069    REF   11  LAST   263      43,2074   0 2120 0             TC       ALM/END          VB98 SPARE
 0070    REF    6  LAST   263      43,2075   0 2361 1             TC       GOLOADLV         VB99 PLEASE ENABLE ENGINE

R0071    END OF EXTENDED VERB FAN


 0072    REF    5  LAST   246      43,2076  11'044 1  TESTXACT CCS      EXTVBACT         ARE EXTENDED VERBS BUSY
 0073    REF   12  LAST   263      43,2077   0 2120 0             TC       ALM/END          YES, TURN ON OPERATOR LIGHT
 0074    REF    2  LAST   222      43,2100   3 0100 0             CA       FLAGWRD4         ARE PRIORITY DISPLAYS USING DSKY
 0075    REF    1                  43,2101   7 2127 0             MASK     OC24100
 00751   REF   64  LAST   261      43,2102  10 000 0              CCS      A
 00752   REF   13  LAST   263      43,2103   0 2120 0             TC       ALM/END          YES
 0076    REF    2  LAST   231      43,2104   3 6007 0             CAF      OCT24            SET BITS 3 AND 5
 0077    REF    6  LAST   263      43,2105  55'044 1  SETXTACT TS       EXTVBACT         NO. SET FLAG TO SHOW EXT VERB DISPLAY
A0078                                                                                      SYSTEM BUSY

 0079    REF   23  LAST   258      43,2106   3 0002 0             CA       Q
 0080    REF   34  LAST   262      43,2107  54 155 1              TS       MPAC +1

 0081    REF    4  LAST   244      43,2110   4 4752 1             CS       TWO              BLANK EVERYTHING EXCEPT MM AND VERB
 0082    REF    1                  43,2111   0 4154 0             TC       NVSUB
 0083                              43,2112   0 2113 0             TC       +1
 0084    REF   35  LAST   263      43,2113   0 0155 0             TC       MPAC +1

 0085    REF    2  LAST   231      43,2114   0 4364 1  XACTALM  TC       FALTON           TURN ON OPERATOR ERROR LIGHT.
 0086    REF    6  LAST   208      43,2115   0 5472 0             TC       ENDEXT           RELEASE MARK AND EXT. VERB DISPLAY SYS.

 0087    REF    7  LAST   263         5472             TERMEXTV EQUALS   ENDEXT
 0088    REF    8  LAST  263       5472            ENDEXTVB EQUALS ENDEXT

 0089    REF   25  LAST  258   43,2116  3 4755 1  XACTO     CAF      ZERO                RELEASE MARK AND EXT. VERB DISPLAY SYS.
 0090    REF    1              43,2117  0 2105 1            TC       SETXTACT

 0091    REF    3  LAST  263   43,2120  0 4364 1  ALM/END   TC       FALTON              TURN ON OPERATOR ERROR LIGHT
 0092    REF    7  LAST  255   43,2121  0 4635 0  GOPIN     TC       POSTJUMP
 0093    REF    2  LAST  227   43,2122   21050 1            CADR     PINBRNCH

 0094    REF    6  LAST  231   43,2123  3 1011 0  CHKPOOH   CA       MODREG              CHECK FOR POO OR POO-.
 0095                          43,2124  0 0006 1            EXTEND
 0096    REF    1              43,2125  1 6742 1            BZF      TCQ
 0097    REF   14  LAST  263   43,2126  0 2120 0            TC       ALM/END

 00971                         43,2127   24100 0  OC24100   OCT      24100
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P0098           VBZERO        VERB 40              DESCRIPTION
R0099
R0100                 1. REQUIRE NOUN 20 (ICDU ANGLES) OR NOUN 72 (RCDU ANGLES).
R0101                2. FOR N20, CHECK IMUCADR IN AN EFFORT TO AVOID A 1210 RESTART.
R0102                   FOR N72, CHECK IF EITHER RADAR IS IN USE.
R0103                 3. EXECUTE THE CDU ZERO.
R0104                 4. STALL UNTILL THE ZERO IS DONE.
R0105                 5. DON'T DIFFERENIATE BETWEEN A BAD OR GOOD RETURN.
R0106                 6. EXIT, RE-ESTABLISHING THE INTERRUPTED DISPLAY (IF ANY).

 0110   REF    1                43,2130  0 2174 1  VBZERO    TC      OP/INERT
 0111   REF    1                43,2131  0 2133 1            TC      IMUZEROK         RETURN HERE IF NOUN = ICDU(20)
 0112   REF    1                43,2132  0 2142 1            TC      RRZEROK          RETURN HERE IF NOUN = RCDU(72)
 0113   REF    1                43,2133  0 2375 1  IMUZEROK  TC      CKMODCAD
 01131  REF   13  LAST   261    43,2134  0 4616 1            TC      BANKCALL         KEYBOARD REQ FOR ISS CDUZERO
 0114   REF    2  LAST   208    43,2135    16714 1           CADR    IMUZERO

 0115   REF   14  LAST   265    43,2136  0 4616 1            TC      BANKCALL         STALL
 0116   REF    2  LAST   208    43,2137    17716 1           CADR    IMUSTALL
 0117                           43,2140  0 2141 1            TC      +1

 0118   REF    1                43,2141  0 2121 1            TC      GOPIN            IMUZERO

 0120   REF    1                43,2142  0 2642 0  RRZEROK   TC      RDRUSECK
 01202  REF   15  LAST   265    43,2143  0 4616 1            TC      BANKCALL
 0121   REF    1                43,2144    52343 1           CADR    RRZERO

 0122   REF   16  LAST   265    43,2145  0 4616 1  RWAITK    TC      BANKCALL
 0123   REF    1                43,2146    17714 0           CADR    RADSTALL
 0124                           43,2147  1 2150 0            TCF     +1
 0125   REF    2  LAST   265    43,2150  0 2121 1            TC      GOPIN            RRZERO

R0126           LRPOS2K      VERB 60               DESCRIPTION
R0127               COMMAND LANDING RADAR TO POSITION 2
R0128              1. EXIT WITH OP ERROR IF SOMEONE IS USING EITHER RADAR.
R0130               2. ALARM WITH CODE 523 IF POS 2 IS NOT INDICATED WITHIN
R0131                  THE PRESCRIBED TIME.
R01311              3. RE-ESTABLISH THE DISPLAYS.

 0132   REF    2  LAST   265    43,2151  0 2642 0  LRPOS2K   TC      RDRUSECK
 01322  REF   17  LAST   265    43,2152  0 4616 1            TC      BANKCALL         COMMAND LR TO POSITION 2
 0133   REF    1                43,2153    53471 0           CADR    LRPOS2
 0134   REF   18  LAST   265    43,2154  0 4616 1            TC      BANKCALL
 01341  REF    2  LAST   265    43,2155    17714 0           CADR    RADSTALL
 01342  REF    1                43,2156  0 2160 1            TC      LRP2ALM
 01343  REF    3  LAST   265    43,2157  0 2121 1            TC      GOPIN

 01345  REF   17  LAST   257    43,2160  0 5567 0  LRP2ALM   TC      ALARM
 01346                          43,2161    00523 0           OCT     523
 01347  REF    4  LAST   265    43,2162  0 2121 1            TC      GOPIN
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R0135  V61      VERB 61, DISPLAY DAP ATTITUDE ERRORS ON FDAI ATTITUDE ERROR NEEDLES.

 0137  REF  10  LAST  231   43,2163  0 5516 0  DAPATTER TC      DOWNFLAG
 0138  REF   1              43,2164   00013 0           ADRES   NEEDLFLG
 0139  REF   5  LAST  265   43,2165  0 2121 1           TC      GOPIN

R0140  V62      VERB 62, DISPLAY TOTAL ATTITUDE ERRORS ON FDAI ATTITUDE ERROR NEEDLES.

 0142  REF   1              43,2166  0 5504 0  TOTATTER TC      UPFLAG
 0143  REF   2  LAST  266   43,2167   00013 0           ADRES   NEEDLFLG
 0144  REF   6  LAST  266   43,2170  0 2121 1           TC      GOPIN

R0145
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R0146            VBCOARK       VERB 41            DESCRIPTION
R0147                 COARSE ALIGN IMU OR RADAR
R0148               1. REQUIRE NOUN 20 OR NOUN 72 OR TURN ON OPERATOR ERROR.
R0149                 2. REQUIRE EXT VERB DISPLAY SYS AVAILABLE OR TURN ON OPERATOR ERROR LIGHT AND GO TO PINBRNCH.
R0151                 CASE 1      NOUN 20      (ICDU ANGLES)
R0152                 3. SET EXT VERB DISPLAY ACTIVE FLAG.
R0153                 4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0154                      RESPONSES
R0155                        A. TERMINATE
R0156                             1. RELEASE EXT VERB DISPLAY SYSTEM
R0157                        B. PROCEED
R0158                          1. COARSE ALIGN TO THE EXISTING THETAD'S (ICORK2).
R0168                        C. ENTER
R0169                          1. COARSE ALIGN TO THE LOADED THETAD'S (ICORK2).
R0170                 ICORK2
R0171                      1. RE-DISPLAY VERB 41.
R0172                      2. EXECUTE IMUCOARS (IMU COARSE ALIGN).
R0173                      3. EXECUTE IMUSTALL (ALLOW TIME FOR DATA TRANSFER).
R0174                      4. RELEASE EXT VERB DISPLAY SYSTEM.
R0175                 CASE 2      NOUN 72      (RCDU ANGLES)
R01755                  EXIT WITH OP ERROR IF SOMEONE IS USING EITHER RADAD.
R0176                 5. DISPLAY FLASHING V24,N73 (LOAD NEW RR TRUNION ANGLE AND NEW SHAFT ANGLE).
R0178                      RESPONSES
R0179                      A. TERMINATE
R0180                           1. RELEASE EXT VERB DISPLAY SYS.
R0181                      B. PROCEED OR ENTER
R0182                           1. EXECUTE AURLOKON (ASK OPERATOR FOR LOCK-ON REQUIREMENTS).
R0184                           2. RE-DISPLAY VERB 41.
R0185                           3. SCHEDULE RRDESK2 WITH PRIORITY 20.
R0186                           4. RELEASE EXT VERB DISPLAY SYS.

R0187                      AURLOKON

R0188                    1. FLASH V04 N12 R1 = 00006 R2 = 00002
R0189                         RESPONSES
R0190                         A. TERMINATE
R0194                         B. PROCEED
R0195                           1. RESET LOCK-ON SWITCH
R01951                          2. SET CONTINUOUS DESIGNATE FLAG
R01952                          3. DISABLE R25
R0196                       C. V22 E 1 E, R1 = 00001, PROCEED
R0197                           1. SET LOCK-ON SWITCH
 0198    REF    2  LAST  265    43,2171  0 2174 1  VBCOARK   TC      OP/INERT
 0199    REF    1               43,2172  0 2205 1            TC      IMUCOARK          RETURN HERE IF NOUN = ICDU(20)
 0200    REF    1               43,2173  0 2227 1            TC      RRDESNBK          RETURN HERE IF NOUN = RCDU(72)
R0201               RETURNS TO L+1 IF IMU OR L+2 IF RR.

 0202    REF    3  LAST  263    43,2174  4 6007 1  OP/INERT  CS      OCT24
 0203    REF    2  LAST  222    43,2175  6 1002 1            AD      NOUNREG
 0204                           43,2176  0 0006 1            EXTEND
 0205    REF    2  LAST   264    43,2177   1 6742 1              BZF      TCQ                IF = 20.

 0207    REF    1                43,2200   6 2204 0              AD       RRIMUDIF           -52
 0208                            43,2201   0 0006 1              EXTEND
 0209    REF    2  LAST   157    43,2202   1 6737 0              BZF      Q+1

 0210    REF   15  LAST   264    43,2203   0 2120 0              TC       ALM/END            ILLEGAL.

 0211                            43,2204    77713 1   RRIMUDIF   DEC      -52                THE IMU
 0213    REF    2  LAST   265    43,2205   0 2375 1   IMUCOARK   TC       CKMODCAD
 0214    REF    1                43,2206   0 2076 1              TC       TESTXACT           COARSE ALIGN FROM KEYBOARD.
 0215    REF    1                43,2207   3 2225 0              CAF      VNLODCDU           CALL FOR THETAD LOAD
 0216    REF   19  LAST   265    43,2210   0 4616 1              TC       BANKCALL
 0217    REF    1                43,2211    20334 1              CADR     GOXDSPF
 0218    REF    1                43,2212   0 5472 0              TC       TERMEXTV
 0219                            43,2213   1 2214 0              TCF      +1

 0220    REF    1                43,2214   3 2226 0   ICORK2     CAF      IMUCOARV           RE-DISPLAY COARSE ALIGN VERB.
 0221    REF   20  LAST   268    43,2215   0 4616 1              TC       BANKCALL
 0222    REF    2  LAST   207    43,2216    20620 1              CADR     EXDSPRET

 0223    REF   21  LAST   268    43,2217   0 4616 1              TC       BANKCALL           CALL MODE SWITCHING PROG
 0224    REF    1                43,2220    17000 1              CADR     IMUCOARS

 0225    REF   22  LAST   268    43,2221   0 4616 1              TC       BANKCALL           STALL
 0226    REF    3  LAST   265    43,2222    17716 1              CADR     IMUSTALL
 0227    REF    1                43,2223   0 5472 0              TC       ENDEXTVB
 0228    REF    2  LAST   268    43,2224   0 5472 0              TC       ENDEXTVB

 0229                            43,2225    06226 1   VNLODCDU   VN       2522
 0230                            43,2226    12200 0   IMUCOARV   VN       4100
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P0231               DESIGNATE TO DESIRED GIMBAL ANGLES.

 0232   REF   3  LAST  265   43,2227  0 2642 0  RRDESNBK TC       RDRUSECK
 0234   REF   2  LAST  268   43,2230  0 2076 1           TC       TESTXACT
 0235   REF   3  LAST  228   43,2231  3 4745 0           CA       RNDVZBIT     IS P20 RUNNING?
 0236   REF  18  LAST  231   43,2232  7 0074 0           MASK     FLAGWRD0
 0237   REF  65  LAST  263   43,2233 10 000 0            CCS      A
 0238   REF   1              43,2234  1 2114 0           TCF      XACTALM      OPERATOR ERROR IF IN P20
 0239   REF   1              43,2235  4 2321 1           CS       OCT41000     TERMINATE PRESENT DESIGNATION
 0240                        43,2236  0 0004 0           INHINT                RELINT DONE IN GOXDSPF
 0241   REF  18  LAST  220   43,2237  7 0110 0           MASK     RADMODES
 0242   REF   1  LAST  269   43,2240 54 110 0            TS       RADMODES

 0243   REF   1              43,2241  3 2260 1           CAF      VNLDRCDU     ASK FOR GIMBAL ANGLES.
 0244   REF  23  LAST  268   43,2242  0 4616 1           TC       BANKCALL
 0245   REF   2  LAST  268   43,2243    20334 1          CADR     GOXDSPF
 0246   REF   2  LAST  268   43,2244  0 5472 0           TC       TERMEXTV
 0247                        43,2245  1 2241 0           TCF      -4           V33

 0248   REF  24  LAST  269   43,2246  0 4616 1           TC       BANKCALL     ASK OP FOR LOCK ON REQUIREMENTS.
 0249   REF   1              43,2247    46000 0          CADR     AURLOKEN

 0250   REF   1              43,2250  3 2226 0           CAF      OPTCOARV     RE-DISPLAY OUR OWN VERB
 0251   REF  25  LAST  269   43,2251  0 4616 1           TC       BANKCALL
 0252   REF   3  LAST  268   43,2252    20620 1          CADR     EXDSPRET

 0253   REF   1              43,2253  3 4736 1           CAF      PRIO20
 0254   REF   3  LAST  244   43,2254  0 5105 0           TC       FINDVAC
 0255   REF   6  LAST  240   E7,1456                     EBANK=   LOSCOUNT
 0256   REF   1              43,2255    02261 0          2CADR    RRDESK2
 0256   REF   1              43,2256    66107 1

 0257   REF   3  LAST  269   43,2257  1 5472 1           TCF      TERMEXTV     FREES DISPLAY.

 0258                        43,2260    06111 0 VNLDRCDU VN       2473
 0259   REF   2  LAST  268   43,2226            OPTCOARV EQUALS   IMUCOARV     DIFFERENT NOUNS.

 0260   REF  26  LAST  269   43,2261  0 4616 1  RRDESK2  TC       BANKCALL
 0261   REF   1              43,2262    52475 0          CADR     RRDESNB

 0262                        43,2263  0 2264 0           TC       +1           DUMMY NEEDED SINCE DESRETRN DOES INCR
 02621  REF   9  LAST  221   43,2264  3 0167 1           CA       PRIORITY
 02622  REF   5  LAST  258   43,2265  7 5004 1           MASK     LOW9
 02623  REF  66  LAST  269   43,2266 10 000 0            CCS      A
 02624  REF  67  LAST  269   43,2267 50 000 1            INDEX    A
 02625  REF  68  LAST  269   43,2270 54 000 0            TS       A            RELEASE THIS JOBS VAC AREA.
 02626                       43,2271  4 0000 0           COM                   INSURE ENDOFJOB DOES A NOVAC END (BZMF).
 02627  REF  10  LAST  269   43,2272 26 167 0            ADS      PRIORITY
 0263   REF  27  LAST  269   43,2273  0 4616 1           TC       BANKCALL     WAIT FOR COMPLETION OF DESIGNATE
 0264   REF   3  LAST  265   43,2274    17714 0          CADR     RADSTALL
 0265                             43,2275   0 2277 1               TC       +2               BADEND-NO LOCKON OR OUT OF LIMITS
 0266   REF   4  LAST   239       43,2276   0 5155 0               TC       ENDOFJOB         GOODEND-LOCKON ACHIEVED
 0267   REF  18  LAST   265       43,2277   0 5567 0               TC       ALARM
 0268                             43,2300    00503 1               OCT      503              TURN ON ALARM LIGHT -503 DESIGNATE FAIL
 0269   REF   5  LAST   270       43,2301   0 5155 0               TC       ENDOFJOB

 0270   REF  20  LAST   269       43,2302  10 110 0   RRDESEND CCS      RADMODES         TERMINATE CONTINUOUS DESIGNATE ONLY
 0271   REF   7  LAST   266       43,2303   1 2121 0               TCF      GOPIN
 0272   REF   8  LAST   270       43,2304   1 2121 0               TCF      GOPIN
 0273                             43,2305   1 2306 1               TCF      +1
 0274   REF   2  LAST   269       43,2306   4 2321 1               CS       OCT41000         BEGDES GOES TO ENDRADAR
 0275                             43,2307   0 0004 0               INHINT                    RELINT DONE IN DOWNFLAG
 0276   REF  21  LAST   270       43,2310   7 0110 0               MASK     RADMODES
 0277   REF  22  LAST   270       43,2311  54 110 0                TS       RADMODES
 02771  REF   3  LAST   230       43,2312   0 6011 1               TC       CLRADMOD
 02773  REF   1                   43,2313   3 4777 1               CAF      1SEC
 02774  REF  28  LAST   269       43,2314   0 4616 1               TC       BANKCALL
 02775  REF   3  LAST   208       43,2315    01735 1               CADR     DELAYJOB
 0278   REF  11  LAST   266       43,2316   0 5516 0               TC       DOWNFLAG         ENABLE R25 GIMBAL MONITOR
 0279   REF   1                   43,2317    00126 1               ADRES    NORRMON
 0280   REF   9  LAST   270       43,2320   1 2121 0               TCF      GOPIN
 0281                             43,2321    41000 1    OCT41000 OCT      41000            CONTINUOUS DESIGNATE - DESIGNATE
 02812                        23,2000                          BANK    23
 02814  REF   1               23,2000                          SETLOC  EXTVB1
 02816                        23,2000                          BANK
 02818  REF   1                                                COUNT*  $$/EXTVB

 0282   REF   1               23,2000  0 4545 1  AURLOKON     TC      MAKECADR
 0283   REF   2  LAST   103   23,2001  55'113 1               TS      DESRET
 0284   REF   5  LAST   263   23,2002  3 4752 0               CAF     TWO
 0285   REF   1               23,2003  55'052 0               TS      OPTIONX +1
 0286   REF   7  LAST   258   23,2004  3 6242 0               CAF     SIX           OPTION CODE FOR V04N12
 02862  REF   2  LAST   271   23,2005  55'051 0               TS      OPTIONX

 02864  REF   1               23,2006  3 2037 1     -5        CAF     V04N1272
 02866  REF  29  LAST   270   23,2007  0 4616 1               TC      BANKCALL               R2    00001  LOCK-ON
 02868  REF   1               23,2010   20353 0               CADR    GOMARKFR
 02869  REF   9  LAST   264   23,2011  1 5472 1               TCF     ENDEXT        V34
 0287                         23,2012  1 2017 1               TCF     +5            V33
 0288                         23,2013  1 2006 1               TCF     -5            V32
 0289   REF  14  LAST   254   23,2014  3 4751 0               CAF     BIT3
 0290   REF   1               23,2015  0 5464 1               TC      BLANKET
 0291   REF   6  LAST   270   23,2016  0 5155 0               TC      ENDOFJOB

 0292   REF   3  LAST   271   23,2017  3 1052 1     +5        CA      OPTIONX +1
 0293   REF  21  LAST   244   23,2020  7 4752 1               MASK    BIT2
 0294   REF  69  LAST   269   23,2021  10 000 0               CCS     A
 0295   REF   1               23,2022  1 2026 0               TCF     NOLOKON
 0296   REF   2  LAST   266   23,2023  0 5504 0               TC      UPFLAG
 0297   REF   1               23,2024   00012 1               ADRES   LOKONSW
 0298   REF   1               23,2025  1 2034 0               TCF     AURLKON1

 0299   REF  12  LAST   270   23,2026  0 5514 0  NOLOKON      TC      DOWNFLAG      IF NO LOCK-ON, SET BIT15 OF RADMODES TO
 02991  REF   2  LAST   271   23,2027   00012 1               ADRES   LOKONSW       INDICATE THAT CONTINUOUS DESIGNATION IS
 02992  REF   3  LAST   271   23,2030  0 5504 0               TC      UPFLAG        WANTED (TO BE TERMINATED BY V44.)
 02993  REF   1               23,2031   00264 1               ADRES   CDESFLAG
 0302   REF   4  LAST   271   23,2032  0 5504 0               TC      UPFLAG        SET NO RR ANGLE MONITOR FLAG.
 0303   REF   2  LAST   270   23,2033   00126 1               ADRES   NORRMON       (DISABLE R25 RR GIMBAL MONITOR IN T4RUPT
 0304                         23,2034  0 0003 1  AURLKON1     RELINT
 0305   REF   3  LAST   271   23,2035  3 1113 0               CA      DESRET
 0306   REF   1               23,2036  1 4640 0               TCF     BANKJUMP


 03064                        23,2037   01014 0  V04N1272     VN      412
 03065                        23,2040   77757 1  -LOKONFG     OCT     -20

 03066                        43,2322                          BANK    43
 03067  REF   2  LAST   262   43,2000                          SETLOC  EXTVERBS
 03068                        43,2322                          BANK
 03069  REF   2 LAST   262 TO  271:    210    210*             COUNT*  $$/EXTVB

 0307   REF   5  LAST   271   43,2322  0 5504 0  LRON         TC      UPFLAG        PERMIT  INCORPORATION OF LR DATA      V57
 0308    REF   1                 43,2323   00254 1          ADRES   LRINH
 0309    REF  10  LAST  270      43,2324  1 2121 0          TCF     GOPIN

 0310    REF  13  LAST  271      43,2325  0 5516 0  LROFF   TC      DOWNFLAG          INHIBIT INCORPORATION OF LR DATA      V58
 0311    REF   2  LAST  272      43,2326   00254 1          ADRES   LRINH
 0312    REF  11  LAST  272      43,2327  1 2121 0          TCF     GOPIN


 031297  REF   4  LAST  262      E5,1737                    EBANK=  DGC
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P0313              IMUFINEK      VERB 42              DESCRIPTION
R0314                 FINE ALIGN IMU
R0315                 1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG OR TURN ON OPER ERROR AND GO TO PINBRNCH.
R0317                 2. DISPLAY FLASHING V25,N93....LOAD DELTA GYRO ANGLES....
R0318                    RESPONSES
R0319                    A. TERMINATE
R0320                       1. RELEASE EXT VERB DISPLAY SYSTEM.
R0321                    B. PROCEED OR ENTER
R0322                       1. RE-DISPLAY VERB 42
R0323                       2. EXECUTE IMUFINE (IMU FINE ALIGN MODE SWITCHING).
R0324                       3. EXECUTE IMUSTALL (ALLOW FOR DATA TRANSFER)
R0325                          A. FAILED
R0326                             1. RELEASE EXT VERB DISPLAY SYSTEM.
R0327                          B. GOOD
R0328                             1. EXECUTE IMUPULSE (TORQUE IRIGS).
R0329                             2. EXECUTE IMUSTALL AND RELEASE EXT VERB DISPLAY SYSTEM.

 0331    REF   3  LAST  268   43,2330  0 2375 1  IMUFINEK TC      CKMODCAD
 0332    REF   3  LAST  269   43,2331  0 2076 1           TC      TESTXACT          FINE ALIGN WITH GYRO TORQUING.
 0333    REF   1              43,2332  3 2357 1           CAF     VNLODGYR          CALL FOR LOAD OF GYRO COMMANDS
 0334    REF  30  LAST  271   43,2333  0 4616 1           TC      BANKCALL
 0335    REF   3  LAST  268   43,2334   20334 1           CADR    GOXDSPF
 0336    REF   4  LAST  269   43,2335  0 5472 0           TC      TERMEXTV
 0337                         43,2336  0 2337 1           TC      +1                PROCEED WITHOUT A LOAD

 0338    REF   1              43,2337  3 2360 0           CAF     IMUFINEV          RE-DISPLAY OUR OWN VERB
 0339    REF  31  LAST  273   43,2340  0 4616 1           TC      BANKCALL
 0340    REF   4  LAST  269   43,2341   20620 1           CADR    EXDSPRET

 0341    REF  32  LAST  273   43,2342  0 4616 1           TC      BANKCALL          CALL MODE SWITCH PROG
 0342    REF   1              43,2343   17210 1           CADR    IMUFINE

 0343    REF  33  LAST  273   43,2344  0 4616 1           TC      BANKCALL          HIBERNATION
 0344    REF   4  LAST  268   43,2345   17716 1           CADR    IMUSTALL
 0345    REF   3  LAST  268   43,2346  0 5472 0           TC      ENDEXTVB

 0346    REF   1              43,2347  3 2356 0  FINEK2   CAF     LGYROBIN          PINBALL LEFT COMMANDS IN OGC REGISTERS
 0347    REF  34  LAST  273   43,2350  0 4616 1           TC      BANKCALL
 0348    REF   1              43,2351   17323 0           CADR    IMUPULSE

 0349    REF  35  LAST  273   43,2352  0 4616 1           TC      BANKCALL          WAIT FOR PULSES TO GET OUT.
 0350    REF   5  LAST  273   43,2353   17716 1           CADR    IMUSTALL
 0351    REF   4  LAST  273   43,2354  0 5472 0           TC      ENDEXTVB
 0352    REF   5  LAST  273   43,2355  0 5472 0           TC      ENDEXTVB

 0353    REF   5  LAST  272   43,2356   02737 0  LGYROBIN ECADR   OGC
 0354                         43,2357   06335 1  VNLODGYR VN      2593
 0355                         43,2360   12400 0  IMUFINEV VN      4200
R0356             GOLOADLV      VERB 50              DESCRIPTION
R0357                           AND OTHER PLEASE
```

```
R0358                         DO SOMETHING VERBS
R0359                  PLEASE PERFORM, MARK, CALIBRATE, ETC.
R0360                  1. PRESSING ENTER ON DSKY INDICATES REQUESTED ACTION HAS BEEN PERFORMED, AND THE PROGRAM DOES THE
R0362                     SAME RECALL AS A COMPLETED LOAD.
R0363                  2. THE EXECUTION OF A VERB 33 (PROCEED WITHOUT DATA) INDICATES THE REQUESTED ACTION IS NOT DESIRED.

 0365   REF    1                 40,2000                         SBANK= PINSUPER         FOR LOADLV1 AND SHOWSUM CADR'S.

 0366   REF    1                 43,2361  0 4433 1  GOLOADLV TC      FLASHOFF

 0367   REF    1                 43,2362  3 4201 0           CAF     PINSUPBT
 0368                            43,2363  0 0006 1           EXTEND
 0369   REF    3  LAST   228     43,2364  01 C07 1           WRITE   SUPERBNK
 0370   REF    8  LAST   264     43,2365  0 4635 0           TC      POSTJUMP
 0371   REF    1                 43,2366   62001 1           CADR    LOADLV1
R0372   VERB 47 - AGS INITIALIZATION - V47.

R0373           SEE LOG SECTION AGS INITIALIZATION FOR OTHER PERTINENT REMARKS.

 0374   REF    4  LAST   273     43,2367  0 2076 1  V47TXACT TC      TESTXACT         NO OTHER EXTVERB.
 0375   REF    1                 43,2370  3 4740 0           CAF     PR104
 0376   REF    4  LAST   269     43,2371  0 5105 0           TC      FINDVAC
 0377   REF   14  LAST   208     E[illegible],1600                  EBANK= AGSBUFF
 0378   REF    1                 43,2372   02005 0           2CADR   AGSINIT
 0378   REF    1                 43,2373   64064 1
 0379   REF    7  LAST   271     43,2374  0 5155 0           TC      ENDOFJOB

 0380   REF    4  LAST   106     43,2375  3 1304 1  CKMODCAD CA      MODECADR
 0381                            43,2376  0 0006 1           EXTEND
 0382   REF    3  LAST   268     43,2377  1 6742 1           BZF     TCQ
 0383   REF   16  LAST   268     43,2400  0 2120 0           TC      ALM/END          SOMEBODY IS USING MODECADR SO EXIT
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R0384            ALINTIME     VERB 55            DESCRIPTION
R0385                      REQUIRE P00 OR P00-.
R0386                   1. SET EXT VERB DISPLAY BUSY FLAG.
R0387                   2. DISPLAY FLASHING V25,N24 (LOAD DELTA TIME FOR AGC CLOCK.
R0388                   3. REQUIRE EXECUTION OF VERB 23.
R0389                   4. ADD DELTA TIME, RECEIVED FROM INPUT REGISTER, TO THE COMPUTER TIME.
R0391                   5. RELEASE EXT VERB DISPLAY SYSTEM

 0393   REF   5  LAST  274   43,2401  0 2076 1  ALINTIME TC      TESTXACT
 03931  REF   7  LAST  274   43,2402  0 4635 0           TC      POSTJUMP          NO ROOM IN 43
 03932  REF   1              43,2403   64002 1           CADR    R33

 03933                       42,2002                     BANK    42
 03934  REF   2  LAST   46   42,2000                     SETLOC  SBAND
 03935                       42,2002                     BANK
 03936  REF   1                                          COUNT*  $$/R33

 03937  REF   1              42,2002  3 5021 1  R33      CAF     PRIO7
 03938  REF   1              42,2003  0 5146 1           TC      PRIOCHNG
 0394   REF   1              42,2004  3 2034 1           CAF     VNLODDT
 0395   REF  36  LAST  273   42,2005  0 4616 1           TC      BANKCALL
 0396   REF   4  LAST  273   42,2006   20334 1           CADR    GOXDSPF
 0397   REF  10  LAST  271   42,2007  0 5472 0           TC      ENDEXT            TERMINATE
 0398   REF  11  LAST  275   42,2010  0 5472 0           TC      ENDEXT            PROCEED
 0399   REF   1              42,2011  4 2033 1           CS      DEC23             DATA IN OR RESEQUENCE(UNLIKELY)
 0400   REF  36  LAST  263   42,2012  6 0154 1           AD      MPAC              RECALL LEFT VERB IN MPAC
 0401                        42,2013  0 0006 1           EXTEND
 0402   REF   1              42,2014  1 2016 0           BZF     UPDATIME          GO AHEAD WITH UPDATE ONLY IF RECALL
 0403   REF  12  LAST  275   42,2015  0 5472 0           TC      ENDEXT              WITH V23 (DATA IN).

 0404                        42,2016  0 0004 0  UPDATIME INHINT                    DELTA TIME IS IN DSPTEM1, +1.
 0405   REF  26  LAST  264   42,2017  3 4755 1           CAF     ZERO
 0406   REF  37  LAST  275   42,2020  54 156 1           TS      MPAC     +2       NEEDED FOR TP AGREE
 0407   REF  21  LAST  258   42,2021  54 001 1           TS      L                 ZERO T1 + 2 WHILE ALIGNING.
 0408   REF   8  LAST  254   42,2022  52 025 1           DXCH    TIME2
 0409   REF  38  LAST  275   42,2023  52 155 1           DXCH    MPAC
 0410   REF   2  LAST  102   42,2024  53'052 0           DXCH    DSPTEM2  +1       INCREMENT
 0411   REF  39  LAST  275   42,2025  20 155 1           DAS     MPAC

 0412   REF   1              42,2026  0 7257 0           TC      TPAGREE           FORCE SIGN AGREEMENT.
 0413   REF  40  LAST  275   42,2027  52 155 1           DXCH    MPAC              NEW CLOCK.
 0414   REF   9  LAST  275   42,2030  20 025 1           DAS     TIME2
 0415                        42,2031  0 0003 1           RELINT
 0416   REF  13  LAST  275   42,2032  0 5472 0  UPDTMEND TC      ENDEXT

 0417                        42,2033   00027 1  DEC23    DEC     23                V 23

 0418                        42,2034   06230 0  VNLODDT  VN      2524              V25N24 FOR LOAD DELTA TIME
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P0419            SET UP FOR RADAR SAMPLING.

 04191                      42,2035                        BANK    42
 04192  REF   3  LAST  271  43,2000                        SETLOC  EXTVERBS
 04193                      43,2404                        BANK

 0420   REF   1             E4,1600                        EBANK=  RSTACK

 0421   REF   1                                            COUNT*  $$/R0477

 04211  REF   4  LAST  269  43,2404  0 2642 0   R77        TC      RDRUSECK          TRY TO AVOID THE 1210.
 042111 REF   5  LAST  220  43,2405  3 0077 1              CA      FLAGWRD3          IS R04 RUNNING?
 042112 REF   1             43,2406  7 4743 1              MASK    R04FLBIT
 042113 REF  70  LAST  271  43,2407  10 000 0              CCS     A
 042114 REF  17  LAST  274  43,2410  0 2120 0              TC      ALM/END           YES.
 04214  REF   6  LAST  271  43,2411  0 5504 0              TC      UPFLAG
 04215  REF   1             43,2412   00117 0              ADRES   R77FLAG
 04216  REF   1             43,2413  1 2420 1              TCF     R04Z

 0422   REF   5  LAST  276  43,2414  0 2642 0   R04        TC      RDRUSECK          TRY TO AVOID THE 1210.
 0423   REF   6  LAST  275  43,2415  0 2076 1              TC      TESTXACT
 0424   REF   7  LAST  276  43,2416  0 5504 0              TC      UPFLAG
 0425   REF   3  LAST  229  43,2417   00063 1              ADRES   R04FLAG           SET R04FLAG FOR ALARMS

 0426   REF   1             43,2420  3 4741 1   R04Z       CAF     EBANK4
 0427   REF   5  LAST  220  43,2421  54 003 0              TS      EBANK
 0428   REF   1             43,2422  3 2640 1              CAF     1SEC+1            SAMPLE ONCE PER SECOND
 0429   REF   1             43,2423  55'755 0              TS      RSAMPDT
 0430   REF  27  LAST  275  43,2424  3 4755 1              CAF     ZERO
 0431   REF   2  LAST  119  43,2425  55'754 1              TS      RTSTLOC
 0432   REF   1             43,2426  55'756 0              TS      RFAILCNT          ZERO BAD SAMPLE COUNTER

 0433                       43,2427  0 0004 0              INHINT
 0434   REF   1             43,2430  4 2641 1              CS      LRPOSCAL          INITIALIZE
 0435   REF  23  LAST  270  43,2431  7 0110 0              MASK    RADMODES              BIT9   LR RANGE  LOW SCALE =0
 0436   REF  24  LAST  276  43,2432  54 110 0              TS      RADMODES              BIT6   LR POS 1 =0
 0437   REF   2  LAST  276  43,2433  3 2641 0              CAF     LRPOSCAL              BIT3   RR RANGE  LOW SCALE =0
 0438                       43,2434  0 0006 1              EXTEND
 0439   REF   4  LAST  219  43,2435  02 033 0              RAND    CHAN33
 0440   REF  25  LAST  276  43,2436  26 110 0              ADS     RADMODES
 0441                       43,2437  0 0003 1              RELINT

 04411  REF   6  LAST  276  43,2440  4 0077 0              CS      FLAGWRD3          CHECK R04FLAG     R04 =1    R77 =0
 04412  REF   2  LAST  276  43,2441  7 4743 1              MASK    R04FLBIT
 04413  REF  71  LAST  276  43,2442  10 000 0              CCS     A
 04414  REF   1             43,2443  1 2575 0              TCF     R04K

 0442   REF  12  LAST  261  43,2444  3 4753 1              CAF     ONE               INDICATES RENDEZVOUS DESIRED
 0443   REF   4  LAST  271  43,2445  55'052 0              TS      OPTIONX +1
 0444   REF  15  LAST  271  43,2446  3 4751 0   R04A       CAF     BIT3              OPTION CODE FOR V04N12
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L        EXTENDED VERBS                                                                      USER'S PAGE NO.  16        E4 S4

 04442   REF     5  LAST  276   43,2447  55'051 0             TS       OPTIONX
 04444   REF     1              43,2450  3 2635 0             CAF      V04N12X
 0445    REF    37  LAST  275   43,2451  0 4616 1             TC       BANKCALL             R2   00001  RENDEZVOUS RADAR
 0446    REF     2  LAST  271   43,2452   20353 0             CADR     GOMARKFR                  00002  LANDING RADAR
 0447    REF     1              43,2453  1 2603 1             TCF      R04END          V34
 0448                           43,2454  1 2461 1             TCF      +5              V33
 0449    REF     1              43,2455  1 2450 0             TCF      R04A +2         R2
 04491   REF    16  LAST  276   43,2456  3 4751 0             CAF      BIT3
 04492   REF     2  LAST  271   43,2457  0 5464 1             TC       BLANKET
 04493   REF [illegible] LAST  274   43,2460  0 5155 0             TC       ENDOFJOB

 0450    REF     6  LAST  277   43,2461  3 1052 1             CA       OPTIONX +1      SAVE DESIRED OPTION      RR =1      LR =2
 0451    REF     2  LAST  119   43,2462  55'751 1             TS       RTSTDEX

 0452    REF     6  LAST  271   43,2463  3 6242 0  R04X       CAF      SIX             RR OR LR DESIRED
 0453    REF     3  LAST  277   43,2464  7 1751 1             MASK     RTSTDEX
 0454    REF    72  LAST  276   43,2465  10 000 0             CCS      A
 0455    REF     1              43,2466  1 2577 1             TCF      R04L            LANDING RADAR
 0456    REF     1              43,2467  55'753 0             TS       RTSTBASE        FOR RR    BASE = 0, MAX = 1

 0457    REF    22  LAST  271   43,2470  3 4752 0  R04B       CAF      BIT2            IS RR AUTO MODE DISCRETE PRESENT
 0458                           43,2471  0 0006 1             EXTEND
 0459    REF     5  LAST  276   43,2472  02 033 0             RAND     CHAN33
 0460                           43,2473  0 0006 1             EXTEND
 0461    REF     1              43,2474  1 2505 1             BZF      R04C            YES

 0462    REF     1              43,2475  3 2637 1             CAF      201R04          REQUEST SELECTION OF RR AUTO MODE
 04621   REF     2  LAST  102   43,2476  55'045 0             TS       DSPTEM1
 04622   REF     1              43,2477  3 2636 0             CAF      V50N25X
 0463    REF   3[illegible]  LAST  277   43,2500  0 4616 1             TC       BANKCALL
 0464    REF     2  LAST  252   43,2501   20345 1             CADR     GOMARK4
 0465    REF     2  LAST  277   43,2502  1 2603 1             TCF      R04END          V34
 0466    REF     1              43,2503  1 2470 1             TCF      R04B            V33
 0467                           43,2504  1 2475 1             TCF      -7              E

 0468    REF    30  LAST  261   43,2505  3 4736 1  R04C       CAF      BIT14           ENABLE RR AUTO TRACKER
 0469                           43,2506  0 0006 1             EXTEND
 0470    REF    17  LAST  220   43,2507  05 012 1             WOR      CHAN12

 0471    REF     6  LAST  271   43,2510  3 4752 0             CAF      TWO
 0472    REF     1              43,2511  55'752 1             TS       RTSTMAX         FOR SEQUENTIAL STORAGE

 0473    REF     8  LAST  253   43,2512  0 5203 0             TC       WAITLIST
 0474    REF     2  LAST  276   E4,1600                       EBANK=   RSTACK
 0475    REF     1              43,2513   02003 0             2CADR    RADSAMP
 0475    REF     1              43,2514   52104 0
 0476                           43,2515  0 0003 1             RELINT

 04761   REF     7  LAST  276   43,2516  4 0077 0             CS       FLAGWRD3        CHECK R04FLAG       R04 =1     R77 =0
 04762   REF     3  LAST  276   43,2517  7 4743 1             MASK     R04FLBIT
 04763  REF  73  LAST  277   43,2520  10 000 0           CCS     A
 04764  REF  12  LAST  272   43,2521  1 2121 0           TCF     GOPIN             R77

 0477   REF   7  LAST  277   43,2522  3 6242 0           CAF     SIX               RR OR LR
 0478   REF   4  LAST  277   43,2523  7 1751 1           MASK    RTSTDEX
 0479   REF  74  LAST  278   43,2524  10 000 0           CCS     A
 0480   REF   1              43,2525  1 2542 1           TCF     R04LR             LR

 0481   REF   1              43,2526  3 2631 1  R04RR    CAF     V16N72            DISPLAY RR CDU ANGLES (1/SEC)
 0482   REF  39  LAST  277   43,2527  0 4616 1           TC      BANKCALL                     R1  +   XXX.XX DEG   TRUNNION
 0483   REF   5  LAST  261   43,2530   20334 1           CADR    GOMARKF                      R2  +   XXX.XX DEG   SHAFT
 0484   REF   3  LAST  277   43,2531  1 2603 1           TCF     R04END            V34        R3      BLANK
 0485                        43,2532  1 2534 0           TCF     +2                V33
 0486   REF   1              43,2533  1 2526 0           TCF     R04RR             V32

 0487   REF   1              43,2534  3 2632 1           CAF     V16N78            DISPLAY RR RANGE AND RANGE RATE (1/SEC)
 0488   REF  40  LAST  278   43,2535  0 4616 1           TC      BANKCALL                     R1  +-  XXX.XX NM    RANGE
 0489   REF   6  LAST  278   43,2536   20334 1           CADR    GOMARKF                      R2  +-  XXXXX. FPS   RANGE RATE
 0490   REF   4  LAST  278   43,2537  1 2603 1           TCF     R04END            V34        R3      BLANK
 0491   REF   1              43,2540  1 2556 1           TCF     R04Y              V33
 0492   REF   2  LAST  278   43,2541  1 2526 0           TCF     R04RR             V32

 0493   REF   1              43,2542  3 2633 0  R04LR    CAF     V16N66            DISPLAY LR RANGE AND POSITION (1/SEC)
 0494   REF  41  LAST  278   43,2543  0 4616 1           TC      BANKCALL                     R1  +-  XXXXX. FT    LR RANGE
 0495   REF   7  LAST  278   43,2544   20334 1           CADR    GOMARKF                      R2  +   0000X.       POS. NO.
 0496   REF   5  LAST  278   43,2545  1 2603 1           TCF     R04END            V34        R3      BLANK
 0497                        43,2546  1 2550 1           TCF     +2                V33
 0498   REF   2  LAST  278   43,2547  1 2542 1           TCF     R04LR             V32

 0499   REF   1              43,2550  3 2634 1           CAF     V16N67            DISPLAY LR VELX, VELY, VELZ (1/SEC)
 0500   REF  42  LAST  278   43,2551  0 4616 1           TC      BANKCALL                     R1  +-  XXXXX. FPS   LR V(X)
 0501   REF   8  LAST  278   43,2552   20334 1           CADR    GOMARKF                      R2  +-  XXXXX. FPS   LR V(Y)
 0502   REF   6  LAST  278   43,2553  1 2603 1           TCF     R04END            V34        R3  +-  XXXXX. FPS   LR V(Z)
 0503   REF   2  LAST  278   43,2554  1 2556 1           TCF     R04Y              V33
 0504   REF   3  LAST  278   43,2555  1 2542 1           TCF     R04LR             V32

 0505   REF  28  LAST  276   43,2556  3 4755 1  R04Y     CAF     ZERO              TO TERMINATE SAMPLING
 0506   REF   2  LAST  276   43,2557  55'755 0           TS      RSAMPDT
 0507   REF   1              43,2560  3 5000 1           CAF     2SECS             WAIT FOR LAST RADARUPT
 0508   REF  43  LAST  278   43,2561  0 4616 1           TC      BANKCALL
 0509   REF   4  LAST  270   43,2562   01735 1           CADR    DELAYJOB
 0510   REF   2  LAST  276   43,2563  3 2640 1           CAF     1SEC+1            SAMPLE ONCE PER SECOND
 0511   REF   3  LAST  278   43,2564  55'755 0           TS      RSAMPDT
 0512   REF  29  LAST  278   43,2565  3 4755 1           CAF     ZERO              FOR STORING RESULTS
 0513   REF   3  LAST  276   43,2566  55'754 1           TS      RTSTLOC
 0514   REF   8  LAST  278   43,2567  3 6242 0           CAF     SIX
 0515   REF   5  LAST  278   43,2570  7 1751 1           MASK    RTSTDEX
 0516   REF  75  LAST  278   43,2571  10 000 0           CCS     A
 0517   REF  13  LAST  276   43,2572  4 4753 0           CS      ONE               WAS LR
 0518   REF   7  LAST  277   43,2573  6 4752 0           AD      TWO               WAS RR
 0519    REF   1                43,2574  1 2462 1           TCF     R04X -1

 05191   REF   1                43,2575  3 4766 1  R04K     CAF     250MS+1       SAMPLE 4 LR COMPONENTS PER SECOND.
 05192   REF   4  LAST   278    43,2576  55'755 0           TS      RSAMPDT

 0520    REF   8  LAST   278    43,2577  3 4752 0  R04L     CAF     TWO
 0521    REF   2  LAST   277    43,2600  55'753 0           TS      RTSTBASE      FOR LR    BASE = 2, MAX = 3
 0522    REF   9  LAST   278    43,2601  3 6242 0           CAF     SIX
 0523    REF   2  LAST   277    43,2602  1 2511 1           TCF     R04C +4
 0524    REF  30  LAST   278    43,2603  3 4755 1  R04END   CAF     ZERO          ZERO RSAMPDT
 0525    REF   5  LAST   279    43,2604  55'755 0           TS      RSAMPDT       TO TERMINATE SAMPLING
 0526    REF  19  LAST   258    43,2605  3 4744 1           CAF     BIT8          WAIT 1.28 SECONDS FOR POSSIBLE
 0527    REF  44  LAST   278    43,2606  0 4616 1           TC      BANKCALL      PENDING RUPT.
 0528    REF   5  LAST   278    43,2607   01735 1           CADR    DELAYJOB

 0529                           43,2610  0 0004 0           INHINT
 0530    REF  31  LAST   277    43,2611  4 4736 0           CS      BIT14         DISABLE RR AUTO TRACKER
 0531                           43,2612  0 0006 1           EXTEND
 0532    REF  18  LAST   277    43,2613  03 012 1           WAND    CHAN12

 0533    REF  14  LAST   272    43,2614  0 5516 0           TC      DOWNFLAG
 0534    REF   4  LAST   276    43,2615   00063 1           ADRES   R04FLAG       SIGNAL END OF R04.

 0535    REF  14  LAST   275    43,2616  0 5472 0           TC      ENDEXT

 05351   REF   2  LAST   276    43,2617  3 4741 1  R77END   CAF     EBANK4        TO TERMINATE SAMPLING
 05352   REF   6  LAST   276    43,2620  54 003 0           TS      EBANK
 05353   REF  31  LAST   279    43,2621  3 4755 1           CAF     ZERO
 05354   REF   6  LAST   279    43,2622  55'755 0           TS      RSAMPDT
 05355   REF  31  LAST   261    43,2623  3 4746 0           CAF     BIT6          WAIT 320 MS FOR POSSIBLE
 05356   REF  45  LAST   279    43,2624  0 4616 1           TC      BANKCALL      PENDING RUPT.
 05357   REF   6  LAST   279    43,2625   01735 1           CADR    DELAYJOB

 05358   REF  15  LAST   279    43,2626  0 5516 0           TC      DOWNFLAG
 053591  REF   2  LAST   276    43,2627   00117 0           ADRES   R77FLAG
 053592  REF  13  LAST   278    43,2630  1 2121 0           TCF     GOPIN

 0536                           43,2631   04110 0  V16N72   VN      1672
 0537                           43,2632   04116 0  V16N78   VN      1678
 0538                           43,2633   04102 0  V16N66   VN      1666
 0539                           43,2634   04103 1  V16N67   VN      1667
 05395                          43,2635   01014 0  V04N12X  VN      412
 05396                          43,2636   14431 1  V50N25X  VN      5025
 0540                           43,2637   00201 1  201R04   OCT     00201
 0541                           43,2640   00145 1  1SEC+1   DEC     101
 0542    REF   1                   4766            250MS+1  EQUALS  CALLCODE
 0543                           43,2641   00444 0  LRPOSCAL OCT     444
 054301 REF    8  LAST  277    43,2642  4 0077 0  RDRUSECK CS     FLAGWRD3          IS R29 ON?
 054302 REF    2  LAST  220    43,2643  7 4741 0           MASK   NR29FBIT
 054303 REF   76  LAST  278    43,2644  10 000 0           CCS    A
 054304 REF   18  LAST  276    43,2645  0 2120 0           TC     ALM/END           YES
 054305 REF   10  LAST  220    43,2646  3 0101 1           CA     FLAGWRD5          IS R77 RUNNING?
 054306 REF    2  LAST  220    43,2647  7 4741 0           MASK   R77FLBIT
 054307 REF   77  LAST  280    43,2650  10 000 0           CCS    A
 054308 REF   19  LAST  280    43,2651  0 2120 0           TC     ALM/END           YES.
 05431  REF    3  LAST  228    43,2652  4 0103 1           CS     FLAGWRD7          IS SERVICER RUNNING AND HENCE POSSIBLY
 054315 REF    2  LAST  228    43,2653  7 4746 1           MASK   V37FLBIT          R12 USING THE LR?
 05432  REF   78  LAST  280    43,2654  10 000 0           CCS    A
 054325 REF    1                43,2655  1 2662 0           TCF    CHECKRR           NO
 05433  REF    2  LAST  229    43,2656  4 0107 0           CS     FLGWRD11          YES, IS R12 ON?
 054335 REF    2  LAST  229    43,2657  7 4735 0           MASK   LRBYBIT
 05434  REF   79  LAST  280    43,2660  10 000 0           CCS    A
 054345 REF   20  LAST  280    43,2661  0 2120 0           TC     ALM/END           YES
 05435  REF    9  LAST  231    43,2662  4 0075 1  CHECKRR  CS     FLAGWRD1          IS THE TRACK FLAG SET AND HENCE POSSIBLY
 054355 REF    1                43,2663  7 4747 0           MASK   TRACKBIT          P20 USING THE RR?
 05436  REF   80  LAST  280    43,2664  10 000 0           CCS    A
 054365 REF    1                43,2665  1 2672 1           TCF    CHECKP22          NO, CHECK FOR P22.

 054366 REF   19  LAST  269    43,2666  3 0074 1  CKRNDBIT CA     FLAGWRD0          YES, BUT IS IT P25?
 054367 REF    4  LAST  269    43,2667  7 4745 1           MASK   RNDVZBIT
 054368 REF   81  LAST  280    43,2670  10 000 0           CCS    A
 054369 REF   21  LAST  280    43,2671  0 2120 0           TC     ALM/END
 054372 REF    7  LAST  264    43,2672  4 1011 1  CHECKP22 CS     MODREG
 054373 REF    1                43,2673  6 2677 0           AD     DEC22
 054374                         43,2674  0 0006 1           EXTEND
 054375 REF   22  LAST  280    43,2675  1 2120 1           BZF    ALM/END
 054376 REF   24  LAST  263    43,2676  0 0002 0           TC     Q

 054377                         43,2677   00026 0  DEC22    DEC    22

 0544    REF    3 LAST   271 TO  275:    50    260*          COUNT* $$/EXTVB

 0545    REF    1              43,2700  0 2123 0  VB64     TC     CHKPOOH           DEMAND PROGRAM 00.
 0546    REF    7  LAST  276   43,2701  0 2076 1           TC     TESTXACT          IF DISPLAY SYS. NOT BUSY,MAKE IT BUSY.
 0547    REF    2  LAST  274   43,2702  3 4740 0           CAF    PRIO4
 0548    REF    5  LAST  274   43,2703  0 5105 0           TC     FINDVAC
 0549    REF    3  LAST  118   E4,1600                     EBANK= ALPHASB
 0550    REF    1              43,2704   03606 1           2CADR  SBANDANT          CALC.,DISPLAY S-BAND ANTENNA ANGLES.
 0550    REF    1              43,2705   64104 0
 0551    REF    9  LAST  277   43,2706  0 5155 0           TC     ENDOFJOB
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P0552              IMUATTCK      VERB 43             DESCRIPTION
R0553                  LOAD IMU ATTITUDE ERROR METERS
R0554                      1. REQUIRE P00 OR FRESH START.
R0555                      2. REQUIRE COARSE ALIGN ENABLE AND ZERO ICDU BITS OFF.
R0556                      3. REQUIRE THAT NEEDLES BE OFF.
R0557                      4. REQUEST LOAD OF N22   (VALUES TO BE DISPLAYED).
R0558                      5. ON PROCEED OR ENTER RE-DISPLAY V43 AND SEND PULSES.

 0559    REF    2  LAST  280    43,2707  0 2123 0  IMUATTCK TC      CHKPOOH            VB 76 - LOAD IMU ATT. ERROR METERS

 0560    REF    3  LAST  180    43,2710  3 4763 1           CAF      BITS4&5            SEE IF COARSE ALIGN ENABLE AND ZERO IMU
 0561                           43,2711  0 0006 1           EXTEND                      CDUS BITS ARE ON
 0562    REF   19  LAST  279    43,2712  02 012 0           RAND     CHAN12
 0563    REF   82  LAST  280    43,2713  10 000 0           CCS      A
 0564    REF   23  LAST  280    43,2714  1 2120 1           TCF      ALM/END            NOT ALLOWED IF IMU COARSE OR IMU ZERO ON

 0565    REF    1               43,2715  3 4355 0           CAF      BIT13-14           BOTH BITS 13 AND 14 MUST BE 1
 0566                           43,2716  0 0006 1           EXTEND                      INDICATING THE MODE SELECTED IS OFF.
 0567    REF    1               43,2717  06 031 0           RXOR     CHAN31
 0568    REF    2  LAST  281    43,2720  7 4355 1           MASK     BIT13-14
 0569                           43,2721  0 0006 1           EXTEND
 0570                           43,2722  1 2724 0           BZF      +2                 NEEDLES IS OFF.
 0571    REF   24  LAST  281    43,2723  1 2120 1           TCF      ALM/END            EXIT.  NEEDLES IS ON.

 0572    REF    8  LAST  280    43,2724  0 2076 1           TC       TESTXACT

 0573    REF    2  LAST  268    43,2725  3 2225 0           CAF      VNLODCDU
 0574    REF   46  LAST  279    43,2726  0 4616 1           TC       BANKCALL
 0575    REF    5  LAST  275    43,2727   20334 1           CADR     GOXDSPF
 0576    REF   15  LAST  279    43,2730  0 5472 0           TC       ENDEXT             V34
 0577                           43,2731  0 2732 0           TC       +1
 0578    REF    1               43,2732  3 2745 0           CAF      V43K               REDISPLAY OUR VERB.
 0579    REF   47  LAST  281    43,2733  0 4616 1           TC       BANKCALL
 0580    REF    5  LAST  273    43,2734   20620 1           CADR     EXDSPRET
 0581    REF   32  LAST  279    43,2735  3 4746 0           CAF      BIT6
 0582                           43,2736  0 0006 1           EXTEND
 0583    REF   20  LAST  281    43,2737  05 012 1           WOR      CHAN12             ENABLE ERROR COUNTERS.
 0584    REF    9  LAST  279    43,2740  3 4752 0           CAF      TWO
 0585    REF    9  LAST  277    43,2741  0 5203 0           TC       WAITLIST           PUT OUT COMMANDS IN .32 SECONDS.
 0586    REF    4  LAST   99       0321                     EBANK=   THETAD
 0587    REF    1               43,2742   02035 0           2CADR    ATTCK2
 0587    REF    1               43,2743   64100 1
 0588    REF   16  LAST  281    43,2744  1 5472 1           TCF      ENDEXT

 0589                           42,2035                     BANK     42
 0590    REF    1               42,2000                     SETLOC   PINBALL3           SOMETHING IN B42.
 0591                           42,2035                     BANK

 0592    REF    1                                           COUNT*   $$/EXTVB
 0593    REF  10  LAST  281    42,2035  3 4752 0  ATTCK2   CAF     TWO                  PUT OUT COMMANDS.
 0594    REF  25  LAST  280    42,2036  54 002 1   +1      TS      Q                    CDU WILL LIMIT EXCESS DATA.
 0595    REF  83  LAST  281    42,2037  50 000 1           INDEX   A
 0596    REF   5  LAST  281    42,2040  3 0321 1           CA      THETAD
 0597                          42,2041  0 0006 1           EXTEND
 0598    REF   1               42,2042  7 2053 1           MP      ATTSCALE
 0599    REF  26  LAST  282    42,2043  50 002 0           INDEX   Q
 0600    REF   2  LAST  174    42,2044  56 050 1           XCH     CDUXCMD
 0601    REF  27  LAST  282    42,2045  10 002 1           CCS     Q
 0602    REF   2  LAST  281    42,2046  1 2036 1           TCF     ATTCK2 +1

 0603    REF   1               42,2047  3 7740 0           CAF     13,14,15
 0604                          42,2050  0 0006 1           EXTEND
 0605    REF   6  LAST  220    42,2051  05 014 1           WOR     CHAN14
 0606    REF   4  LAST  239    42,2052  1 5261 0           TCF     TASKOVER             LEAVE ERROR COUNTERS ENABLED.

 06061                         42,2053   03146 1  ATTSCALE DEC     0.1

 0607                          07,2667                     BANK    7
 0608    REF   4  LAST  276    43,2000                     SETLOC  EXTVERBS
 0609                          43,2745                     BANK

 0610    REF   4 LAST  280 TO  281:     37   297*          COUNT*  $$/EXTVB

 0611                          43,2745   12600 1  V43K     VN      4300
R0613           V82PERF      VERB 82               DESCRIPTION
R0614                REQUEST ORBIT PARAMETERS DISPLAY (R30)
R0615    1. IF AVERAGE G IS OFF:
R0616           FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0617            TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0618            CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0619           SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0620           CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R0621            RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0622            HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0623            HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0624            INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0625           FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0626            NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0627            ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0628            DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0629            ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0630    2. IF AVERAGE G IS ON:
R0631           CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0632            FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0633            OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0634           FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0635           IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R0636            RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.
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 0637   REF   9  LAST  281   43,2746  0 2076 1  V82PERF   TC      TESTXACT

 0638   REF   2  LAST  275   43,2747  3 5021 1            CAF     PRIO7              LESS THAN LAMBERT.  R30,V82
 0639   REF   2  LAST  275   43,2750  0 5146 1            TC      PRIOCHNG
 0640                        43,2751  0 0006 1            EXTEND
 0641   REF   1              43,2752  3 2755 1            DCA     V82CON
 0642   REF   1              43,2753  0 5165 0            TC      SUPDXCHZ           V82CALL IN DIFF SUPERBANK FROM V82PERF

 0643   REF   2  LAST  117   E4,1716                      EBANK=  HAPO
 0644   REF   1              43,2754   03242 0  V82CON    2CADR   V82CALL
 0644   REF   1              43,2755   44104 1


R0645             VB83PERF      VERB 83              DESCRIPTION
R0646                 REQUEST RENDEZVOUS PARAMETER DISPLAY (R31)
R0647                 1. SET EXT VERB DISPLAY BUSY FLAG.
R0648                 2. SCHEDULE R31CALL WITH PRIORITY 5.
R0649                     A. DISPLAY
R0650                          R1  RANGE
R0651                          R2  RANGE RATE
R0652                          R3  THETA

 0653   REF  10  LAST  283   43,2756  0 2076 1  V83PERF   TC      TESTXACT

 0654   REF  23  LAST  277   43,2757  3 4752 0            CAF     BIT2
 0655   REF  10  LAST  281   43,2760  0 5203 0            TC      WAITLIST
 0656   REF   1              E7,1611                      EBANK=  TSTART
 0657   REF   1              43,2761   03674 1            2CADR   R31CALL
 0657   REF   1              43,2762   60107 1
 0658   REF  10  LAST  280   43,2763  0 5155 0            TC      ENDOFJOB

R0659   VERB 89 DESCRIPTION      RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)

R0660   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED.  CALCULATES AND
R0661   DISPLAYS FINAL FDAI BALL ANGLES TO POINT LM +X OR +Z AXIS AT CSM.

R0662   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R0663   EXIT R63, OTHERWISE CONTINUE.

R0664   2. IF IN P00, DO IMU STATUS CHECK ROUTINE (R02BOTH). IF IMU ON AND ITS
R0665   ORIENTATION KNOWN TO LGC, CONTINUE.

R0666   3. FLASH DISPLAY V 04 N 06.  R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0667   BE POINTED AT CSM.  INITIAL CHOICE IS PREFERRED (+Z) AXIS (R2=1).
R0668   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT = 1) BY V 22 E 2 E.  CONTINUE
R0669   AFTER KEYING IN PROCEED.

R0670   4. BOTH VEHICLE STATE VECTORS UPDATED BY CONIC EQS.

R0671   5. HALF MAGNITUDE UNIT LOS VECTOR (IN STABLE MEMBER COORDINATES) AND
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R0672    HALF MAGNITUDE UNIT SPACECRAFT AXIS VECTOR (IN BODY COORDINATES)
R0673    PREPARED FOR VECPOINT.

R0674    6. GIMBAL ANGLES FROM VECPOINT TRANSFORMED INTO FDAI BALL ANGLES BY
R0675    BALLANGS. FLASH DISPLAY V 06 N 18 AND AWAIT RESPONSE.

R0676    7. RECYCLE - RETURN TO STEP 4.
R0677       TERMINATE - EXIT P63.
R0678       PROCEED - RESET 3AXISFLG AND CALL R60LEM FOR ATTITUDE MANEUVER.


 0679    REF   3  LAST  281   43,2764  0 2123 0  V89PERF   TC      CHKPOOH
 0680    REF  11  LAST  283   43,2765  0 2076 1            TC      TESTXACT
 0681    REF   1              43,2766  3 4737 0            CAF     PRIO10
 0682    REF   6  LAST  280   43,2767  0 5105 0            TC      FINDVAC
 0683    REF   3  LAST  118   E4,1606                      EBANK=  RONE
 0684    REF   1              43,2770   02022 0            2CADR   V89CALL
 0684    REF   1              43,2771   54104 0
 0685    REF  11  LAST  283   43,2772  0 5155 0            TC      ENDOFJOB

R0686             V90PERF     VERB 90               DESCRIPTION
R0687                 REQUEST RENDEZVOUS OUT-OF-PLANE DISPLAY (R36)
R0688                 1. SET EXT VERB DISPLAY BUSY FLAG.
R0689                 2. SCHEDULE R36 CALL WITH PRIORITY 10
R0690                    A. DISPLAY
R0691                        TIME OF EVENT - HOURS , MINUTES , SECONDS
R0692                        Y  OUT-OF-PLANE POSITION - NAUTICAL MILES
R0693                        YDOT  OUT-OF-PLANE VELOCITY - FEET/SECOND
R0694                        PSI  ANGLE BTW LINE OF SIGHT AND FORWARD
R0695                             DIRECTION VECTOR IN HORIZONTAL PLANE - DEGREES

 0696    REF  12  LAST  284   43,2773  0 2076 1  V90PERF   TC      TESTXACT
 0697    REF   3  LAST  233   43,2774  3 5021 1            CAF     PRIO7             R36,V90
 0698    REF   7  LAST  284   43,2775  0 5105 0            TC      FINDVAC
 0699    REF   2  LAST  118   E4,1606                      EBANK=  RPASS36
 0700    REF   1              43,2776   02656 0            2CADR   R36
 0700    REF   1              43,2777   10104 0
 0701    REF  12  LAST  284   43,3000  1 5155 1            TCF     ENDOFJOB
R0702             MINIMP     VERB 76                DESCRIPTION
R0703                 MINIMUM IMPULSE MODE
R0704                 1. SET MINIMUM IMPULSE RHC MODE FLAG TO 1.

 0705                         43,3001  0 0004 0  MINIMP    INHINT
 0706    REF   4  LAST  219   43,3002  4 0111 1            CS      DAPBOOLS
 0707    REF   1              43,3003  7 4735 0            MASK    PULSES            PULSES = 1 INDICATES MIN IMP MODE
 0708    REF   5  LAST  284   43,3004  26 111 1            ADS     DAPBOOLS
 0709    REF  14  LAST  279   43,3005  1 2121 0            TCF     GOPIN             RETURN VIA PINBRNCH

R0710             NOMINIMP     VERB 77              DESCRIPTION
R0711                 RATE COMMAND MODE
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R0712                    1. SET MINIMUM IMPULSE RHC MODE FLAG TO 0. (ZERO INDICATES NOT MINIMUM IMPULSE MODE.).
R0714                    2. MOVE CDUX,CDUY,CDUZ INTO CDUXD,CDUYD,CDUZD.

 0718                           43,3006  0 0004 0  NOMINIMP INHINT
 0719   REF   2  LAST  284      43,3007  4 4735 0           CS       PULSES
 0720   REF   6  LAST  284      43,3010  7 0111 1           MASK     DAPBOOLS
 0721   REF   7  LAST  285      43,3011  54 111 1           TS       DAPBOOLS            PULSES = 0 NOT IN MINIMUM UMPULSE MODE
 0722   REF  11  LAST  245      43,3012  0 4674 0           TC       IBNKCALL
 0723   REF   1                 43,3013   40153 1           CADR     ZATTEROR
 0724   REF  15  LAST  284      43,3014  0 2121 1           TC       GOPIN
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R0738             CREWMANU      VERB 49               DESCRIPTION
R0739                 START AUTOMATIC ATTITUDE MANEUVER
R0740                 1. REQUIRE PROGRAM 00 ACTIVE.
R0741                 2. SET EXT VERB DISPLAY BUSY FLAG.
R0742                 3. SCHEDULE R62DISP WITH PRIORITY 10.
R0743                 4. RELEASE EXT VERB DISPLAY.

R0744               R62DISP
R0745                 1. DISPLAY FLASHING V06,N22.
R0746                    RESPONSES
R0747                    A. TERMINATE
R0748                       1. GO TO GOTOPOOH.
R0749                    B. PROCEED
R0750                       1. SET 3AXISFLG TO INDICATE MANEUVER IS SPECIFIED BY 3 AXIS.
R0752                       2. EXECUTE R60LEM (ATTITUDE MANEUVER).
R0753                    C. ENTER
R0754                       1. REPEAT FLASHING V06,N22.

 0755    REF   4  LAST  284   43,3015  0 2123 0  CREWMANU TC      CHKPOOH          DEMAND POO

 0756    REF  13  LAST  284   43,3016  0 2076 1           TC      TESTXACT

 0757    REF   2  LAST  284   43,3017  3 4737 0           CAF     PRIO10
 0758    REF   8  LAST  284   43,3020  0 5105 0           TC      FINDVAC
 0759    REF   2  LAST  135   E6,1676                     EBANK=  BCDU
 0760    REF   1              43,3021   02103 1           2CADR   R62DISP
 0760    REF   1              43,3022   46106 1
 0761    REF  13  LAST  284   43,3023  0 5155 0           TC      ENDOFJOB
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P0762    TRMTRACK      VERB 56                      DESCRIPTION
R0763                  TERMINATE TRACKING (P20 AND P25).
R0764                  1. KNOCK DOWN RENDEZVOUS, TRACK, AND UPDATE FLAGS.
R0765                  2. REQUIRE P20 OR  P25 NOT RUNNING ALONE OR GO TO GOTOPOOH (REQUEST PROGRAM 00).
R0767                  3. SCHEDULE V56TOVAC WITH PRIORITY 30.

R0768                  V56TOVAC
R0769                  1. EXECUTE INTSTALL (IF INTEGRATION IS RUNNING, STALL UNTIL IT IS FINISHED.).
R0771                  2. ZERO GROUP 2 TO HALT P20.
R0772                  3. TRANSFER CONTROL TO GOPROG2 (SOFTWARE RESTART).

 0773    REF   1                43,3024  3 3044 1  TRMTRACK CA      BITS9+7          IS REND OR P25 FLAG ON
 0774    REF  20  LAST  280     43,3025  7 0074 0           MASK    FLAGWRD0
 0775                           43,3026  0 0006 1           EXTEND
 0776    REF  16  LAST  285     43,3027  1 2121 0           BZF     GOPIN            NO

 0777    REF  16  LAST  279     43,3030  0 5516 0           TC      DOWNFLAG
 0778    REF   1                43,3031   00010 0           ADRES   RNDVZFLG

 0779    REF  17  LAST  287     43,3032  0 5516 0           TC      DOWNFLAG
 0780    REF   1                43,3033   00006 1           ADRES   P25FLAG

 07803   REF  18  LAST  287     43,3034  0 5516 0           TC      DOWNFLAG         ENSURE SEARCH FLAG IS OFF
 07806   REF   1                43,3035   00037 0           ADRES   SRCHOPTN

 0781    REF   2  LAST  280     43,3036  3 4747 1           CA      TRACKBIT         IS TRACK FLAG ON?
 0782    REF  10  LAST  280     43,3037  7 0075 1           MASK    FLAGWRD1
 0783                           43,3040  0 0006 1           EXTEND
 0784    REF  17  LAST  287     43,3041  1 2121 0           BZF     GOPIN

 07841   REF  10  LAST  275     43,3042  0 4635 0           TC      POSTJUMP
 07842   REF   1                43,3043   64054 1           CADR    TRMTRAK1

 078425                         43,3044   00500 1  BITS9+7  OCT     500

 07843   REF   3  LAST  271     42,2000                     SETLOC  SBAND            BANK 42
 07844                          42,2054                     BANK

 07845   REF   2 LAST  281 TO  282:   15     15*            COUNT*  $$/EXTVB

 0785    REF  19  LAST  287     42,2054  0 5516 0  TRMTRAK1 TC      DOWNFLAG
 0786    REF   1                42,2055   00027 1           ADRES   UPDATFLG         UPDATE FLAG DOWN
 0787    REF  20  LAST  287     42,2056  0 5516 0           TC      DOWNFLAG
 0788    REF   1                42,2057   00031 0           ADRES   TRACKFLG         TRACK FLAG DOWN
 0789    REF  21  LAST  287     42,2060  0 5516 0           TC      DOWNFLAG
 0790    REF   2  LAST  231     42,2061   00007 0           ADRES   IMUSE

 0791    REF   6  LAST  252     42,2062  0 6037 0           TC      INTPRET
 0792                           42,2063   77624 1           CALL
 0793    REF   3  LAST  236     42,2064   27414 0                   INTSTALL         DONT INTERRUPT INTEGRATION
 0794                        42,2065   77776 1              EXIT

 0795    REF   2  LAST  228  42,2066  0 5353 1              TC       PHASCHNG
 0796                        42,2067   00002 0              OCT      2                KILL GROUP 2 TO HALT P20 ACTIVITY

 0797                        42,2070  0 0004 0              INHINT
 0798    REF  12  LAST  285  42,2071  0 4674 0              TC       IBNKCALL         ZERO THE COMMANDED RATES TO STOP
 0799    REF   1             42,2072   40165 1              CADR     STOPRATE         MANEUVER

 0800    REF  13  LAST  288  42,2073  0 4674 0              TC       IBNKCALL
 0801    REF   1             42,2074   40123 0              CADR     RESTORDB

 0802    REF   4  LAST  270  42,2075  0 6011 1              TC       CLRADMOD         CLEAR BITS 10 + 15 OF RADMODES.

 0804    REF  32  LAST  279  42,2076  4 4736 0              CS       BIT14            DISABLE LOCKON
 0805                        42,2077  0 0006 1              EXTEND
 0806    REF  21  LAST  281  42,2100  03 012 1              WAND     CHAN12
 0807    REF  11  LAST  287  42,2101  0 4635 0              TC       POSTJUMP
 0808    REF   2  LAST  230  42,2102   12770 1              CADR     GOPROG2          CAUSE RESTART.

R0810                DNEDJMP     VERB 74              DESCRIPTION
R0811                    INITIALIZE DOWN-TELEMETRY PROGRAM FOR ERASABLE MEMORY DUMP.
R0812                    1. SET EXT VERB DISPLAY BUSY FLAG.
R0813                    2. REPLACE CURRENT DOWNLIST WITH ERASABLE MEMORY.
R0814                    3. RELEASE EXT VERB DISPLAY.

 08145   REF   5  LAST  282  43,2000                        SETLOC EXTVERBS
 08146                       43,3045                        BANK

 08147   REF   5 LAST   282 TO  287:     64    361*         COUNT* $$/EXTVB

 0815                           0400                        EBANK= 400
 0816    REF   1             43,3045  3 3050 1  DNEDUMP     CAF      LDNDUMPI
 0817    REF   3  LAST  219  43,3046  54 335 0              TS       DNTMGOTO
 0818    REF   1  LAST  287  43,3047  0 2121 1              TC       GOPIN

 0819    REF   2  LAST  262  43,3045            V74         EQUALS DNEDUMP
 0820    REF   1             43,3050   03707 1  LDNDUMPI    REMADR DNDUMPI


R0821                LEMVEC      VERB 80              DESCRIPTION
R0822                    UPDATE LEM STATE VECTOR
R0823                       RESET VEHUPFLG TO 0

 0825    REF  22  LAST  287  43,3051  0 5516 0  LEMVEC      TC       DOWNFLAG
 0826    REF   1             43,3052   00026 0              ADRES    VEHUPFLG         VB 80 - VEHUPFLG DOWN INDICATES LEM

 0827    REF   1             43,3053  0 3056 1              TC       NOUPDOWN
R0828                CSMVEC      VERB 81              DESCRIPTION
R0829                    UPDATE CSM STATE VECTOR
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R0830                       SET   VEHUPFLG TO 1

 0832   REF   8  LAST  276   43,3054  0 5504 0  CSMVEC    TC     UPFLAG
 0833   REF   2  LAST  288   43,3055   00026 0            ADRES  VEHUPFLG      VB 81 - VEHUPFLG UP INDICATES CSM

 0834   REF  23  LAST  288   43,3056  0 5514 0  NOUPDOWN  TC     DOWNFLAG
 0835   REF   1              43,3057   00030 1            ADRES  NOUPFLAG

 0836   REF  19  LAST  289   43,3060  1 2121 0            TCF    GOPIN

R0842                UPDATOFF   VERB95         DESCRIPTION
R0843                    INHIBIT STATE VECTOR UPDATES BY INCORP
R0844                       SET NOUPFLAG TO 1

 0845   REF   9  LAST  289   43,3061  0 5504 0  UPDATOFF  TC     UPFLAG        VB 95 SET NOUPFLAG
 0846   REF   2  LAST  289   43,3062   00030 1            ADRES  NOUPFLAG

 0847   REF  20  LAST  289   43,3063  0 2121 1            TC     GOPIN
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P0848                SYSTEST      VERB 92                 DESCRIPTION
R0849                  OPERATE IMU PERFORMANCE TEST.
R0850                    1. REQUIRE PROGRAM GO OR TURN ON OPERATOR ERROR.
R0851                    2. SET EXT VERB BUSY FLAG.
 0852   REF    2  LAST  127    E5,1417                              EBANK= QPLACE

 0853   REF    5  LAST  286    43,3064   0 2123 0  SYSTEST  TC      CHKPOOH          DEMAND POO

 0854   REF   14  LAST  286    43,3065   0 2076 1           TC      TESTXACT

 0855   REF    1               43,3066   3 7710 0           CAF     PRIO22
 0856   REF    9  LAST  286    43,3067   0 5105 0           TC      FINDVAC
 0857   REF    3  LAST  290    E5,1417                      EBANK= QPLACE
 0858   REF    1               37,2000                      SBANK= IMUSUPER
 0859   REF    1               43,3070    02002 1           2CADR   REDO
 0859   REF    1               43,3071    76065 0
 0860   REF   14  LAST  286    43,3072   0 5155 0           TC      ENDOFJOB

R0861   VERB 93           CLEAR RENDWFLG, CAUSES W-MATRIX TO BE RE-INITIALIZED.

 0862                          43,3073   0 0004 0  WMATRXNG INHINT
 0863   REF    1               43,3074   4 4753 0           CS      RENDWBIT
 0864   REF   11  LAST  280    43,3075   7 0101 0           MASK    FLAGWRD5
 0865   REF   12  LAST  290    43,3076   54 101 0           TS      FLAGWRD5

 0866   REF   21  LAST  289    43,3077   0 2121 1           TC      GOPIN

 0867   REF    1               43,3100             GOSHOSUM EQUALS  SHOWSUM

 0868   REF    6  LAST  290    43,3100   0 2123 0  SHOWSUM  TC      CHKPOOH          *
 0869   REF   15  LAST  290    43,3101   0 2076 1           TC      TESTXACT         *
 0870   REF    4  LAST  284    43,3102   3 5021 1           CAF     PRIO7            ALLOW OTHER CHARINS.
 0871   REF    3  LAST  283    43,3103   0 5146 1           TC      PRIOCHNG
 0872   REF    1               43,3104   3 4753 1           CAF     S+1              *
 0873   REF    2  LAST  106    43,3105   55'376 0           TS      SKEEP6           * SHOWSUM OPTION
 0874   REF    1               43,3106   3 4755 1           CAF     S+ZERO           *
 0875   REF    3  LAST  212    43,3107   55'362 0           TS      SMODE            * TURN OFF SELF-CHECK
 0876   REF    1               43,3110   3 3245 1           CA      SELFADRS         *
 0877   REF    3  LAST  222    43,3111   55'361 0           TS      SELFRET          *
 0878   REF    1               43,3112   0 3522 1           TC      STSHOSUM         * ENTER ROPECHK

 0879   REF    2  LAST  108    43,3113   23'372 0  SDISPLAY LXCH    SKEEP2           * BANK # FOR DISPLAY
 0880   REF    2  LAST  108    43,3114   23'373 1           LXCH    SKEEP3           * BUGGER WORD FOR DISPLAY
 0881   REF    1               43,3115   3 3244 0  NOKILL   CA      ADRS1            *
 0882   REF   41  LAST  275    43,3116   54 156 1           TS      MPAC +2          *
 0883   REF    1               43,3117   3 3130 0           CA      VNCON            * 0501
 0884   REF   48  LAST  281    43,3120   0 4616 1           TC      BANKCALL         *
 0885   REF    6  LAST  281    43,3121    20334 1           CADR    GOXDSPF          *
 0886                          43,3122   0 3125 1           TC      +3               *
 0887   REF    1               43,3123   0 3633 1           TC      NXTBNK           *
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0888   REF   1               43,3124  0 3115 1            TC       NOKILL       *
0889   REF   2  LAST  290    43,3125  3 3245 1            CA       SELFADRS
0890   REF   2  LAST  108    43,3126  55'371 1            TS       SKEEP1

0891   REF  17  LAST  281    43,3127  0 5472 0            TC       ENDEXT       *

0892                         43,3130   01201 0  VNCON     VN       501          *

0893   REF   3  LAST  290    43,3131  3 1376 1  ENDSUMS   CA       SKEEP6       *
0894                         43,3132  0 0006 1            EXTEND                *
0895   REF   2  LAST  222    43,3133  1 3336 0            BZF      SELFCHK      * ROPECHK, START SELFCHK AGAIN.
0896   REF   2  LAST  290    43,3134  0 3522 1            TC       STSHOSUM     * START SHOWSUM AGAIN.
```

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P0897                DAPDISP      VERB 48               DESCRIPTION
R0898                    LOAD AUTO PILOT  DATA
R0899                    1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG.
R0900                    2. EXECUTE DAPDATA1, DAPDATA2, AND DAPDATA3.
R0901                    3. RELEASE EXT VERB DISPLAY SYSTEM.
 0902    REF  16  LAST  290    43,3135  0 2076 1  DAPDISP  TC       TESTXACT
 0903    REF   5  LAST  290    43,3136  3 5021 1           CAF      PRIO7               R03
 0904    REF   4  LAST  290    43,3137  0 5146 1           TC       PRIOCHNG
 0905    REF  12  LAST  2      43,3140  0 4635 0           TC       POSTJUMP
 0906    REF   1               43,3141   40004 1           CADR     DAPDATA1
 0907                          34,2000                     BANK     34
 0908    REF   1               20,2000                     SETLOC   LOADDAP
 0909                          20,2004                     BANK

 0910    REF   1                                           COUNT*   $$/R03

 0911    REF   2  LAST  210    30,2000                     SBANK=   LOWSUPER            FOR SUBSEQUENT LOW 2CADR'S.

 0912    REF   1               20,2004  3 2114 1  DAPDATA1 CAF      BOOLSMSK            SET DISPLAY ACCORDING TO DAPBOOLS BITS.
 0913    REF   8  LAST  285    20,2005  7 0111 1           MASK     DAPBOOLS            LM
 0914    REF   1               20,2006  55'343 0           TS       DAPDATR1            LM
 0927    REF   6  LAST  216    20,2007  4 0106 1           CS       FLGWRD10            SET BIT 14 TO BE COMPLEMENT OF APSFLAG.
 0928    REF   2  LAST  213    20,2010  7 4737 1           MASK     APSFLBIT
 0929    REF  84  LAST  282    20,2011  10 000 0           CCS      A
 0930    REF  33  LAST  288    20,2012  3 4736 1           CAF      BIT14
 0931    REF   2  LAST  292    20,2013  27'343 0           ADS      DAPDATR1
 0932    REF   3  LAST  292    20,2014  31'343 1  CHKDATA1 CAE      DAPDATR1            IF BITS 13 AND 14 ARE BOTH ZERO, FORCE
 0933    REF   3  LAST  281    20,2015  7 4355 1           MASK     BIT13-14              A ONE INTO BIT 13.
 0934                          20,2016  0 0006 1           EXTEND
 0935    REF   1               20,2017  1 2034 0           BZF      FORCEONE
 0936    REF   4  LAST  292    20,2020  31'343 1           CAE      DAPDATR1            ENSURE THAT NO ILLEGAL BITS SET BY CREW.
 0937    REF   1               20,2021  7 2113 1  MSKDATR1 MASK     DSPLYMSK
 0938    REF   5  LAST  292    20,2022  55'343 0           TS       DAPDATR1
 0939    REF   1               20,2023  3 2112 1           CAF      V01N46              LM
 0940    REF  49  LAST  290    20,2024  0 4616 1           TC       BANKCALL
 0941    REF   1               20,2025   20353 0           CADR     GOXDSPFR
 0942    REF  18  LAST  291    20,2026  1 5472 1           TCF      ENDEXT              V34E  TERMINATE
 0943    REF   1               20,2027  1 2037 0           TCF      DPDAT1              V33E  PROCEED
 0944    REF   1               20,2030  1 2014 1           TCF      CHKDATA1            E     NEW DATA     CHECK AND REDISPLAY
 0945    REF   1               20,2031  3 6242 0           CAF      REVCNT              BITS 2 & 3:  BLANKS R2 & R3.
 0946    REF   3  LAST  277    20,2032  0 5464 1           TC       BLANKET
 0947    REF  15  LAST  290    20,2033  1 5155 1           TCF      ENDOFJOB
 0948    REF  21  LAST  258    20,2034  3 4737 0  FORCEONE CAF      BIT13
 0949    REF   6  LAST  292    20,2035  27'343 0           ADS      DAPDATR1
 0950    REF   1               20,2036  1 2021 1           TCF      MSKDATR1

 0951                          20,2037  0 0004 0  DPDAT1   INHINT                       INHINT FOR SETTING OF FLAG BITS AND MASS
 0952    REF   3  LAST  292    20,2040  4 4737 1           CS       APSFLBIT              ON BASIS OF DISPLAYED DAPDATR1.
 0953    REF   7  LAST  292    20,2041  7 0106 1           MASK     FLGWRD10
 0954    REF  22  LAST  275    20,2042  54 001 1           TS       L                   SET APSFLAG TO BE COMPLEMENT OF BIT 14.
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0955  REF   7  LAST  292   20,2043  4 1343 0            CS      DAPDATR1
0956  REF  34  LAST  292   20,2044  7 4736 0            MASK    BIT14
0957  REF  85  LAST  292   20,2045  10 000 0            CCS     A
0958  REF   4  LAST  292   20,2046  3 4737 0            CAF     APSFLBIT
0959  REF  23  LAST  292   20,2047  6 0001 0            AD      L
0960  REF   8  LAST  292   20,2050  54 106 1            TS      FLGWRD10
0961  REF   8  LAST  293   20,2051  4 1343 0            CS      DAPDATR1             SET BITS OF DAPBOOLS ON BASIS OF DISPLAY
0962  REF   4  LAST  292   20,2052  7 4355 1            MASK    BIT13-14               MASK OUT CSMDOCKD (BIT 13) UNLESS BOTH
0963  REF  86  LAST  293   20,2053  10 000 0            CCS     A                      13 AND 14 ARE SET.
0964  REF   1              20,2054  4 4737 1            CS      CSMDOCKD
0965  REF   2  LAST  292   20,2055  6 2114 1            AD      BOOLSMSK
0966  REF   9  LAST  293   20,2056  7 1343 0            MASK    DAPDATR1
0967  REF  24  LAST  293   20,2057  54 001 1            TS      L
0968  REF   3  LAST  293   20,2060  4 2114 0            CS      BOOLSMSK
0969  REF   9  LAST  292   20,2061  7 0111 1            MASK    DAPBOOLS
0970  REF  25  LAST  293   20,2062  6 0001 0            AD      L
0971  REF  10  LAST  293   20,2063  54 111 1            TS      DAPBOOLS
0972  REF   2  LAST  293   20,2064  7 4737 1            MASK    CSMDOCKD             LOAD MASS IN ACCORDANCE WITH CSMDOCKD.
0973  REF  87  LAST  293   20,2065  10 000 0            CCS     A                      MASS IS USUALLY ALREADY OKAY, SO DO
0974  REF   1              20,2066  31'332 1            CAE     CSMMASS                NOT TOUCH ITS LOW-ORDER PART.
0975  REF   7  LAST  204   20,2067  6 1331 1            AD      LEMMASS
0976  REF   3  LAST  105   20,2070  55'244 0            TS      MASS
0977  REF  11  LAST  293   20,2071  30 111 0            CAE     DAPBOOLS
0978  REF   1              20,2072  7 4741 0            MASK    ACC4OR2X             2 OR 4 JET X-TRANSLATION
0979                       20,2073  0 0006 1            EXTEND                       (BIT ACC4OR2X = 1 FOR 4 JETS)
0980                       20,2074  1 2101 1            BZF     +5
0981  REF  10  LAST  217   20,2075  4 4735 0            CS      BIT15
0982  REF  11  LAST  287   20,2076  7 0075 1            MASK    FLAGWRD1             CLEAR NJTSFLAG TO 0 FOR 4 JETS
0983  REF  12  LAST  293   20,2077  54 075 1            TS      FLAGWRD1
0984                       20,2100  1 2104 1            TCF     +4
0985  REF  13  LAST  293   20,2101  4 0075 1            CS      FLAGWRD1             SET NJTSFLAG TO 1 FOR 2 JETS
0986  REF  10  LAST  293   20,2102  7 4735 0            MASK    BIT15
0987  REF  14  LAST  293   20,2103  26 075 1            ADS     FLAGWRD1
0988  REF  12  LAST  293   20,2104  3 0111 0            CA      DAPBOOLS             SELECT DESIRED KALCMANU AUTOMATIC
0989  REF   2  LAST  233   20,2105  7 6245 0            MASK    THREE                MANEUVER RATE
0990                       20,2106  6 0000 1            DOUBLE                       RATEINDX HAS TO BE 0,2,4,6 SINCE RATES
0991  REF   2  LAST  212   20,2107  55'325 0            TS      RATEINDX             ARE DP
0992  REF  13  LAST  292   20,2110  0 4635 0            TC      POSTJUMP
0993  REF   1              20,2111   02206 1            CADR    STIKLOAD

0995                       20,2112   00256 0  V01N46    VN      0146
0996                       20,2113   33113 1  DSPLYMSK  OCT     33113
0997                       20,2114   13113 0  BOOLSMSK  OCT     13113
0998                       01,2206                      BANK    01
0999  REF   2  LAST   43   01,2000                      SETLOC  LOADDAP1
1000                       01,2206                      BANK

1001  REF   2 LAST    43 TO   43:     2       2*        COUNT*  $$/R03

1002  REF   3  LAST  219   01,2206  3 5015 0  STIKLOAD  CAF     EBANK6
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 1003    REF    7  LAST   279   01,2207  54 003 0             TS       EBANK
 1004    REF    2  LAST   212   E6,1444                       EBANK=   STIKSENS
 1005    REF    1               01,2210  3 4745 0             CA       RHCSCALE        SET STICK SENSITIVITY TO CORRESPOND TO A
 1006    REF   13  LAST   293   01,2211  7 0111 1             MASK     DAPBOOLS        MAXIMUM COMMANDED RATE (AT 42 COUNTS) OF
 1007    REF   88  LAST   293   01,2212  10 000 0             CCS      A               20 D/S(NORMAL) OR 4 D/S(FINE), SCALED
 1008    REF    1               01,2213  3 2337 1             CA       NORMAL          AT 45 D/S.
 1009    REF    1               01,2214  6 2340 1             AD       FINE
 1010    REF    3  LAST   294   01,2215  55'444 0             TS       STIKSENS
 1011    REF    1               01,2216  3 2342 0             CA       -0.6D/S
 1012    REF    3  LAST   212   01,2217  55'476 1             TS       -RATEDB         LM-ONLY BREAKOUT LEVEL IS .6 D/S.
 1013    REF    3  LAST   293   01,2220  3 4737 0             CA       CSMDOCKD        IF CSM-DOCKED, DIVIDE STICK SENSITIVITY
 1014    REF   14  LAST   294   01,2221  7 0111 1             MASK     DAPBOOLS        BY 10. NORMAL SCALING IS THEN 2 D/S AND
 1015                           01,2222  0 0006 1             EXTEND                   FINE SCALING IS 0.4 D/S
 1016                           01,2223  1 2232 1             BZF      +7              BRANCH IF CSM IS NOT DOCKED.
 1017    REF    4  LAST   294   01,2224  3 1444 1             CA       STIKSENS
 1018                           01,2225  0 0006 1             EXTEND
 1019    REF    1               01,2226  7 2341 1             MP       1/10
 1020    REF    5  LAST   294   01,2227  55'444 0             TS       STIKSENS
 1021    REF    1               01,2230  3 2343 1             CA       -0.3D/S         CSM-DOCKED BREAKOUT LEVEL IS .3 D/S.
 1022    REF    4  LAST   294   01,2231  55'476 1             TS       -RATEDB
 1023                           01,2232  0 0003 1             RELINT                   PROCEED TO NOUN 47, MASS LOAD,

 1024    REF    1               01,2233  3 2334 1  DAPDATA2   CAF      V0647
 1025    REF   50  LAST   292   01,2234  0 4616 1             TC       BANKCALL
 1026    REF    2  LAST   292   01,2235   20353 0             CADR     GOXDSPFR
 1027    REF    1               01,2236  1 2244 0             TCF      ENDR03          V34E  TERMINATE. FIRST SET DB, DC 1/ACCS
 1028    REF    1               01,2237  1 2250 0             TCF      DAPDAT2         V33E  PROCEED
 1029    REF    1               01,2240  1 2233 0             TCF      DAPDATA2              LOAD NEW DATA AND RECYCLE
 1030    REF   17  LAST   277   01,2241  3 4751 0             CAF      BIT3            BLANKS R3
 1031    REF    4  LAST   292   01,2242  0 5464 1             TC       BLANKET                     LM
 1032    REF   16  LAST   292   01,2243  1 5155 1             TCF      ENDOFJOB
 1033                           01,2244  0 0004 0  ENDR03     INHINT
 1034    REF   14  LAST   288   01,2245  0 4674 0             TC       IBNKCALL
 1035    REF    2  LAST   288   01,2246   40123 0             CADR     RESTORDB
 1036    REF   19  LAST   292   01,2247  1 5472 1             TCF      ENDEXT          DOES RELINT

 1037    REF    9  LAST   293   01,2250  4 0106 1  DAPDAT2    CS       FLGWRD10        DETERMINE STAGE FROM APSFLAG
 1038    REF    5  LAST   293   01,2251  7 4737 1             MASK     APSFLBIT
 1039    REF   89  LAST   294   01,2252  10 000 0             CCS      A
 1040    REF    1               01,2253  3 2000 0             CA       MINLMD
 1041    REF    1               01,2254    2001 1             AD       MINMINLM
 1042    REF    8  LAST   293   01,2255  6 1331 1             AD       LEMMASS         LEMMASS MUST BE GREATER THAN EMPTY LEM
 1043                           01,2256  0 0006 1             EXTEND
 1044    REF    2  LAST   294   01,2257  6 2233 1             BZMF     DAPDATA2        ASK FOR NEW MASSES
 1045    REF   15  LAST   294   01,2260  30 111 0             CAE      DAPBOOLS
 1046    REF    4  LAST   294   01,2261  7 4737 1             MASK     CSMDOCKD
 1047                           01,2262  0 0006 1             EXTEND
 1048    REF    1               01,2263  1 2271 0             BZF      LEMALONE        SKIP TEST ON CSMMASS IF NOT DOCKED.
 1049    REF    1               01,2264  4 4741 0             CS       MINCSM          TEST CSM MASS
 1050    REF    2  LAST   293   01,2265  6 1332 1             AD       CSMMASS         CSMMASS MUST BE GREATER THAN EMPTY CSM
 1051                         01,2266  0 0006 1              EXTEND
 1052  REF  3  LAST  294      01,2267  6 2233 1              BZMF     DAPDATA2         ASK FOR NEW MASSES
 1053  REF  3  LAST  294      01,2270  31'332 1              CAE      CSMMASS          DOCKED:  MASS = CSMMASS + LEMMASS
 1054  REF  3  LAST  294      01,2271  6 1331 1    LEMALONE  AD       LEMMASS          LEM ALONE:  MASS = LEMMASS
 1055                         01,2272  22 007 0              ZL
 1056  REF  4  LAST  293      01,2273  53'245 1              DXCH     MASS
 1057                         01,2274  0 0004 0              INHINT
 1058  REF 15  LAST  294      01,2275  0 4674 0              TC       IBNKCALL         SET DEADBANK AND COMPUTE MOMENTS OF
 1059  REF  3  LAST  294      01,2276   40123 0              CADR     RESTORDB           INERTIA.
 1060                         01,2277  0 0003 1              RELINT                    PROCEED TO NOUN 48 (OR END).

 1061  REF 10  LAST  294      01,2300  4 0106 1    DAPDATA3  CS       FLGWRD10
 1062  REF  6  LAST  294      01,2301  7 4737 1              MASK     APSFLBIT
 1063                         01,2302  0 0006 1              EXTEND                    END ROUTINE IF LEM HAS STAGED,
 1064  REF 20  LAST  294      01,2303  1 5472 1              BZF      ENDEXT
 1065  REF  1                 01,2304  3 2335 0              CAF      V06N48           DISPLAY TRIM ANGLES AND REQUEST RESPONSE
 1066  REF 51  LAST  294      01,2305  0 4616 1              TC       BANKCALL
 1067  REF  2  LAST  294      01,2306   20353 0              CADR     GOXDSPFR
 1068  REF 21  LAST  295      01,2307  0 5472 0              TC       ENDEXT
 1069  REF  1                 01,2310  1 2315 0              TCF      DPDAT3           V33E GO DO TRIM (WAITLIST TO TRIMGIMB)
 1070                         01,2311  1 2304 0              TCF       -5                   LOAD NEW DATA AND RECYCLE
 1071  REF 18  LAST  29       01,2312  3 4751 0              CAF      BIT3
 1072  REF  5  LAST  294      01,2313  0 5464 1              TC       BLANKET          BLANK R3
 1073  REF 17  LAST  294      01,2314  1 5155 1              TCF      ENDOFJOB
 1074  REF 18  LAST  181      01,2315  3 4753 1    DPDAT3    CAF      BIT1             GO TO TRIMGIMB VIA WAITLIST SO IT
 1075                         01.2316  0 0004 0              INHINT                    CAN USE FIXDELAY AND VARDELAY
 1076  REF 11  LAST  283      01,2317  0 5203 0              TC       WAITLIST
 1077  REF  1                 E6,1401                        EBANK=   NULLTIME
 1078  REF  1                 01,2320   03217 0              2CADR    TRIMGIMB
 1078  REF  1                 01,2321   54066 1
 1079  REF 18  LAST  295      01,2322  1 5155 1              TCF      ENDOFJOB         DOES A RELINT
 1080  REF  1                 01,2323  3 2336 0    TRIMDONE  CAF      V50N48
 1081  REF 52  LAST  295      01,2324  0 4616 1              TC       BANKCALL         TRIM IS FINISHED; PLEASE TERMINATE R03
 1082  REF  1                 01,2325   20361 1              CADR     GOMARK3R
 1083  REF 22  LAST  295      01,2326  0 5472 0              TC       ENDEXT           V34E TERMINATE
 1084  REF 23  LAST  295      01,2327  0 5472 0              TC       ENDEXT
 1085  REF 24  LAST  295      01,2330  0 5472 0              TC       ENDEXT
 1086  REF  4  LAST  267      01,2331  3 6007 0              CAF      OCT24            BITS TO CHANGE TO PERFORM, 3 TO BLANK R3
 1087  REF  6  LAST  295      01,2332  0 5464 1              TC       BLANKET
 1088  REF 19  LAST  295      01,2333  1 5155 1              TCF      ENDOFJOB

 10885                        01,2334   01457 0    V0667     VN       0647
 1089                         01,2335   01460 1    V06N48    VN       0648

 1090                         01,2336   14460 0    V50N48    VN       5048
 1091                          1,2337   25101 0    NORMAL    DEC      .660214
A1092                                                                                   NORMAL SCALING IS 20 D/S
 1093                         01,2340   05220 1    FINE      DEC      .165054          FINE STICK SCALING (4 D/S).
 1094                         01,2341   03146 1    1/10      DEC      .1               FACTOR FOR CSM-DOCKED SCALING
 1095                         01,2342   77445 1    -0.6D/S   DEC      -218
 1096                          01,2343   77622 1  -0.3D/S  DEC     -109
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P1097    VERB 66.  VEHICLES ARE ATTACHED.  MOVE THIS VEHICLE STATE VECTOR TO
R1098              OTHER VEHICLE STATE VECTOR.

R1099        USE SUBROUTINE GENTRAN.

 1100                          07,2667                        BANK    7
 1101    REF   6  LAST  288    43,2000                        SETLOC  EXTVERBS
 1102                          43,3142                        BANK

 1103    REF   6 LAST  288 TO  292:     61    422*            COUNT*  $$/EXTVB

 1104    REF   1               E3,1626                        EBANK=  RRECTHIS

 1105    REF   3  LAST  286    43,3142  3 4737 0  ATTACHED CAF     PRIO10
 1106    REF  10  LAST  290    43,3143  0 5105 0           TC      FINDVAC
 1107    REF   2  LAST  297    E3,1626                     EBANK=  RRECTHIS

 1108    REF   1               43,3144   03147 0           2CADR   ATTACHIT
 1108    REF   1               43,3145   66103 0
 1109    REF  20  LAST  295    43,3146  0 5155 0           TC      ENDOFJOB

 1110    REF   7  LAST  287    43,3147  0 6037 0  ATTACHIT TC      INTPRET
 1111                          43,3150   77624 1           CALL
 1112    REF   6  LAST  287    43,3151   27414 0                   INTSTALL
 1113                          43,3152   43014 0           SET     BON
 1114    REF   1               43,3153   04063 0                   MOONOTH
 1115    REF   1               43,3154   04304 1                   MOONTHIS
 1116                          43,3155   67160 1                   +3
 1117                          43,3156   77614 1           CLEAR
 1118    REF   2  LAST  297    43,3157   04263 1                   MOONOTH
 1119                          43,3160   77776 1           EXIT
 1120    REF   1               43,3161  3 3204 1           CAF     OCT51
 1121    REF   1               43,3162  0 5544 1           TC      GENTRAN
 1122    REF   3  LAST  297    43,3163   01626 1           ADRES   RRECTHIS          OUR STATE VECTOR INTO OTHER VIA GENTRAN
 1123    REF   1               43,3164   01554 1           ADRES   RRECTOTH

 1124                          43,3165  0 0003 1           RELINT
 1125    REF   8  LAST  297    43,3166  0 6037 0           TC      INTPRET
 1126                          43,3167   77624 1           CALL                      UPDATE R-OTHER, V-OTHER
 1127    REF   1               43,3170   26760 1                   PTOALEM
 1128                          43,3171   45154 0           LXA,2   CALL
 1129    REF   2  LAST  114    43,3172   02030 0                   PBODY
 1130    REF   1               43,3173   26114 1                   SVDWN1
 1131                          43,3174   77776 1           EXIT

 1132    REF   1               43,3175  3 3205 0           CAF     TCPINAD
 1133    REF   8  LAST  252    43,3176  50 120 1           INDEX   FIXLOC
 1134    REF   1               43,3177  54 052 1           TS      QPRET
 1135    REF  14  LAST  293    43,3200  0 4635 0           TC      POSTJUMP
 1136    REF   1               43,3201   27425 1           CADR    INTWAKE           FREE INTEGRATION AND EXIT.
 1137                            43,3202   77634 0  TCPIN      RTB
 1138   REF   3  LAST  264      43,3203   21050 1                        PINBRNCH

 1139                            43,3204   00051 0  OCT51      OCT        51
 1140   REF   1                 43,3205   67202 0  TCPINAD    CADR       TCPIN

R1141   VERB 96  SET QUITFLAG TO STOP INTEGRATION.

R1142            GO TO V37 WITH ZERO TO CAUSE P00.
R1143            STATEINT WILL CHECK QUITFLAG AND SKIP 1ST PASS,
R1144                     THUS ALLOWING A 10 MINUTE PERIOD WITHOUT INTEGRATION.

 1145   REF  10  LAST  289      43,3206  0 5504 0  VERB96     TC         UPFLAG           QUITFLAG WILL CAUSE INTEGRATION TO EXIT
 1146   REF   1                 43,3207   00221 0             ADRES      QUITFLAG            AT NEXT TIMESTEP

 1147   REF  32  LAST  279      43,3210  3 4755 1             CAF        ZERO
 1148   REF  15  LAST  297      43,3211  0 4635 0             TC         POSTJUMP
 1149   REF   1                 43,3212   10040 1             CADR       V37              GO TO P00

R1150
R1151   VERB 67 :    DISPLAY OF W MATRIX

 1152   REF  17  LAST  292      43,3213  0 2076 1  V67        TC         TESTXACT
 1153   REF   2  LAST  229      43,3214  3 5017 1             CAF        PRIO5
 1154   REF  11  LAST  297      43,3215  0 5105 0             TC         FINDVAC
 1155   REF   1                 E4,1600                       EBANK=     WWPOS
 1156   REF   1                 43,3216   02007 1             2CADR      V67CALL
 1156   REF   1                 43,3217   62064 1
 1157   REF  21  LAST  297      43,3220  0 5155 0             TC         ENDOFJOB

R1158   VERB 65           DISABLE U,V JETS DURING DPS BURNS

 1159   REF  11  LAST  298      43,3221  0 5504 0  SNUFFOUT   TC         UPFLAG
 1160   REF   1                 43,3222   00115 1             ADRES      SNUFFER
 1161   REF  22  LAST  290      43,3223  0 2121 1             TC         GOPIN

R1162   VERB 75           ENABLE U,V JETS DURING DPS BURNS

 1163   REF  24  LAST  289      43,3224  0 5512 0  OUTSNUFF   TC         DOWNFLAG
 1164   REF   2  LAST  298      43,3225   00115 1             ADRES      SNUFFER
 1165   REF  23  LAST  298      43,3226  0 2121 1             TC         GOPIN
R1166   VERB 85           DISPLAY RR LOS AZIMUTH AND ELEVATION.

R1167            AZIMUTH IS THE ANGLE BETWEEN THE LOS AND THE X-Z NB PLANE, 0 - 90 DEG IN THE +Y HEMISPHERE,
R1168   360 - 270 DEG IN THE -Y HEMISPHERE.

R1170            ELEVATION IS THE ANGLE BETWEEN +ZNB AND THE PROJECTION OF THE LOS INTO THE X-Z PLANE, 0 - 360 ABOUT +Y.

 1172   REF   2  LAST  118      E4,1600                       EBANK=     RR-AZ
 1173   REF  18  LAST  298      43,3227  0 2076 1  VERB85     TC         TESTXACT
 1174    REF  16  LAST  298    43,3230  0 4635 0              TC       POSTJUMP
 1175    REF   1               43,3231   60000 1              CADR     DSPRRLOS

 1176    REF   1               40,2000                        SETLOC   PINBALL1
 1177                          40,2000                        BANK

 1178    REF   1                                              COUNT*   $$/EXTVB

 1179    REF   3  LAST  298    40,2000  3 5017 1  DSPRRLOS    CAF      PRIO5
 1180    REF  12  LAST  298    40,2001  0 5105 0              TC       FINDVAC
 1181    REF   3  LAST  298    E4,1600                        EBANK=   RR-AZ
 1182    REF   1               40,2002   02017 0              2CADR    RRLOSDSP
 1182    REF   1               40,2003   60104 1
 1183    REF   3  LAST  280    40,2004  3 4740 0              CAF      PRIO4
 1184    REF   5  LAST  292    40,2005  0 5146 1              TC       PRIOCHNG
 1185    REF   1               40,2006  3 2076 1              CAF      V16N56
 1186    REF  53  LAST  295    40,2007  0 4616 1              TC       BANKCALL
 1187    REF   3  LAST  277    40,2010   20353 0              CADR     GOMARKF
 1188    REF   1               40,2011  0 5563 1              TC       B5OFF
 1189    REF   2  LAST  299    40,2012  0 5563 1              TC       B5OFF
 1190    REF   3  LAST  [illegible]    40,2013  0 5563 1              TC       B5OFF

 1191    REF  19  LAST  295    40,2014  3 4751 0              CAF      BIT3
 1192    REF   7  LAST  [illegible]    40,2015  0 5464 1              TC       BLANKET
 1193    REF  22  LAST  298    40,2016  0 5155 0              TC       ENDOFJOB

 1194                          40,2017  0 0006 1  RRLOSDSP    EXTEND
 1195    REF   2  LAST  187    40,2020  3 0036 1              DCA      CDUT
 1196    REF  42  LAST  290    40,2021  52 155 1              DXCH     MPAC
 1197    REF   9  LAST  297    40,2022  0 6037 0              TC       INTPRET
 1198                          40,2023   77624 1              CALL
 1199    REF   1               40,2024   46065 0                       RRNBMPAC            GET RR LOS IN BODY AXIS.
 1200                          40,2025   00001 0              STORE    0D                  UNIT LOS
 1201                          40,2026   14007 0              STODL    6D
 1202    REF   1               40,2027   06522 1                       HI6ZEROS
 1203                          40,2030   24011 1              STOVL    8D
 1204                          40,2031   00007 0                       6D
 1205                          40,2032   77656 1              UNIT
 1206                          40,2033   00007 0              STORE    6D                  UNIT OF LOS PROJ IN X-Z PLANE
 1207                          40,2034   77641 1              DOT
 1208    REF   3  LAST   37    40,2035   06514 1                       UNITZ
 1209    REF   1               40,2036   24021 1              STOVL    COSTH               16D
 1210    REF   3  LAST   37    40,2037   06520 0                       UNITX
 1211                          40,2040   77641 1              DOT
 1212                          40,2041   00007 0                       6D
 1213    REF   1               40,2042   34023 1              STCALL   SINTH               18D
 1214    REF   1               40,2043   47320 0                       ARCTRIG
 1215                          40,2044   43244 1              BPL      DAD                 INSURE DISPLAY OF 0 - 360 DEG.
 1216                          40,2045   60047 1                       +2
 1217    REF   1               40,2046   06530 1                       DPPOSMAX            INTRODUCES AN ERROR OF B-28 REVS.
 1218   REF    1              40,2047   26203 1          STOVL   RR-ELEV
 1219                         40,2050   00001 0                  0D
 1220                         40,2051   77641 1          DOT
 1221   REF    2  LAST    37  40,2052   06516 0                  UNITY
 1222   REF    2  LAST   299  40,2053   24023 0          STOVL   SINTH
 1223                         40,2054   00001 0                  0D
 1224                         40,2055   77641 1          DOT
 1225                         40,2056   00007 0                  6D
 1226   REF    2  LAST   299  40,2057   34021 0          STCALL  COSTH
 1227   REF    2  LAST   299  40,2060   47320 0                  ARCTRIG
 1228                         40,2061   43244 1          BPL     DAD            INSURE DISPLAY OF 0 - 360 DEG.
 1229                         40,2062   60064 0                  +2
 1230   REF    2  LAST   299  40,2063   06530 1                  DPPOSMAX       INTRODUCES AN ERROR OF B-28 REVS.
 1231   REF    4  LAST   299  40,2064   02201 0          STORE   RR-AZ
 1232                         40,2065   77776 1          EXIT
 1233   REF    2  LAST   270  40,2066  3 4777 1          CA      1SEC
 1234   REF    4  LAST   299  40,2067  0 4616 1          TC      BANKCALL
 1235   REF    7  LAST   279  40,2070   01735 1          CADR    DELAYJOB

 1236   REF   16  LAST   254  40,2071  3 4747 1          CA      BIT5
 1237   REF    7  LAST   263  40,2072  7 10[illegible] 1          MASK    EXTVBACT
 1238   REF   90  LAST   294  40,2073 10 000 0           CCS     A
 1239   REF    2  LAST   299  40,2074  0 2017 0          TC      RRLOSDSP
 1240   REF   25  LAST   295  40,2075  0 5472 0          TC      ENDEXT

 1241                         40,2076   04070 1  V16N56  VN      1656
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L        PINBALL NOUN TABLES                                                         USER'S PAGE NO.   1      FO 54

P1000    THE FOLLOWING REFERS TO THE NOUN TABLES

R1001    COMPONENT CODE NUMBER              INTERPRETATION

R1002    00000                              1 COMPONENT
R1003    00001                              2 COMPONENT
R1004    00010                              3 COMPONENT
R1005    X1XXX                              BIT4 = 1. DECIMAL ONLY
R1006    1XXXX                              BIT5 = 1. NO LOAD
R1007    END OF COMPONENT CODE NUMBERS

R1008    SF ROUTINE CODE NUMBER             INTERPRETATION

R1009    00000     OCTAL ONLY
R1010    00001     STRAIGHT FRACTIONAL
R1011    00010     CDU DEGREES (XXX.XX)
R1012    00011     ARITHMETIC SF
R1013    00100     ARITH DP1   OUT(MULT BY 2EXP14 AT END)     IN(STRAIGHT)
R1014    00101     ARITH DP2   OUT(STRAIGHT)                  IN(SL 7 AT END)
R1015    00110     LANDING RADAR POSITION (+0000X)
R1016    00111     ARITH DP3   OUT ( SL 7 AT END)        IN ( STRAIGHT)
R1017    01000     WHOLE HOURS IN R1, WHOLE MINUTES (MOD 60) IN R2,
R1018                 SECONDS (MOD 60) 0XX.XX IN R3. *** ALARMS IF USED WITH OCTAL
R1019    01001     MINUTES (MOD 60) IN D1D2, D3 BLANK, SECONDS (MOD 60) IN D4D5
R1020                              LIMITS TO 59B59 IF MAG EXCEEDS THIS VALUE.
R1021                              ALARMS IF USED WITH OCTAL  ********  IN (ALARM)
R1022    01010     ARITH DP4   OUT (STRAIGHT)                   IN (SL 3 AT END)
R10221   01011     ARITH1 SF   OUT(MULT BY 2EXP14 AT END)     IN(STRAIGHT)
R10222   01100     2 INTEGERS IN D1D2, D4D5, D3 BLANK.
R10223                             ALARMS IF USED WITH OCTAL  ********  IN (ALARM)
R10224   01101     360-CDU DEGREES (XXX.XX)
R1023    END OF SF ROUTINE CODE NUMBERS

R1024    SF CONSTANT CODE NUMBER            INTERPRETATION

R1025    00000                              WHOLE                            USE ARITH
R1026    00000                              DP TIME SEC (XXX.XX SEC)         USE ARITHDP1
R10265   00000                              LR POSITION (+0000X)          USE LR POSITION
R1027    00001                              SPARE
R1028    00010                              CDU DEGREES                   USE CDU DEGREES
R1029    00010                              360-CDU DEGREES           USE 360-CDU DEGREES
R1030    00011                              DP DEGREES (90) XX.XXX DEG  USE ARITHDP3
R1031    00100                              DP DEGREES (360) XXX.XX DEG USE ARITHDP4
R1032    00101                              DEGREES (180) XXX.XX DEG         USE ARITH
R10321   00101                              OPTICAL TRACKER AZIMUTH ANGLE(XXX.XXDEG)
R10322                                                                   USE ARITHDP1
R1034    00110                              WEIGHT2 (XXXXX. LBS)             USE ARITH1
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R1035   00111                           POSITION5 (XXX.XX NAUTICAL MILES)
R10351                                                              USE ARITHDP3
R1037   01000                           POSITION4 (XXXX.X NAUTICAL MILES)
R10371                                                              USE ARITHDP3
R1038   01001                           VELOCITY2 (XXXXX. FT/SEC)   USE ARITHDP4
R1039   01010                           VELOCITY3 (XXXX.X FT/SEC)   USE ARITHDP3
R1040   01011                           ELEVATION DEGREES(89.999MAX) USE ARITH
R1041   01100                           RENDEZVOUS RADAR RANGE (XXX.XX NAUT MI)
R1042                                                               USE ARITHDP1
R1043   01101                           RENDEZVOUS RADAR RANGE RATE(XXXXX.FT/SEC
R1044                                                               USE ARITHDP1
R1045   01110                           LANDING RADAR ALTITUDE(XXXXX.FEET)
R1046                                                               USE ARITHDP1
R1047   01111                           INITIAL/FINAL ALTITUDE(XXXXX.FEET)
R1048                                                               USE ARITHDP1
R1049   10000                           ALTITUDE RATE(XXXXX.FT/SEC)    USE ARITH
R1050   10001                           FORWARD/LATERAL VELOCITY(XXXXX.FEET/SEC)
R1051                                                                  USE ARITH
R1052   10010                           ROTATIONAL HAND CONTROLLER ANGLE RATES
R1053                                         XXXXX.DEG/SEC            USE ARITH
R1054   10011                           LANDING RADAR VELX(XXXXX.FEET/SEC)
R1055                                                               USE ARITHDP1
R1056   10100                           LANDING RADAR VELY(XXXXX.FEET/SEC)
R1057                                                               USE ARITHDP1
R1058   10101                           LANDING RADAR VELZ(XXXXX.FEET/SEC)
R1059                                                               USE ARITHDP1
R1060   10110                           POSITION7 (XXXX.X NAUT MI)  USE ARITHDP4
R10601  10111                           TRIM DEGREES2 (XXX.XX DEG)  USE ARITH
R1061   11000                           COMPUTED ALTITUDE (XXXXX. FEET)
R106101                                                             USE ARITHDP1
R106102 11001                           DP DEGREES (XXXX.X DEG)     USE ARITHDP3
R106103 11010                           POSITION9 (XXXXX. FT)       USE ARITHDP3
R106104 11011                           VELOCITY4 (XXXX.X FT/SEC)   USE ARITHDP2
R106105 11100                           RADIANS (XX.XXX RADIANS)    USE ARITHDP4
R1062   END OF SF CONSTANT CODE NUMBERS


R1063   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R1064   NOUN TABLES.
R1065   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R1066   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R1067   TO GET AT BOTH MAJOR AND MINOR PARTS(IN OCTAL), USE NOUN 01.


R1068   A NOUN MAY BE DECLARED :DECIMAL ONLY: BY MAKING BIT4=1 OF ITS COMPONENT
R1069   CODE NUMBER. IF THIS NOUN IS USED WITH ANY OCTAL DISPLAY VERB, OR IF
R1070   DATA IS LOADED IN OCTAL, IT ALARMS.

R1071   IN LOADING AN :HOURS, MINUTES, SECONDS: NOUN, ALL 3 WORDS MUST BE
R1072   LOADED, OR ALARM.
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R1073    ALARM IF AN ATTEMPT IS MADE TO LOAD :SPLIT MINUTES/SECONDS: (MMBSS).
R1074    THIS IS USED FOR DISPLAY ONLY.
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R1075    THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R1076    (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R1077    ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.


R1078    LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R1079    NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R1080    IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R1081    IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R1082    MIXED OR NORMAL NOUN.

 1200                       06,3263                        BANK    6
 12002  REF    2  LAST  281  42,2000                        SETLOC  PINBALL3
 12003                      42,2103                        BANK
 12005  REF    1                                           COUNT*  $$/NOUNS
 1201   REF    1            42,2103  52 152 0  LODNNTAB DXCH    IDAD2TEM           SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
 1202   REF    3  LAST  267  42,2104  51'002 1           INDEX   NOUNREG
 1203   REF    1            42,2105  3 2154 0            CAF     NNADTAB
 1204   REF    1            42,2106  54 146 0            TS      NNADTEM
 1205   REF    4  LAST  304  42,2107  51'002 1           INDEX   NOUNREG
 1206   REF    1            42,2110  3 2320 1            CAF     NNTYPTAB
 1207   REF    1            42,2111  54 147 1            TS      NNTYPTEM
 1208   REF    5  LAST  304  42,2112  4 1002 0           CS      NOUNREG
 1209   REF    1            42,2113  6 4771 1            AD      MIXCON
 1210                       42,2114  0 0006 1            EXTEND
 1211   REF    1            42,2115  6 2121 1            BZMF    LODMIXNN           NOUN NUMBER G/E FIRST MIXED NOUN
 1212   REF   14  LAST  278  42,2116  3 4753 1           CAF     ONE                NOUN NUMBER L/ FIRST MIXED NOUN
 1213   REF    1            42,2117  54 140 0            TS      MIXBR              NORMAL.  +1 INTO MIXBR.
 1214   REF    1            42,2120  0 2137 0            TC      LODNLV
 1215   REF   11  LAST  282  42,2121  3 4752 0  LODMIXNN CAF     TWO                MIXED.  +2 INTO MIXBR.
 1216   REF    2  LAST  304  42,2122  54 140 0           TS      MIXBR
 1217   REF    6  LAST  304  42,2123  51'002 1           INDEX   NOUNREG
 1218   REF    1            42,2124  3 3064 0            CAF     RUTMXTAB -40D      FIRST MIXED NOUN = 40.
 1219   REF    1            42,2125  54 153 1            TS      RUTMXTEM
 1220   REF    2  LAST  232  42,2126  3 5012 1           CAF     LOW10
 1221   REF    2  LAST  304  42,2127  7 0146 0           MASK    NNADTEM
 1222   REF   28  LAST  282  42,2130  54 002 1           TS      Q                  TEMP
 1223   REF   91  LAST  300  42,2131  50 000 1           INDEX   A
 1224   REF    1            42,2132  3 2650 0            CAF     IDADDTAB
 1225   REF    1            42,2133  54 150 1            TS      IDAD1TEM           LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
 1226                       42,2134  0 0006 1            EXTEND
 1227   REF   29  LAST  304  42,2135  5 0002 0           INDEX   Q                  LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
 1228   REF    2  LAST  304  42,2136  3 2652 1           DCA     IDADDTAB +1        LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
 1229   REF    2  LAST  304  42,2137  52 152 0  LODNLV   DXCH    IDAD2TEM           PUT RETURN INFO INTO A, L.
 1230   REF    1            42,2140  52 006 0            DXCH    Z

 1231   REF    1               4771             MIXCON   =       OCT50              (DEC 40)
R1232   GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.

 1233   REF    1            42,2141  52 124 1  GTSFOUT  DXCH    SFTEMP1            2X(SFCONUM) ARRIVES IN SFTEMP1.
 1234                              42,2142   0 0006 1              EXTEND
 1235    REF  92  LAST  304        42,2143   5 0000 1              INDEX     A
 1236    REF   1                   42,2144   3 2557 1              DCA       SFOUTAB
 1237    REF   2  LAST  304        42,2145   52 124 1   SFCOM      DXCH      SFTEMP1
 1238    REF   2  LAST  304        42,2146   52 0006 0             DXCH      Z

R1239    GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

 1240    REF   3  LAST  305        42,2147   52 124 1   GTSFIN     DXCH      SFTEMP1              2X(SFCONUM) ARRIVES IN SFTEMP1.
 1241                              42,2150   0 0006 1              EXTEND
 1242    REF  93  LAST  305        42,2151   5 0000 1              INDEX     A
 1243    REF   1                   42,2152   3 2465 1              DCA       SFINTAB
 1244    REF   1                   42,2153   1 2145 1              TCF       SFCOM

A1400                                                                                             NN  NORMAL NOUNS
 1401                              42,2154   00000 1    NNADTAB    OCT       00000                00 NOT IN USE
 1402                              42,2155   40000 0               OCT       40000                01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
 1403                              42,2156   40000 0               OCT       40000                02 SPECIFY MACHINE ADDRESS (WHOLE)
 1404                              42,2157   40000 0               OCT       40000                03 SPECIFY MACHINE ADDRESS (DEGREES)
 1405    REF   3  LAST  277        42,2160   01045 1               ECADR     DSPTEM1              04 ANGULAR ERROR/DIFFERENCE
 1406    REF   4  LAST  305        42,2161   01045 1               ECADR     DSPTEM1              05 ANGULAR ERROR/DIFFERENCE
 1407    REF   1                   42,2162   01144 1               ECADR     OPTION1              06 OPTION CODE
 1408    REF   1                   42,2163   01003 0               ECADR     XREG                 07 ECADR OF WORD TO BE MODIFIED
A14081                                                                                               ONES FOR BITS TO BE MODIFIED
A14082                                                                                               1 TO SET OR 0 TO RESET SELECTED BITS
 1409    REF   2  LAST  108        42,2164   01363 0               ECADR     ALMCADR              08 ALARM DATA
 1410    REF   4  LAST  211        42,2165   00375 0               ECADR     FAILREG              09 ALARM CODES
 1411                              42,2166   77776 1               OCT       77776                10 CHANNEL TO BE SPECIFIED
 1412    REF   3  LAST  198        42,2167   03633 1               ECADR     TCSI                 11 TIG OF CSI (HRS,MIN,SEC)
 1413    REF   7  LAST  277        42,2170   01051 1               ECADR     OPTIONX              12 OPTION CODE
A14131                                                                                                    (USED BY EXTENDED VERBS ONLY)
 1414    REF   3  LAST  198        42,2171   01776 0               ECADR     TCDH                 13 TIG OF CDH (HRS,MIN,SEC)
 1415    REF   4  LAST  207        42,2172   01051 1               ECADR     DSPTEMX              14 CHECKLIST
A14151                                                                                                    (USED BY EXTENDED VERBS ONLY)
 1416                              42,2173   77777 0               OCT       77777                15 INCREMENT MACHINE ADDRESS
 1417    REF   5  LAST  305        42,2174   01051 1               ECADR     DSPTEMX              16 TIME OF EVENT (HRS,MIN,SEC)
 1418                              42,2175   00000 1               OCT       00000                17 SPARE
 1419    REF   1                   42,2176   02344 0               ECADR     FDAIX                18 AUTO MANEUVER BALL ANGLES
 1420                              42,2177   00000 1               OCT       00000                19 SPARE
 1421    REF   6  LAST  254        42,2200   00032 0               ECADR     CDUX                 20 ICDU ANGLES
 1422    REF   1                   42,2201   00037 0               ECADR     PIPAX                21 PIPAS
 1423    REF   6  LAST  282        42,2202   00321 1               ECADR     THETAD               22 NEW ICDU ANGLES
 1424                              42,2203   00000 1               OCT       00000                23 SPARE
 1425    REF   3  LAST  275        42,2204   01051 1               ECADR     DSPTEM2 +1           24 DELTA TIME FOR AGC CLOCK(HRS,MIN,SEC)
 1426    REF   5  LAST  305        42,2205   01045 1               ECADR     DSPTEM1              25 CHECKLIST
A14261                                                                                                    (USED WITH PLEASE PERFORM ONLY)
 1427    REF   6  LAST  305        42,2206   01045 1               ECADR     DSPTEM1              26 PRIO/DELAY, ADRES, BBCON
 1428    REF   4  LAST  290        42,2207   01362 1               ECADR     SMODE                27 SELF TEST ON/OFF SWITCH
 1429                               42,2210   00000 1         OCT      00000          28 SPARE
 1430                               42,2211   00000 1         OCT      00000          29 SPARE
 1431                               42,2212   00000 1         OCT      0              30 SPARE
 1432                               42,2213   00000 1         OCT      0              31 SPARE
 1433     REF    1                  42,2214   02142 1         ECADR    -TPER          32 TIME TO PERIGEE (HRS,MIN,SEC)
 1434     REF    7  LAST  243       42,2215   03441 0         ECADR    TIG            33 TIME OF IGNITION (HRS,MIN(SEC)
 1435     REF    7  LAST  305       42,2216   01045 1         ECADR    DSPTEM1        34 TIME OF EVENT (HRS,MIN,SEC)
 1436     REF    8  LAST  241       42,2217   03453 0         ECADR    TTOGO          35 TIME TO GO TO EVENT (HRS,MIN,SEC)
 1437     REF   10  LAST  275       42,2220   00024 1         ECADR    TIME2          36 TIME OF AGC CLOCK (HRS,MIN,SEC)
 1438     REF    3  LAST  198       42,2221   03635 1         ECADR    TTPI           37 TIG OF TPI (HRS,MIN,SEC)
 1439     REF    2  LAST  110       42,2222   01516 1         ECADR    TET            38 TIME OF STATE BEING INTEGRATED
 1440                               42,2223   00000 1         OCT      00000          39 SPARE
R14401    END OF NNADTAB FOR NORMAL NOUNS


A14402                                                                                NN  MIXED NOUNS
 1441                               42,2224   64000 0         OCT      64000          40 TIME TO IGNITION/CUTOFF
A14411                                                                                   VG
A14412                                                                                   DELTA V (ACCUMULATED)
 1442                               42,2225   02003 0         OCT      02003          41 TARGET   AZIMUTH
A14421                                                                                            ELEVATION
 1443                               42,2226   24006 1         OCT      24006          42 APOGEE
A14431                                                                                   PERIGEE
A14432                                                                                   DELTA V (REQUIRED)
 1444                               42,2227   24011 1         OCT      24011          43 LATITUDE
A14441                                                                                   LONGITUDE
A14442                                                                                   ALTITUDE
 1445                               42,2230   64014 0         OCT      64014          44 APOGEE
A14451                                                                                   PERIGEE
A14452                                                                                   TFF
 1446                               42,2231   64017 0         OCT      64017          45 MARKS
A14461                                                                                   TTI OF NEXT BURN
A14462                                                                                   MGA
 1447                               42,2232   00022 1         OCT      00022          46 AUTOPILOT CONFIGURATION
 1448                               42,2233   22025 0         OCT      22025          47 LEM WEIGHT
A14481                                                                                   CSM WEIGHT
 1449                               42,2234   22030 1         OCT      22030          48 GIMBAL PITCH TRIM
A14491                                                                                   GIMBAL ROLL TRIM
 1450                               42,2235   24033 1         OCT      24033          49 DELTA R
A14501                                                                                   DELTA V
A14502                                                                                   RADAR DATA SOURCE CODE
 1451                               42,2236   00000 1         OCT      0              50 SPARE
 1452                               42,2237   22041 1         OCT      22041          51 S-BAND ANTENNA PITCH
A14521                                                                                                     YAW
 1453                               42,2240   00044 1         OCT      00044          52 CENTRAL ANGLE OF ACTIVE VEHICLE
 1454                               42,2241   00000 1         OCT      00000          53 SPARE
 1455                               42,2242   24052 0         OCT      24052          54 RANGE
A14551                                                                                   RANGE RATE
A14552                                                                                   THETA
 1456                               42,2243   24055 1         OCT      24055          55 NO. OF APSIDAL CROSSINGS
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A14581                                                               ELEVATION ANGLE
A14582                                                               CENTRAL ANGLE
 1459                 42,2244   02060 0      OCT     02060        56 RR LOS AZIMUTH
A14591                                                                         ELEVATION
 1460                 42,2245   20063 0      OCT     20063        57 DELTA R
 1461                 42,2246   24066 1      OCT     24066        58 PERIGEE ALT
A14611                                                               DELTA V TPI
A14612                                                               DELTA V TPF
 1462                 42,2247   24071 1      OCT     24071        59 DELTA VELOCITY LOS
 1463                 42,2250   24074 1      OCT     24074        60 HORIZONTAL VELOCITY
A14631                                                               ALTITUDE RATE
A14632                                                               COMPUTED ALTITUDE
 1464                 42,2251   64077 0      OCT     64077        61 TIME TO GO IN BRAKING PHASE
A14641                                                               TIME TO IGNITION
A14642                                                               CROSS RANGE DISTANCE
 1465                 42,2252   64102 0      OCT     64102        62 ABSOLUTE VALUE OF VELOCITY
A14651                                                               TIME TO IGNITION
A14652                                                               DELTA V (ACCUMULATED)
 1466                 42,2253   24105 0      OCT     24105        63 ABSOLUTE VALUE OF VELOCITY
A14661                                                               ALTITUDE RATE
A14662                                                               COMPUTED ALTITUDE
 1467                 42,2254   64110 0      OCT     64110        64 TIME LEFT FOR REDESIGNATION-LPD ANGLE
A14671                                                               ALTITUDE RATE
A14672                                                               COMPUTED ALTITUDE
 1468                 42,2255   24113 1      OCT     24113        65 SAMPLED AGC TIME (HRS,MIN,SEC)
A14681                                                               (FETCHED IN INTERRUPT)
 1470                 42,2256   62116 0      OCT     62116        66 LR RANGE
A14701                                                                   POSITION
 1471                 42,2257   04121 1      OCT     04121        67 LRVX
A14711                                                               LRVY
A14712                                                               LRVZ
 1472                 42,2260   64124 1      OCT     64124        68 SLANT RANGE TO LANDING SIGHT
A14721                                                               TIME TO GO IN BRAKING PHASE
A14722                                                               LR ALTITUDE - COMPUTED ALTITUDE
 1473                 42,2261   00000 1      OCT     00000        69 SPARE
 1474                 42,2262   04132 0      OCT     04132        70 AOT DETENT CODE/STAR CODE
 1475                 42,2263   04135 1      OCT     04135        71 AOT DETENT CODE/STAR CODE
 1476                 42,2264   02140 0      OCT     02140        72 RR  360 - TRUNNION ANGLE
A14761                                                                     SHAFT ANGLE
 1477                 42,2265   02143 0      OCT     02143        73 NEW RR  360 - TRUNNION ANGLE
A14771                                                                          SHAFT ANGLE
 1478                 42,2266   64146 0      OCT     64146        74 TIME TO IGNITION
A14781                                                               YAWAFTER VEHICLE RISE
A14782                                                               PITCH AFTER VEHICLE RISE
 1479                 42,2267   64151 0      OCT     64151        75 DELTA ALTITUDE CDH
A14791                                                               DELTA TIME (CDH-CSI OR TPI-CDH)
A14792                                                               DELTA TIME (TPI-CDH OR TPI-NOMTPI)
 1480                 42,2270   24154 1      OCT     24154        76 DESIRED HORIZONTAL VELOCITY
A14801                                                               DESIRED RADIAL VELOCITY
A14802                                                               CROSS-RANGE DISTANCE
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 1481                    42,2271   62157 0          OCT      62157            77 TIME TO ENGINE CUTOFF
A14811                                                                           VELOCITY NORMAL TO CSM PLANE
 1482                    42,2272   02162 0          OCT      02162            78 RR RANGE
A14821                                                                              RANGE RATE
 1483                    42,2273   24165 0          OCT      24165            79 CURSOR ANGLE
A14831                                                                           SPIRAL ANGLE
A14832                                                                           POSITION CODE
 1484                    42,2274   02170 0          OCT      02170            80 DATA INDICATOR
A14841                                                                           OMEGA
 1485                    42,2275   24173 1          OCT      24173            81 DELTA V (LV)
 1486                    42,2276   24176 1          OCT      24176            82 DELTA V (LV)
 1487                    42,2277   24201 1          OCT      24201            83 DELTA V (BODY)
 1488                    42,2300   24204 1          OCT      24204            84 DELTA V (OTHER VEHICLE)
 1489                    42,2301   24207 1          OCT      24207            85 VG (BODY)
 1490                    42,2302   24212 0          OCT      24212            86 VG (LV)
 1491                    42,2303   02215 0          OCT      02215            87 BACKUP OPTICS LOS AZIMUTH
A14911                                                                                                ELEVATION
 1492                    42,2304   24220 1          OCT      24220            88 HALF UNIT SUN OR PLANET VECTOR
 1493                    42,2305   24223 1          OCT      24223            89 LANDMARK LATITUDE
A14931                                                                                    LONGITUDE/2
A14932                                                                                    ALTITUDE
 1494                    42,2306   24226 1          OCT      24226            90 Y
A14941                                                                           Y DOT
A14942                                                                           PSI
 1495                    42,2307   04231 0          OCT      04231            91 ALTITUDE
A14951                                                                           VELOCITY
A14952                                                                           FLIGHT PATH ANGLE
 1496                    42,2310   00000 1          OCT      00000            92 SPARE
 1497                    42,2311   04237 0          OCT      04237            93 DELTA GYRO ANGLES
 1498                    42,2312   00000 1          OCT      00000            94 SPARE
 1499                    42,2313   00000 1          OCT      0                95 SPARE
 1500                    42,2314   00000 1          OCT      0                96 SPARE
 1501                    42,2315   04253 1          OCT      04253            97 SYSTEM TEST INPUTS
 1502                    42,2316   04256 1          OCT      04256            98 SYSTEM TEST RESULTS
 1503                    42,2317   24261 1          OCT      24261            99 RMS IN POSITION
A15031                                                                           RMS IN VELOCITY
A15032                                                                           RMS IN BIAS
R1504   END OF NNADTAB FOR MIXED NOUNS


A1800                                                                         NN        NORMAL NOUNS
 1801                    42,2320   00000 1 NNTYPTAB OCT      00000            00 NOT IN USE
 1802                    42,2321   04040 1          OCT      04040            01 3COMP   FRACTIONAL
 1803                    42,2322   04140 0          OCT      04140            02 3COMP   WHOLE
 1804                    42,2323   04102 0          OCT      04102            03 3COMP   CDU DEGREES
 1805                    42,2324   00504 0          OCT      00504            04 1COMP   DPDEG(360)
 1806                    42,2325   00504 0          OCT      00504            05 1COMP   DPDEG(360)
 1807                    42,2326   04000 0          OCT      04000            06 3COMP   OCTAL ONLY
 1808                    42,2327   04000 0          OCT      04000            07 3COMP   OCTAL ONLY
 1809                    42,2330   04000 0          OCT      04000            08 3COMP   OCTAL ONLY
 1810                          42,2331   04000 0        OCT      04000          09 3COMP   OCTAL ONLY
 1811                          42,2332   00000 1        OCT      00000          10 1COMP   OCTAL ONLY
 1812                          42,2333   24400 0        OCT      24400          11 3COMP   HMS (DEC ONLY)
 1813                          42,2334   02000 0        OCT      02000          12 2COMP   OCTAL ONLY
 1814                          42,2335   24400 0        OCT      24400          13 3COMP   HMS (DEC ONLY)
 1815                          42,2336   04140 0        OCT      04140          14 3COMP   WHOLE
 1816                          42,2337   00000 1        OCT      00000          15 1COMP   OCTAL ONLY
 1817                          42,2340   24400 0        OCT      24400          16 3COMP   HMS (DEC ONLY)
 1818                          42,2341   00000 1        OCT      0              17        SPARE
 1819                          42,2342   04102 0        OCT      04102          18 3COMP   CDU DEG
 1820                          42,2343   00000 1        OCT      00000          19         SPARE
 1821                          42,2344   04102 0        OCT      04102          20 3COMP   CDU DEGREES
 1822                          42,2345   04140 0        OCT      04140          21 3COMP   WHOLE
 1823                          42,2346   04102 0        OCT      04102          22 3COMP   CDU DEGREES
 1824                          42,2347   00000 1        OCT      00000          23         SPARE
 1825                          42,2350   24400 0        OCT      24400          24 3COMP   HMS (DEC ONLY)
 1826                          42,2351   04140 0        OCT      04140          25 3COMP   WHOLE
 1827                          42,2352   04000 0        OCT      04000          26 3COMP   OCTAL ONLY
 1828                          42,2353   00140 1        OCT      00140          27 1COMP   WHOLE
 1829                          42,2354   00000 1        OCT      00000          28         SPARE
 1830                          42,2355   00000 1        OCT      00000          29         SPARE
 1831                          42,2356   00000 1        OCT      0              30 SPARE
 1832                          42,2357   00000 1        OCT      0              31 SPARE
 1833                          42,2360   24400 0        OCT      24400          32 3COMP   HMS (DEC ONLY)
 1834                          42,2361   24400 0        OCT      24400          33 3COMP   HMS (DEC ONLY)
 1835                          42,2362   24400 0        OCT      24400          34 3COMP   HMS (DEC ONLY)
 1836                          42,2363   24400 0        OCT      24400          35 3COMP   HMS (DEC ONLY)
 1837                          42,2364   24400 0        OCT      24400          36 3COMP   HMS (DEC ONLY)
 1838                          42,2365   24400 0        OCT      24400          37 3COMP   HMS (DEC ONLY)
 1839                          42,2366   24400 0        OCT      24400          38 3COMP   HMS (DEC ONLY)
 1840                          42,2367   00000 1        OCT      00000          39         SPARE
P18401  END OF NNTYPTAB FOR NORMAL NOUNS


A18402                                                                          NN    MIXED NOUNS
 1841                          42,2370   24500 1        OCT      24500          40 3COMP   MIN/SEC, VEL3, VEL3
A18411                                                                                     (NO LOAD, DEC ONLY)
 1842                          42,2371   00542 1        OCT      00542          41 2COMP   CDU DEG, ELEV DEG
 1843                          42,2372   24410 1        OCT      24410          42 3COMP   POS4, POS4, VEL3
A18431                                                                                     (DEC ONLY)
 1844                          42,2373   20204 0        OCT      20204          43 3COMP   DPDEG(360), DPDEG(360), POS4
A18441                                                                                     (DEC ONLY)
 1845                          42,2374   00410 1        OCT      00410          44 3COMP   POS4, POS4, MIN/SEC
A18451                                                                                     (NO LOAD, DEC ONLY)
 1846                          42,2375   10000 0        OCT      10000          45 3COMP   WHOLE, MIN/SEC, DPDEG(360)
A18461                                                                                     (NO LOAD, DEC ONLY)
 1847                          42,2376   00000 1        OCT      00000          46 1COMP   OCTAL ONLY
 1848                          42,2377   00306 1        OCT      00306          47 2COMP  WEIGHT2 FOR EACH
A18481                                                                                     (DEC ONLY)
 1849                          42,2400   01367 1        OCT      01367          48 2COMP   TRIM DEG2 FOR EACH
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A18491                                                                        (DEC ONLY)
 1850                   42,2401   00510 0        OCT      00510          49 3COMP  POS4, VEL3, WHOLE
A18501                                                                        (DEC ONLY)
 1851                   42,2402   00000 1        OCT      0              50        SPARE
 1852                   42,2403   00204 1        OCT      00204          51 2COMP  DPDEG(360), DPDEG(360)
A18521                                                                        (DEC ONLY)
 1853                   42,2404   00004 0        OCT      00004          52 1COMP  DPDEG(360)
 1854                   42,2405   00000 1        OCT      00000          53        SPARE
 1855                   42,2406   10507 1        OCT      10507          54 3COMP  POS5, VEL3, DPDEG(360)
A18551                                                                        (DEC ONLY)
 1858                   42,2407   10200 1        OCT      10200          55 3COMP  WHOLE, DPDEG(360), DPDEG(360)
A18581                                                                        (DEC ONLY)
 1859                   42,2410   00204 1        OCT      00204          56 2COMP  DPDEG(360), DPDEG(360)
 1860                   42,2411   00010 0        OCT      00010          57 1COMP  POS4
A18601                                                                        (DEC ONLY)
 1861                   42,2412   24510 0        OCT      24510          58 3COMP  POS4, VEL3, VEL3
A18611                                                                        (DEC ONLY)
 1862                   42,2413   24512 1        OCT      24512          59 3COMP  VEL3 FOR EACH
A18621                                                                        (DEC ONLY)
 1863                   42,2414   60512 1        OCT      60512          60 3COMP  VEL3, VEL3, COMP ALT
A18631                                                                        (DEC ONLY)
 1864                   42,2415   54000 0        OCT      54000          61 3COMP  MIN/SEC, MIN/SEC, POS7
A18641                                                                        (NO LOAD, DEC ONLY)
 1865                   42,2416   24012 1        OCT      24012          62 3COMP  VEL3, MIN/SEC, VEL3
A18651                                                                        (NO LOAD, DEC ONLY)
 1866                   42,2417   60512 1        OCT      60512          63 3COMP  VEL3, VEL3, COMP ALT
A18661                                                                        (DEC ONLY)
 1867                   42,2420   60500 1        OCT      60500          64 3COMP  2INT, VEL3, COMP ALT
A18671                                                                        (NO LOAD, DEC ONLY)
 1868                   42,2421   00000 1        OCT      00000          65 3COMP  HMS (DEC ONLY)
 1869                   42,2422   00016 0        OCT      00016          66 2COMP  LANDING RADAR ALT, POSITION
A18691                                                                        (NO LOAD, DEC ONLY)
 1870                   42,2423   53223 1        OCT      53223          67 3COMP LANDING RADAR VELX, Y, Z
 1871                   42,2424   60026 0        OCT      60026          68 3COMP  POS7, MIN/SEC, COMP ALT
A18711                                                                        (NO LOAD, DEC ONLY)
 1872                   42,2425   00000 1        OCT      00000          69        SPARE
 1873                   42,2426   00000 1        OCT      0              70 3COMP  OCTAL ONLY FOR EACH
 1874                   42,2427   00000 1        OCT      0              71 3COMP  OCTAL ONLY FOR EACH
 1875                   42,2430   00102 1        OCT      00102          72 2COMP  360-CDU DEG, CDU DEG
 1876                   42,2431   00102 1        OCT      00102          73 2COMP  360-CDU DEG, CDU DEG
 1877                   42,2432   10200 1        OCT      10200          74 3COMP  MIN/SEC, DPDEG(360),DPDEG(360)
A18771                                                                        (NO LOAD, DEC ONLY)
 1878                   42,2433   00010 0        OCT      00010          75 3COMP  POS4, MIN/SEC, MIN/SEC
A18781                                                                        (NO LOAD, DEC ONLY)
 1879                   42,2434   20512 0        OCT      20512          76 3COMP  VEL3, VEL3, POS4
A18791                                                                        (DEC ONLY)
 1880                   42,2435   00500 1        OCT      00500          77 2COMP  MIN/SEC, VEL3
A18801                                                                        (NO LOAD, DEC ONLY)
 1881                   42,2436   00654 0        OCT      00654          78 2 COMP  RR RANGE, RR RANGE RATE
 1882                   42,2437   00102 1        OCT      00102          79 3COMP  CDU DEG, CDU DEG, WHOLE
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A18821                                                                     (DEC ONLY)
 1883                      42,2440   00200 0          OCT    00200      80 2COMP  WHOLE, DPDEG(360)
 1884                      42,2441   24512 1          OCT    24512      81 3COMP  VEL3 FOR EACH
A18841                                                                     (DEC ONLY)
 1885                      42,2442   24512 1          OCT    24512      82 3COMP  VEL3 FOR EACH
A18851                                                                     (DEC ONLY)
 1886                      42,2443   24512 1          OCT    24512      83 3COMP  VEL3 FOR EACH
A18861                                                                     (DEC ONLY)
 1887                      42,2444   24512 1          OCT    24512      84 3COMP  VEL3 FOR EACH
A18871                                                                     (DEC ONLY)
 1888                      42,2445   24512 1          OCT    24512      85 3COMP  VEL3 FOR EACH
A18881                                                                     (DEC ONLY)
 1889                      42,2446   24512 1          OCT    24512      86 3COMP  VEL3 FOR EACH
A18891                                                                     (DEC ONLY)
 1890                      42,2447   00102 1          OCT    00102      87 2COMP  CDU DEG FOR EACH
 1891                      42,2450   00000 1          OCT    0          88 3COMP  FRAC FOR EACH
A18912                                                                      (DEC ONLY)
 1892                      42,2451   16143 0          OCT    16143      89 3COMP  DPDEG(90), DPDEG(90), POS5
A18921                                                                     (DEC ONLY)
 1893                      42,2452   10507 1          OCT    10507      90 3COMP  POS5, VEL3, DPDEG(360)
A18931                                                                     (DEC ONLY)
 1894                      42,2453   10450 1          OCT    10450      91 3COMP  POS4, VEL2, DPDEG(360)
 1895                      42,2454   00000 1          OCT    00000      92        SPARE
 1896                      42,2455   06143 1          OCT    06143      93 3COMP  DPDEG(90) FOR EACH
 1897                      42,2456   00000 1          OCT    00000      94        SPARE
 1898                      42,2457   00000 1          OCT    0          95        SPARE
 1899                      42,2460   00000 1          OCT    0          96        SPARE
 1900                      42,2461   00000 1          OCT    00000      97 3COMP  WHOLE FOR EACH
 1901                      42,2462   00000 1          OCT    00000      98 3COMP  WHOLE, FRAC, WHOLE
 1902                      42,2463   71572 1          OCT    71572      99 3COMP  POS9, VEL4, RADIANS
A19021                                                                     (DEC ONLY)
R1903    END OF NNTYPTAB FOR MIXED NOUNS


 2200                      42,2464   00006 1 SFINTAB  OCT    00006      WHOLE, DP TIME (SEC)
 2201                      42,2465   03240 1          OCT    03240
 2202                      42,2466   00000 1          OCT    00000      SPARE
 2203                      42,2467   00000 1          OCT    00000
 2204                      42,2470   00000 1          OCT    00000      CDU DEGREES, 360-CDU DEGREES
 2205                      42,2471   00000 1          OCT    00000         (SFCONS IN DEGINSF)
 2206                      42,2472   10707 0          OCT    10707      DP DEGREES (90)
 2207                      42,2473   03435 0          OCT    03435            UPPED BY 1
 2208                      42,2474   13070 1          OCT    13070      DP DEGREES (360)(POINT BETWN BITS 11-12)
 2209                      42,2475   34345 1          OCT    34345            UPPED BY 1
 2210                      42,2476   00005 1          OCT    00005      DEGREES (180)
 2211                      42,2477   21616 0          OCT    21616
 2212                      42,2500   26113 0          OCT    26113      WEIGHT2
 2213                      42,2501   31713 0          OCT    31713
 2214                      42,2502   00070 0          OCT    00070      POSITION5
 2215                      42,2503   20460 1          OCT    20460
 2216                42,2504   01065 0           OCT     01065              POSITION4
 2217                42,2505   05740 1           OCT     05740
 2218                42,2506   11414 0           OCT     11414              VELOCITY2       (POINT BETWN BITS 11-12)
 2219                42,2507   31463 1           OCT     31463
 2220                42,2510   07475 0           OCT     07475              VELOCITY3
 2221                42,2511   16051 1           OCT     16051
 2222                42,2512   00001 0           OCT     00001              ELEVATION DEGREES
 2223                42,2513   03434 1           OCT     03434
 2224                42,2514   00047 1           OCT     00047              RENDEZVOUS RADAR RANGE
 2225                42,2515   21135 0           OCT     21135
 2226                42,2516   77766 0           OCT     77766              RENDEZVOUS RADAR RANGE RATE
 2227                42,2517   50711 0           OCT     50711
 2228                42,2520   00005 1           2DEC*   .9267840599 E5 B-28 * LANDING RADAR ALTITUDE
 2228                42,2521   25006 0
 2230                42,2522   00002 0           OCT     00002              INITIAL/FINAL ALTITUDE
 2231                42,2523   23224 1           OCT     23224
 2232                42,2524   00014 1           OCT     00014              ALTITUDE RATE
 2233                42,2525   06500 1           OCT     06500
 2234                42,2526   00012 1           OCT     00012              FORWARD/LATERAL VELOCITY
 2235                42,2527   36455 0           OCT     36455
 2236                42,2530   04256 1           OCT     04256              ROT HAND CONT ANGLE RATE
 2237                42,2531   07071 0           OCT     07071
 2238                42,2532   77766 0           2DEC*   -1.552795030 E5 B-28 * LANDING RADAR VELX
 2239                42,2533   60557 0
 2240                42,2534   00005 1           2DEC*    .8250825087 E5 B-28 *  LANDING RADAR VELY
 2240                42,2535   01114 1
 2242                42,2536   00007 0           2DEC*    1.153668673 E5 B-28 *  LANDING RADAR VELZ
 2242                42,2537   01247 1
 2244                42,2540   04324 0           OCT     04324              POSITION7
 2245                42,2541   27600 1           OCT     27600
 2246                42,2542   00036 1           OCT     00036              TRIM DEGREES2
 2247                42,2543   20440 0           OCT     20440
 2248                42,2544   00035 1           OCT     00035              COMPUTED ALTITUDE
 2249                42,2545   30400 0           OCT     30400
 2250                42,2546   23420 0           OCT     23420              DP DEGREES
 2251                42,2547   00000 1           OCT     00000
 2252                42,2550   01670 1           2DEC    30480 B-19         POSITION 9
 2252                42,2551   20000 0
 2253                42,2552   07475 0           2DEC    30.48 B-7          VELOCITY4
 2253                42,2553   16051 1
 2254                42,2554   14400 0           2DEC    100 B-8            RADIANS
 2254                42,2555   00000 1
A2290                                                                       END OF SFINTAB

 2300                42,2556   05174 0  SFOUTAB  OCT     05174              WHOLE, DP TIME (SEC)
 2301                42,2557   13261 0           OCT     13261
 2302                42,2560   00000 1           OCT     00000              SPARE
 2303                42,2561   00000 1           OCT     00000
 2304                42,2562   00000 1           OCT     00000              CDU DEGREES, 360-CDU DEGREES
 2305                  42,2563   00000 1          OCT      00000                (SFCONS IN DEGOUTSF, 360-CDUO)
 2306                  42,2564   00714 0          OCT      00714               DP DEGREES (90) (POINT BETWN BITS 7-8)
 2307                  42,2565   31463 1          OCT      31463
 2308                  42,2566   13412 1          OCT      13412               DP DEGREES (360)
 2309                  42,2567   07534 1          OCT      07534
 2310                  42,2570   05605 1          OCT      05605               DEGREES (180)
 2311                  42,2571   03656 1          OCT      03656
 2312                  42,2572   00001 0          OCT      00001               WEIGHT2
 2313                  42,2573   16170 0          OCT      16170
 2314                  42,2574   00441 0          OCT      00441               POSITION5
 2315                  42,2575   34306 0          OCT      34306
 2316                  42,2576   07176 0          OCT      07176               POSITION4        (POINT BETWN BITS 7-8)
 2317                  42,2577   21603 1          OCT      21603
 2318                  42,2600   15340 1          OCT      15340               VELOCITY2
 2319                  42,2601   15340 1          OCT      15340
 2320                  42,2602   01031 1          OCT      01031               VELOCITY3        (POINT BETWN BITS 7-8)
 2321                  42,2603   21032 0          OCT      21032
 2322                  42,2604   34631 1          OCT      34631               ELEVATION DEGREES
 2323                  42,2605   23146 0          OCT      23146
 2324                  42,2606   00636 1          OCT      00636               RENDEZVOUS RADAR RANGE
 2325                  42,2607   14552 0          OCT      14552
 2326                  42,2610   74552 0          OCT      74552               RENDEZVOUS RADAR RANGE RATE
 2327                  42,2611   70307 1          OCT      70307
 2328                  42,2612   05520 0          2DEC     1.079 E-5 B14       LANDING RADAR ALTITUDE
 2328                  42,2613   15312 0
 2330                  42,2614   14226 1          OCT      14226               INITIAL/FINAL ALTITUDE
 2331                  42,2615   31757 0          OCT      31757
 2332                  42,2616   02476 0          OCT      02476               ALTITUDE RATE
 2333                  42,2617   05531 0          OCT      05531
 2334                  42,2620   02727 1          OCT      02727               FORWARD/LATERAL VELOCITY
 2335                  42,2621   16415 0          OCT      16415
 2336                  42,2622   00007 0          OCT      00007               ROT HAND CONT ANGLE RATE
 2337                  42,2623   13734 0          OCT      13734
 2338                  42,2624   74477 0          2DEC     -.6440 E-5 B14      LANDING RADAR VELX
 2338                  42,2625   50643 0
 2340                  42,2626   06265 0          2DEC       1.212 E-5 B14     LANDING RADAR VELY
 2340                  42,2627   16004 1
 2342                  42,2630   04426 0          2DEC      .8668 E-5 B14      LANDING RADAR VELZ
 2342                  42,2631   31433 1
 2344                  42,2632   34772 1          OCT      34772               POSITION7
 2345                  42,2633   07016 1          OCT      07016
 2346                  42,2634   01030 0          OCT      01030               TRIM DEGREES2
 2347                  42,2635   33675 0          OCT      33675
 2348                  42,2636   01046 1          OCT      01046               COMPUTED ALTITUDE
 2349                  42,2637   15700 1          OCT      15700
 2350                  42,2640   00321 1          OCT      00321               DP DEGREES
 2351                  42,2641   26706 1          OCT      26706
 2352                  42,2642   04231 0          2DEC     17.2010499 B-7      POSITION 9
 2352                  42,2643   27400 0
 2353                  42,2644   01031 1          2DEC     .032808399          VELOCITY4
 2353                  42,2645   21032 0
 2354                        42,2646   12172 0              2DEC     .32            RADIANS
 2354                        42,2647   34122 1
A2390                                                                               END OF SFOUTAB


A2400                                                                               NN  SF CONSTANT          SF ROUTINE

 2401   REF    9  LAST  306   42,2650   03453 0  IDADDTAB ECADR    TTOGO           40 MIN/SEC                    M/S
 2402   REF    1              42,2651   03663 1           ECADR    VGDISP          40 VEL3                       DP3
 2403   REF    2  LAST  147   42,2652   03507 0           ECADR    DVTOTAL         40 VEL3                       DP3
 2404   REF    8  LAST  306   42,2653   01045 1           ECADR    DSPTEM1         41 CDU DEG                    CDU
 2405   REF    9  LAST  314   42,2654   01046 1           ECADR    DSPTEM1 +1      41 ELEV DEG                   ARTH
 2406                         42,2655   00000 1           OCT      0               41 SPARE COMPONENT
 2407   REF    3  LAST  283   42,2656   02316 1           ECADR    HAPO            42 POS4                       DP3
 2408   REF    1              42,2657   02320 1           ECADR    HPER            42 POS4                       DP3
 2409   REF    2  LAST  314   42,2660   03663 1           ECADR    VGDISP          42 VEL3                       DP3
 2410   REF    2  LAST  104   42,2661   01120 0           ECADR    LAT             43 DPDEG(360)                 DP4
 2411   REF    2  LAST  104   42,2662   01122 1           ECADR    LONG            43 DPDEG(360)                 DP4
 2412   REF    2  LAST  104   42,2663   01124 1           ECADR    ALT             43 POS4                       DP3
 2413   REF    2  LAST  114   42,2664   02117 1           ECADR    HAPOX           44 POS4                       DP3
 2414   REF    1              42,2665   02121 1           ECADR    HPERX           44 POS4                       DP3
 2415   REF    2  LAST  115   42,2666   02140 0           ECADR    TFF             44 MIN/SEC                    M/S
 2416   REF    3  LAST  241   42,2667   03462 1           ECADR    TRKMKCNT        45 WHOLE                      ARTH
 2417   REF   10  LAST  314   42,2670   03453 0           ECADR    TTOGO           45 MIN/SEC                    M/S
 2418   REF    1              42,2671   02252 0           ECADR    +MGA            45 DPDEG(360)                 DP4
 2419   REF   10  LAST  293   42,2672   01343 1           ECADR    DAPDATR1        46 OCTAL ONLY                 OCT
 2420                         42,2673   00000 1           OCT      0               46 SPARE COMPONENT
 2421                         42,2674   00000 1           OCT      0               46 SPARE COMPONENT
 2422   REF   10  LAST  295   42,2675   01331 1           ECADR    LEMMASS         47 WEIGHT2                   ARTH1
 2423   REF    4  LAST  295   42,2676   01332 1           ECADR    CSMMASS         47 WEIGHT2                   ARTH1
 2424                         42,2677   00000 1           OCT      0               47 SPARE COMPONENT
 2425   REF    1              42,2700   03002 0           ECADR    PITTIME         48 TRIM DEG2                  ARTH
 2426   REF    2  LAST  295   42,2701   03001 0           ECADR    ROLLTIME        48 TRIM DEG2                  ARTH
 2427                         42,2702   00000 1           OCT      0               48 SPARE COMPONENT
 2428   REF    1              42,2703   00314 1           ECADR    R22DISP         49 POS4                       DP3
 2429   REF    2  LAST  314   42,2704   00316 0           ECADR    R22DISP +2      49 VEL3                       DP3
 2430   REF    1              42,2705   03745 1           ECADR    WHCHREAD        49 WHOLE                      ARTH
 2431                         42,2706   00000 1           OCT      0               50 SPARE
 2432                         42,2707   00000 1           OCT      0               50 SPARE
 2433                         42,2710   00000 1           OCT      0               50 SPARE
 2434   REF    4  LAST  280   42,2711   02200 1           ECADR    ALPHASB         51 DPDEG(360)                 DP4
 2435   REF    3  LAST  118   42,2712   02202 0           ECADR    BETASB          51 DPDEG(360)                 DP4
 2436                         42,2713   00000 1           OCT      0               51 SPARE COMPONENT
 2437   REF    1              42,2714   01755 1           ECADR    ACTCENT         52 DPDEG(360)                 DP4
 2438                         42,2715   00000 1           OCT      00000           52 SPARE COMPONENT
 2439                         42,2716   00000 1           OCT      00000           52 SPARE COMPONENT
 2440                         42,2717   00000 1           OCT      00000           53 SPARE
 2441                         42,2720   00000 1           OCT      00000           53
 2442                         42,2721   00000 1           OCT      00000           53
 2443   REF    7  LAST  118   42,2722   02200 1           ECADR    RANGE           54 POS5                       DP1
 2444   REF   3  LAST  115   42,2723   02202 0         ECADR  RRATE          54 VEL3                                 DP3
 2445   REF   3  LAST  115   42,2724   02204 0         ECADR  RTHETA         54 DPDEG(360)                           DP4
 2446   REF   2  LAST  198   42,2725   03466 0         ECADR  NN             55 WHOLE                                ARTH
 2447   REF   3  LAST  198   42,2726   02256 1         ECADR  ELEV           55 DPDEG(360)                           DP4
 2448   REF   2  LAST  198   42,2727   03620 0         ECADR  CENTANG        55 DPDEG(360)                           DP4
 2449   REF   3  LAST  300   42,2730   02200 1         ECADR  RR-AZ          56 DPDEG(360)                           DP4
 2450   REF   2  LAST  300   42,2731   02202 0         ECADR  RR-ELEV        56 DPDEG(360)                           DP4
 2451                        42,2732   00000 1         OCT    0              56 SPARE COMPONENT
 2452   REF   4  LAST  198   42,2733   02302 1         ECADR  DELTAR         57 POS4                                 DP3
 2453                        42,2734   00000 1         OCT    0              57 SPARE COMPONENT
 2454                        42,2735   00000 1         OCT    0              57 SPARE COMPONENT
 2455   REF   3  LAST  141   42,2736   03605 1         ECADR  POSTTPI        58 POS4                                 DP3
 2456   REF   5  LAST  141   42,2737   03575 0         ECADR  DELVTPI        58 VEL3                                 DP3
 2457   REF   2  LAST  198   42,2740   02347 0         ECADR  DELVTPF        58 VEL3                                 DP3
 2458   REF   2  LAST  117   42,2741   02302 1         ECADR  DVLOS          59 VEL3                                 DP3
 2459   REF   3  LAST  315   42,2742   02304 1         ECADR  DVLOS +2       59 VEL3                                 DP3
 2460   REF   4  LAST  315   42,2743   02306 0         ECADR  DVLOS +4       59 VEL3                                 DP3
 2461   REF   2  LAST  119   42,2744   02262 0         ECADR  VHORIZ         60 VEL3                                 DP3
 2462   REF   3  LAST  147   42,2745   03473 1         ECADR  HDOTDISP       60 VEL3                                 DP3
 2463   REF   2  LAST  147   42,2746   03534 0         ECADR  HCALC          60 COMP ALT                             DP1
 2464   REF   2  LAST  147   42,2747   03475 1         ECADR  TTFDISP        61 MIN/SEC                              M/S
 2465   REF  11  LAST  314   42,2750   03453 0         ECADR  TTOGO          61 MIN/SEC                              M/S
 2466   REF   2  LAST  122   42,2751   02626 1         ECADR  OUTOFPLN       61 POS7                                 DP4
 2467   REF   2  LAST  147   42,2752   03471 0         ECADR  ABVEL          62 VEL3                                 DP3
 2468   REF  12  LAST  315   42,2753   03453 0         ECADR  TTOGO          62 MIN/SEC                              M/S
 2469   REF   3  LAST  314   42,2754   03507 0         ECADR  DVTOTAL        62 VEL3                                 DP3
 2470   REF   3  LAST  315   42,2755   03471 0         ECADR  ABVEL          63 VEL3                                 DP3
 2471   REF   4  LAST  315   42,2756   03473 1         ECADR  HDOTDISP       63 VEL3                                 DP3
 2472   REF   1              42,2757   03774 0         ECADR  HCALC1         63 COMP ALT                             DP1
 2473   REF   5  LAST  150   42,2760   03666 1         ECADR  FUNNYDSP       64 2INT                                 2INT
 2474   REF   5  LAST  315   42,2761   03473 1         ECADR  HDOTDISP       64 VEL3                                 DP3
 2475   REF   3  LAST  315   42,2762   03534 0         ECADR  HCALC          64 COMP ALT                             DP1
 2476   REF   2  LAST  207   42,2763   00013 0         ECADR  SAMPTIME       65 HMS (MIXED ONLY TO KEEP CODE 65) HMS
 2477   REF   3  LAST  315   42,2764   00013 0         ECADR  SAMPTIME       65 HMS                                  HMS
 2478   REF   4  LAST  315   42,2765   00013 0         ECADR  SAMPTIME       65 HMS                                  HMS
 2479   REF   3  LAST  277   42,2766   02206 1         ECADR  RSTACK +6      66 LANDING RADAR ALT                    DP1
 2480                        42,2767   00000 1         OCT    0              66 LR POSITION                         LRPOS
 2481                        42,2770   00000 1         OCT    0              66 SPARE COMPONENT
 2482   REF   4  LAST  315   42,2771   02200 1         ECADR  RSTACK         67 LANDING RADAR VELX                   DP1
 2483   REF   5  LAST  315   42,2772   02202 0         ECADR  RSTACK +2      67 LANDING RADAR VELY                   DP1
 2484   REF   6  LAST  315   42,2773   02204 0         ECADR  RSTACK +4      67 LANDING RADAR VELZ                   DP1
 2485   REF   2  LAST  122   42,2774   02624 0         ECADR  RANGEDSP       68 POS7                                 DP4
 2486   REF   3  LAST  315   42,2775   03475 1         ECADR  TTFDISP        68 MIN/SEC                              M/S
 2487   REF   3  LAST  200   42,2776   03664 0         ECADR  DELTAH         68 COMP ALT                             DP1
 2488                        42,2777   00000 1         OCT    00000          69 SPARE
 2489                        42,3000   00000 1         OCT    00000          69
 2490                        42,3001   00000 1         OCT    00000          69
 2491   REF   3  LAST  246   42,3002   00735 0         ECADR  AOTCODE        70 OCTAL ONLY                           OCT
 2492   REF   4  LAST  315   42,3003   00736 0         ECADR  AOTCODE +1     70 OCTAL ONLY                           OCT
 2493   REF   5  LAST  315   42,3004   00737 1         ECADR  AOTCODE +2     70 OCTAL ONLY                           OCT
 2494   REF   6  LAST  315   42,3005   00735 0          ECADR   AOTCODE        71 OCTAL ONLY                  OCT
 2495   REF   7  LAST  316   42,3006   00736 0          ECADR   AOTCODE +1     71 OCTAL ONLY                  OCT
 2496   REF   8  LAST  316   42,3007   00737 1          ECADR   AOTCODE +2     71 OCTAL ONLY                  OCT
 2497   REF   3  LAST  299   42,3010   00035 1          ECADR   CDUT           72 360-CDU DEG             360-CDU
 2498   REF   3  LAST  198   42,3011   00036 1          ECADR   CDUS           72 CDU DEG                     CDU
 2499                        42,3012   00000 1          OCT     0              72 SPARE COMPONENT
 2500   REF   2  LAST  103   42,3013   01107 0          ECADR   TANG           73 360-CDU DEG             360-CDU
 2501   REF   3  LAST  316   42,3014   01110 0          ECADR   TANG +1        73 CDU DEG                     CDU
 2502                        42,3015   00000 1          OCT     0              73 SPARE COMPONENT
 2503   REF  13  LAST  315   42,3016   03453 0          ECADR   TTOGO          74 MIN/SEC                     M/S
 2504   REF   2  LAST  120   42,3017   02362 1          ECADR   YAW            74 DPDEG(360)                  DP4
 2505   REF   1              42,3020   02364 1          ECADR   PITCH          74 DPDEG(360)                  DP4
 2506   REF   3  LAST  198   42,3021   03577 1          ECADR   DIFFALT        75 POS4                        DP3
 2507   REF   2  LAST  117   42,3022   02252 0          ECADR   T1TOT2         75 MIN/SEC
 2508   REF   1              42,3023   02254 0          ECADR   T2TOT3         75 MIN/SEC                     M/S
 2509   REF   2  LAST  119   42,3024   02276 0          ECADR   ZDOTD          76 VEL3                        DP3
 2510   REF   2  LAST  119   42,3025   02272 1          ECADR   RDOTD          76 VEL3                        DP3
 2511   REF   2  LAST  152   42,3026   03642 1          ECADR   XRANGE         76 POS4                        DP3
 2512   REF  14  LAST  316   42,3027   03453 0          ECADR   TTOGO          77 MIN/SEC                     M/S
 2513   REF   2  LAST  120   42,3030   02310 1          ECADR   YDOT           77 VEL3                        DP3
 2514                        42,3031   00000 1          OCT     0              77 SPARE COMPONENT
 2515   REF   7  LAST  315   42,3032   02200 1          ECADR   RSTACK         78 RR RANGE                    DP1
 2516   REF   8  LAST  316   42,3033   02202 0          ECADR   RSTACK +2      78 RR RANGE RATE               DP1
 2517                        42,3034   00000 1          OCT     00000          78 SPARE COMPONENT
 2518   REF   2  LAST  261   42,3035   01236 1          ECADR   CURSOR         79 CDU DEG                     CDU
 2519   REF   2  LAST  261   42,3036   01240 0          ECADR   SPIRAL         79 CDU DEG                     CDU
 2520   REF   1              42,3037   01242 1          ECADR   POSCODE        79 WHOLE                       ARTH
 2521   REF   2  LAST  144   42,3040   03733 0          ECADR   DATAGOOD       80 WHOLE                       ARTH
 2522   REF   1              42,3041   03734 1          ECADR   OMEGAD         80 DPDEG(360)                  DP4
 2523                        42,3042   00000 1          OCT     0              80 SPARE COMPONENT
 2524   REF   2  LAST  139   42,3043   03433 0          ECADR   DELVLVC        81 VEL3                        DP3
 2525   REF   3  LAST  316   42,3044   03435 0          ECADR   DELVLVC +2     81 VEL3                        DP3
 2526   REF   4  LAST  316   42,3045   03437 1          ECADR   DELVLVC +4     81 VEL3                        DP3
 2527   REF   5  LAST  316   42,3046   03433 0          ECADR   DELVLVC        82 VEL3                        DP3
 2528   REF   6  LAST  316   42,3047   03435 0          ECADR   DELVLVC +2     82 VEL3                        DP3
 2529   REF   7  LAST  316   42,3050   03437 1          ECADR   DELVLVC +4     82 VEL3                        DP3
 2530   REF   1              42,3051   03622 1          ECADR   DELVIMU        83 VEL3                        DP3
 2531   REF   2  LAST  316   42,3052   03624 1          ECADR   DELVIMU +2     83 VEL3                        DP3
 2532   REF   3  LAST  316   42,3053   03626 0          ECADR   DELVIMU +4     83 VEL3                        DP3
 2533   REF   1              42,3054   02222 1          ECADR   DELVOV         84 VEL3                        DP3
 2534   REF   2  LAST  316   42,3055   02224 1          ECADR   DELVOV  +2     84 VEL3                        DP3
 2535   REF   3  LAST  316   42,3056   02226 0          ECADR   DELVOV  +4     84 VEL3                        DP3
 2536   REF   3  LAST  147   42,3057   03501 0          ECADR   VGBODY         85 VEL3                        DP3
 2537   REF   4  LAST  316   42,3060   03503 1          ECADR   VGBODY +2      85 VEL3                        DP3
 2538   REF   5  LAST  316   42,3061   03505 1          ECADR   VGBODY +4      85 VEL3                        DP3
 2539   REF   8  LAST  316   42,3062   03433 0          ECADR   DELVLVC        86 VEL3                        DP3
 2540   REF   9  LAST  316   42,3063   03435 0          ECADR   DELVLVC +2     86 VEL3                        DP3
 2541   REF  10  LAST  316   42,3064   03437 1          ECADR   DELVLVC +4     86 VEL3                        DP3
 2542   REF   3  LAST  246   42,3065   01347 0          ECADR   AZ             87 CDU DEG                     CDU
 2543   REF   1              42,3066   01350 0          ECADR   EL             87 CDU DEG                     CDU
 2544                             42,3067   00000 1              OCT      0              87 SPARE COMPONENT
 2545    REF  11  LAST  253       42,3070   02706 1              ECADR    STARAD         88 FRAC                    FRAC
 2546    REF  12  LAST  317       42,3071   02710 0              ECADR    STARAD +2      88 FRAC                    FRAC
 2547    REF  13  LAST  317       42,3072   02712 1              ECADR    STARAD +4      88 FRAC                    FRAC
 2548    REF   2  LAST  123       42,3073   02706 1              ECADR    LANDLAT        89 DPDEG(90)               DP3
 2549    REF   2  LAST  123       42,3074   02710 0              ECADR    LANDLONG       89 DPDEG(90)               DP3
 2550    REF   1                  42,3075   02712 1              ECADR    LANDALT        89 POS5                    DP1
 2551    REF   8  LAST  314       42,3076   02200 1              ECADR    RANGE          90 POS5                    DP1
 2552    REF   4  LAST  315       42,3077   02202 0              ECADR    RRATE          90 VEL3                    DP3
 2553    REF   4  LAST  315       42,3100   02204 0              ECADR    RTHETA         90 DPDEG(360)              DP4
 2554    REF   1                  42,3101   03715 1              ECADR    P21ALT         91 POS4                    DP3
 2555    REF   2  LAST  148       42,3102   03711 0              ECADR    P21VEL         91 VEL2                    DP4
 2556    REF   2  LAST  148       42,3103   03713 1              ECADR    P21GAM         91 DPDEG(360)              DP4
 2557                             42,3104   00000 1              OCT      00000          92 SPARE
 2558                             42,3105   00000 1              OCT      00000          92
 2559                             42,3106   00000 1              OCT      00000          92
 2560    REF   6  LAST  273       42,3107   02737 0              ECADR    OGC            93 DPDEG(90)               DP3
 2561    REF   7  LAST  317       42,3110   02741 1              ECADR    OGC       +2   93 DPDEG(90)               DP3
 2562    REF   8  LAST  317       42,3111   02743 0              ECADR    OGC       +4   93 DPDEG(90)               DP3
 2563                             42,3112   00000 1              OCT      00000          94 SPARE
 2564                             42,3113   00000 1              OCT      00000          94
 2565                             42,3114   00000 1              OCT      00000          94
 2566                             42,3115   00000 1              OCT      0              95 SPARE
 2567                             42,3116   00000 1              OCT      0              95 SPARE
 2568                             42,3117   00000 1              OCT      0              95 SPARE
 2569                             42,3120   00000 1              OCT      0              96 SPARE
 2570                             42,3121   00000 1              OCT      0              96 SPARE
 2571                             42,3122   00000 1              OCT      0              96 SPARE
 2572    REF  10  LAST  314       42,3123   01045 1              ECADR    DSPTEM1        97 WHOLE                   ARTH
 2573    REF  11  LAST  317       42,3124   01046 1              ECADR    DSPTEM1 +1     97 WHOLE                   ARTH
 2574    REF  12  LAST  317       42,3125   01047 0              ECADR    DSPTEM1 +2     97 WHOLE                   ARTH
 2575    REF   4  LAST  305       42,3126   01050 0              ECADR    DSPTEM2        98 WHOLE                   ARTH
 2576    REF   5  LAST  317       42,3127   01051 1              ECADR    DSPTEM2 +1     98 FRAC                    FRAC
 2577    REF   6  LAST  317       42,3130   01052 1              ECADR    DSPTEM2 +2     98 WHOLE                   ARTH
 2578    REF   2  LAST  298       42,3131   02200 1              ECADR    WWPOS          99 POS5                    DP3
 2579    REF   1                  42,3132   02202 0              ECADR    WWVEL          99 VEL4                    DP2
 2580    REF   1                  42,3133   02204 0              ECADR    WWBIAS         99 RADIANS                 DP4
R2600    END OF IDADDTAB


A2800                                                                                    NN  SF ROUTINES

 2801                             42,3134   16351 1  RUTMXTAB    OCT      16351          40 M/S, DP3, DP3
 2802                             42,3135   00142 0              OCT      00142          41 CDU, ARTH
 2803                             42,3136   16347 0              OCT      16347          42 DP3, DP3, DP3
 2804                             42,3137   16512 0              OCT      16512          43 DP4, DP4, DP3
 2805                             42,3140   22347 1              OCT      22347          44 DP3, DP3, M/S
 2806                             42,3141   24443 1              OCT      24443          45 ARTH, M/S, DP4
 2807                             42,3142   00000 1              OCT      00000          46 OCT
 2808                             42,3143   00553 1              OCT      00553          47 ARITH1, ARITH1
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2809        42,3144   00143 1          OCT        00143            48 ARTH, ARTH
2810        42,3145   06347 1          OCT        06347            49 DP3, DP3, ARTH
2811        42,3146   00000 1          OCT        0                50 SPARE
2812        42,3147   00512 1          OCT        00512            51 DP4, DP4
2813        42,3150   00012 1          OCT        00012            52 DP4
2814        42,3151   00000 1          OCT        00000            53 SPARE
2815        42,3152   24344 1          OCT        24344            54 DP1, DP3, DP4
2816        42,3153   24503 1          OCT        24503            55 ARTH, DP4 , DP4
2817        42,3154   00512 1          OCT        00512            56 DP4, DP4
2818        42,3155   00007 0          OCT        00007            57 DP3
2819        42,3156   16347 0          OCT        16347            58 DP3, DP3, DP3
2820        42,3157   16347 0          OCT        16347            59 DP3, DP3, DP3
2821        42,3160   10347 0          OCT        10347            60 DP3, DP3, DP1
2822        42,3161   24451 1          OCT        24451            61 M/S, M/S, DP4
2823        42,3162   16447 1          OCT        16447            62 DP3, M/S, DP3
2824        42,3163   10347 0          OCT        10347            63 DP3, DP3, DP1
2825        42,3164   10354 1          OCT        10354            64 2INT, DP3, DP1
2826        42,3165   20410 0          OCT        20410            65 HMS, HMS, HMS
2827        42,3166   00304 0          OCT        00304            66 DP1, LRPOS
2828        42,3167   10204 0          OCT        10204            67 DP1, DP1, DP1
2829        42,3170   10452 0          OCT        10452            68 DP4, M/S, DP1
2830        42,3171   00000 1          OCT        00000            69 SPARE
2831        42,3172   00000 1          OCT        0                70 OCT, OCT, OCT
2832        42,3173   00000 1          OCT        0                71 OCT, OCT, OCT
2833        42,3174   00115 1          OCT        00115            72 360-CDU, CDU
2834        42,3175   00115 1          OCT        00115            73 360-CDU, CDU
2835        42,3176   24511 1          OCT        24511            74M/S, DP4,DP4
2836        42,3177   22447 0          OCT        22447            75 DP3, M/S, M/S
2837        42,3200   16347 0          OCT        16347            76 DP3, DP3, DP3
2838        42,3201   00351 0          OCT        00351            77 M/S, DP3
2839        42,3202   00204 1          OCT        00204            78 DP1, DP1
2840        42,3203   06102 1          OCT        06102            79 CDU, CDU, ARTH
2841        42,3204   00503 1          OCT        00503            80 ARTH, DP4
2842        42,3205   16347 0          OCT        16347            81 DP3, DP3, DP3
2843        42,3206   16347 0          OCT        16347            82 DP3, DP3, DP3
2844        42,3207   16347 0          OCT        16347            83 DP3, DP3, DP3
2845        42,3210   16347 0          OCT        16347            84 DP3, DP3, DP3
2846        42,3211   16347 0          OCT        16347            85 DP3, DP3, DP3
2847        42,3212   16347 0          OCT        16347            86 DP3, DP3, DP3
2848        42,3213   00102 1          OCT        00102            87 CDU, CDU
2849        42,3214   02041 0          OCT        02041            88 FRAC FOR EACH
2850        42,3215   10347 0          OCT        10347            89 DP3, DP3, DP1
2851        42,3216   24344 1          OCT        24344            90 DP1, DP3, DP4
2852        42,3217   24507 0          OCT        24507            91 DP3, DP4, DP4
2853        42,3220   00000 1          OCT        00000            92 SPARE
2854        42,3221   16347 0          OCT        16347            93 DP3, DP3, DP3
2855        42,3222   00000 1          OCT        00000            94 SPARE
2856        42,3223   00000 1          OCT        0                95 SPARE
2857        42,3224   00000 1          OCT        0                96 SPARE
2858        42,3225   06143 1          OCT        06143            97 ARTH, ARTH, ARTH
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 2859                      42,3226   06043 0        OCT     06043           98 ARTH, FRAC, ARTH
 2860                      42,3227   24247 0        OCT     24247           99 DP3, DP2, DP4
R2870   END OF RUTMXTAB

 2871   REF    3  LAST  292   30,2000               SBANK= LOWSUPER
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L         LEM GEOMETRY                                                                                   USER'S PAGE NO.   1        EQ S?

 0001                          23,2041                       BANK    23
 000101 REF    1               13,2000                       SETLOC LEMGEOM
 000102                        13,2070                       BANK

 00015  REF    4  LAST  319    30,2000                       SBANK= LOWSUPER
 0002   REF    3  LAST  123    E5,1642                       EBANK= XSM


R0500   THESE TWO ROUTINES COMPUTE THE ACTUAL STATE VECTOR FOR LM,CSM BY ADDING
R0501   THE CONIC R,V AND THE DEVIATIONSR,V. THE STATE VECTORS ARE CONVERTED TO
R0502   METERS B-29 AND METERS/CSEC B-7 AND STORED APPROPRIATELY IN RN,VN OR
R0503   R-OTHER , V-OTHER FOR DOWNLINK. THE ROUTINES NAMES ARE SWITCHED IN THE
R0504   OTHER VEHICLES COMPUTER.

R0505   INPUT
R0506     STATE VECTOR IN TEMPORARY STORAGE AREA
R05061    IF STATE VECTOR IS SCALED POS B27 AND VEL B5
R05062       SET X2 TO +2
R05063    IF STATE VECTOR IS SCALED POS B29 AND VEL B7
R05064       SET X2 TO 0

R0507   OUTPUT
R0508     R(T) IN RN, V(T) IN VN, T IN PIPTIME
R0509   OR
R0510     R(T) IN R-OTHER, V(T) IN V-OTHER   (T IS DEFINED BY T-OTHER)


 05106  REF    1                                             COUNT* $$/GEOM
 0511                          13,2070   43414 1  SVDWN2     BOF    RVQ                 SW=1=AVETOMID DOING W-MATRIX INTEG.
 05112  REF    1               13,2071   04756 1                    AVEMIDSW
 05113                         13,2072   26073 1                    +1
 05114                         13,2073   53775 1             VLOAD  VSL*
 0512   REF    2  LAST  110    13,2074   01521 0                    TDELTAV
 0513                          13,2075   57605 0                    0 -7,2
 0514                          13,2076   53655 1             VAD    VSL*
 0515   REF    2  LAST  110    13,2077   01535 0                    RCV
 0516                          13,2100   57576 1                    0,2
 0517   REF    4  LAST  195    13,2101   25221 1             STOVL  RN
 0518   REF    2  LAST  110    13,2102   01527 0                    TNUV
 0519                          13,2103   53257 1             VSL*   VAD
 0520                          13,2104   57602 1                    0 -4,2
 0521   REF    2  LAST  110    13,2105   01543 1                    VCV
 0522                          13,2106   77657 0             VSL*
 0523                          13,2107   57576 1                    0,2
 0524   REF    4  LAST  195    13,2110   15227 1             STODL  VN
 0525   REF    3  LAST  306    13,2111   01517 0                    TET
 0526   REF    2  LAST  195    13,2112   01235 1             STORE  PIPTIME
 0527                          13,2113   77616 0             RVQ
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0528                        13,2114   53775 1  SVDWN1   VLOAD   VSL*
0529  REF    3  LAST  320   13,2115   01521 0                   TDELTAV
0530                        13,2116   57605 0                   0 -7,2
0531                        13,2117   53655 1           VAD     VSL*
0532  REF    3  LAST  320   13,2120   01535 0                   RCV
0533                        13,2121   57576 1                   0,2
0534  REF    5  LAST  194   13,2122   25720 0           STOVL   R-OTHER
0535  REF    3  LAST  320   13,2123   01527 0                   TNUV
0536                        13,2124   53257 1           VSL*    VAD
0537                        13,2125   57602 1                   0 -4,2
0538  REF    3  LAST  320   13,2126   01543 1                   VCV
0539                        13,2127   77657 0           VSL*
0540                        13,2130   57576 1                   0,2
0541  REF    5  LAST  194   13,2131   01726 0           STORE   V-OTHER
0542                        13,2132   77616 0           RVQ
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R0649             THE FOLLOWING ROUTINE TAKES A HALF UNIT TARGET VECTOR REFERRED TO NAV BASE COORDINATES AND FINDS BOTH
R0651    GIMBAL ORIENTATIONS AT WHICH THE RR MIGHT SIGHT THE TARGET. THE GIMBAL ANGLES CORRESPONDING TO THE PRESENT MODE
R0653    ARE LEFT IN MODEA AND THOSE WHICH WOULD BE USED AFTER A REMODE IN MODEB. THIS ROUTINE ASSUMES MODE 1 IS TRUNNION
R0655    ANGLE LESS THAN 90 DEGS IN ABS VALUE WITH ARBITRARY SHAFT, WITH A CORRESPONDING DEFINITION FOR MODE 2. MODE
R0657    SELECTION AND LIMIT CHECKING ARE DONE ELSEWHERE.

R0658             THE MODE 1 CONFIGURATION IS CALCULATED FROM THE VECTOR AND THEN MODE 2 IS FOUND USING THE RELATIONS

R0660             S(2) = 180 + S(1)
R0661             T(2) = 180 - T(1)

R066101      THE VECTOR ARRIVES IN MPAC WHERE TRG*SMNB OR *SMNB* WILL HAVE LEFT IT.

 0662                          13,2133   00041 1  RRANGLES STORE   32D
 06625                         13,2134   57545 1           DLOAD   DCOMP             SINCE WE WILL FIND THE MODE 1 SHAFT
 0663                          13,2135   00043 0                   34D               ANGLE LATER, WE CAN FIND THE MODE 1
 0664                          13,2136   67401 0           SETPD   ASIN              TRUNNION BY SIMPLY TAKING THE ARCSIN OF
 0665                          13,2137   00001 0                   0                 THE Y COMPONENT, THE ASIN GIVING AN
 0666                          13,2140   44206 0           PUSH    BDSU              ANSWER WHOSE ABS VAL IS LESS THAN 90 DEG
 0667    REF   1               13,2141   24005 1                   LODPHALF
 0668                          13,2142   14005 1           STODL   4                 MODE 2 TRUNNION TO 4.

 0669    REF   3  LAST  249    13,2143   24007 0                   LO6ZEROS
 0670                          13,2144   24043 0           STOVL   34D               UNIT THE PROJECTION OF THE VECTOR
 0671                          13,2145   00041 1                   32D                 IN THE X-Z PLANE
 0672                          13,2146   41056 1           UNIT    BOVB              IF OVERFLOW,TARGET VECTOR IS ALONG Y
 0673    REF   1               13,2147   12421 1                   LUNDESCH          CALL FOR MANEUVER UNLESS ON LUNAR SURF
 0674                          13,2150   14041 1           STODL   32D               PROJECTION VECTOR.
 0675                          13,2151   00041 1                   32D
 0676                          13,2152   44142 0           SR1     STQ
 0677    REF   1               13,2153   00051 0                   S2
 0678    REF   3  LAST  300    13,2154   14023 0           STODL   SINTH             USE ARCTRIG SINCE SHAFT COULD BE ARB.
 0679                          13,2155   00045 0                   36D
 0680                          13,2156   77742 0           SR1
 0681    REF   3  LAST  300    13,2157   34021 0           STCALL  COSTH
 0682    REF   3  LAST  300    13,2160   47320 0                   ARCTRIG
 0683                              13,2161   43206 1          PUSH    DAD           MODE 1 SHAFT TO 2.
 0684  REF   2  LAST  322          13,2162   24005 1                  LODPHALF
 0685                              13,2163   24007 0          STOVL   6
 0686                              13,2164   00005 1                  4
 0687                              13,2165   77634 0          RTB                   FIND MODE 2 CDU ANGLES.
 0688  REF   1                     13,2166   21635 1                  2V1STO2S
 0689  REF   2  LAST  103          13,2167   25112 1          STOVL   MODEB
 0690                              13,2170   00001 0                  0
 0691                              13,2171   77634 0          RTB                   MODE 1 ANGLES TO MODE A.
 0692  REF   2  LAST  323          13,2172   21635 1                  2V1STO2S
 0693  REF   1                     13,2173   01110 0          STORE   MODEA
 0694                              13,2174   77776 1          EXIT

 0695  REF  26  LAST  276          13,2175  4 0110 0          CS      RADMODES      SWAP MODEA AND MODEB IF RR IN MODE 2.
 0696  REF   1                     13,2176  7 4740 1          MASK    ANTENBIT
 0697  REF  94  LAST  305          13,2177  10 000 0          CCS     A
 0698                              13,2200  1 2204 1          TCF     +4

 0699  REF   2  LAST  323          13,2201  53'110 1          DXCH    MODEA
 0700  REF   3  LAST  323          13,2202  53'112 0          DXCH    MODEB
 0701  REF   3  LAST  323          13,2203  53'110 1          DXCH    MODEA

 0702  REF  10  LAST  299          13,2204  0 6037 0          TC      INTPRET
 0703                              13,2205   77650 1          GOTO
 0704  REF   2  LAST  322          13,2206   00051 0                  S2
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R0705   GIVEN RR TRUNNION AND SHAFT (T,S) IN TANGNB,+1,FIND THE ASSOCIATED
R0706   LINE OF SIGHT IN NAV BASE AXES.  THE HALF UNIT VECTOR, .5(SIN(S)COS(T),
R0707   -SIN(T),COS(S)COS(T)) IS LEFT IN MPAC AND 32D.

 07072  REF    1                23,2000                        SETLOC INFLIGHT
 07074                          23,2041                        BANK

 07076  REF    1                                               COUNT* $$/GEOM

 0708                           23,2041   47135 0  RRNB        SLOAD  RTB
 0709   REF    4  LAST   201    23,2042   03753 0                     TANGNB
 07091  REF    5  LAST   250    23,2043   21576 0                     CDULOGIC
 0710                           23,2044   41401 1              SETPD  PUSH                 TRUNNION ANGLE TO 0
 0711                           23,2045   00001 0                     0
 0712                           23,2046   57556 0              SIN    DCOMP
 0713                           23,2047   14043 0              STODL  34D                  Y COMPONENT

 0714                           23,2050   41546 0              COS    PUSH                 .5 COS(T) TO 0
 0715                           23,2051   47135 0              SLOAD  RTB
 0716   REF    5  LAST   324    23,2052   03754 1                     TANGNB +1
 0717   REF    6  LAST   324    23,2053   21576 0                     CDULOGIC
 0718                           23,2054   71406 0  RRNB1       PUSH   COS                  SHAFT ANGLE TO 2
 0719                           23,2055   72405 0              DMP    SL1
 0720                           23,2056   00001 0                     0
 0721                           23,2057   14045 0              STODL  36D                  Z COMPONENT

 0722                           23,2060   41356 1              SIN    DMP
 0723                           23,2061   77752 1              SL1
 0724                           23,2062   24041 1              STOVL  32D
 0725                           23,2063   00041 1                     32D
 0726                           23,2064   77616 0              RVQ

R0727   THIS ENTRY TO RRNB REQUIRES THE TRUNNION AND SHAFT ANGLES IN MPAC AND MPAC +1 RESPECTIVELY

 0729                           23,2065   14025 0  RRNBMPAC STODL  20D                  SAVE SHAFT CDU IN 21.
 07291  REF   43  LAST   299    23,2066   00155 0                     MPAC                 SET MODE TO DP.  (THE PRECEEDING STORE
A07292                                                                                     MAY BE DP, TP OR VECTOR.)
 0730                           23,2067   40234 0              RTB    SETPD
 0731   REF    7  LAST   324    23,2070   21576 0                     CDULOGIC
 0732                           23,2071   00001 0                     0
 0733                           23,2072   73406 1              PUSH   SIN                  TRUNNION ANGLE TO 0
 0734                           23,2073   77676 0              DCOMP
 0735                           23,2074   14043 0              STODL  34D                  Y COMPONENT
 0736                           23,2075   41546 0              COS    PUSH                 .5COS(T) TO 0
 0737                           23,2076   47135 0              SLOAD  RTB                  PICK UP CDU'S.
 0738                           23,2077   00026 0                     21D
 0739   REF    8  LAST   324    23,2100   21576 0                     CDULOGIC
 0740                           23,2101   77650 1              GOTO
 0741   REF    1                23,2102   46054 1                     RRNB1
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L        IMU COMPENSATION PACKAGE                                                              USER'S PAGE NO.   1       EO S3

 0001                             07,2667                         BANK     7
 000101 REF    1                  06,2000                         SETLOC IMUCOMP
 000102                           06,3263                         BANK

 0002    REF    1                 E3,1460                         EBANK= NBDX

 0100    REF    1                                                 COUNT* $$/ICOMP
 0112    REF    1                 06,3263   3 3531 0   1/PIPA     CAF      LGCOMP              SAVE EBANK OF CALLING PROGRAM
 0113    REF    3  LAST   294     06,3264  56 003 1               XCH      EBANK
 0114    REF    1                 06,3265  54 163 1               TS       MODE

 0115    REF    1                 06,3266  11 477 0               CCS      GCOMPSW             BYPASS IF GCOMPSW NEGATIVE
 0116                             06,3267   1 3272 1              TCF      +3
 0117                             06,3270   1 3272 1              TCF      +2
 0118    REF    1                 06,3271   1 3353 0              TCF      IRIG1               RETURN

 0119    REF    4  LAST   255     06,3272   3 4751 0   1/PIPA1    CAF      FOUR                PIPAZ, PIPAY, PIPAX
 0120    REF    9  LAST   122     06,3273  54 132 0               TS       BUF +2

 0121    REF   10  LAST   326     06,3274  50 132 1               INDEX    BUF +2
 0122    REF    1                 06,3275   3 1453 1              CA       PIPASCF             (P.P.M.) X 2(-9)
 0123                             06,3276   0 0006 1              EXTEND
 0124    REF   11  LAST   326     06,3277   5 0132 1              INDEX    BUF +2
 0125    REF    1                 06,3300   7 0324 0              MP       DELVX               (PP) X 2(+14) NOW (PIPA PULSES) X 2(+5)
 0126    REF   30  LAST   304     06,3301  54 002 1               TS       Q                   SAVE MAJOR PART

 0127    REF   26  LAST   293     06,3302   3 0001 0              CA       L                   MINOR PART
 0128                             06,3303   0 0006 1              EXTEND
 0129    REF   33  LAST   281     06,3304   7 4746 1              MP       BIT6                SCALE 2(+9)    SHIFT RIGHT 9
 0130    REF   12  LAST   326     06,3305  50 132 1               INDEX    BUF +2
 0131    REF    2  LAST   326     06,3306  54 325 1               TS       DELVX +1            FRACTIONAL PIPA PULSES SCALED 2(+14)

 0132    REF   31  LAST   326     06,3307   3 0002 0              CA       Q                   MAJOR PART
 0133                             06,3310   0 0006 1              EXTEND
 0134    REF   34  LAST   326     06,3311   7 4746 1              MP       BIT6                SCALE 2(+9)    SHIFT RIGHT 9
 0135    REF   13  LAST   326     06,3312  50 132 1               INDEX    BUF +2
 0136    REF    3  LAST   326     06,3313  20 325 1               DAS      DELVX               (PIPAI) + (PIPAI)(SFE)

 0137    REF   14  LAST   326     06,3314  50 132 1               INDEX    BUF +2
 0138    REF    1                 06,3315   4 1452 1              CS       PIPABIAS            (PIPA PULSES)/(CS) X 2(-5)              *
 0139                             06,3316   0 0006 1              EXTEND
 0140    REF    2  LAST   165     06,3317   7 1075 0              MP       1/PIPADT            (CS) X 2(+8)  NOW (PIPA PULSES) X 2(+3)*
 0141                             06,3320   0 0006 1              EXTEND
 0142    REF   19  LAST   254     06,3321   7 4750 0              MP       BIT4                SCALE 2(+11)  SHIFT RIGHT 11            *
 0143    REF   15  LAST   326     06,3322  50 132 1               INDEX    BUF +2
 0144    REF    4  LAST   326     06,3323  20 325 1               DAS      DELVX               (PIPAI) + (PIPAI)(SFE) - (BIAS)(DELTAT)

 0145    REF   16  LAST   326     06,3324  10 132 0               CCS      BUF +2              PIPAZ, PIPAY, PIPAX
 0146    REF    1                 06,3325   6 7747 1              AD       NEG1
 0147    REF    1                 06,3326   1 3273 0              TCF      1/PIPAI +1
 0148                         06,3327  13 330 0          NOOP                    LESS THAN ZERO IMPOSSIBLE
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L          IMU COMPENSATION PACKAGE                                                     USER'S PAGE NO.   3       E3 S3

 01481  REF   2  LAST  326   06,3330  55'477 0  IRIGCOMP TS     GCOMPSW          INDICATE COMMANDS 2 PULSES OR LESS.
 01482  REF  17  LAST  326   06,3331  54 130 1           TS     BUF              INDEX COUNTER . IRIGX, IRIGY, IRIGZ.

 01483  REF   1              06,3332  0 3356 1           TC     IRIGX            COMPENSATE ACCELERATION TERMS

 01484  REF   2  LAST  326   06,3333  4 1460 0           CS     NBDX             (GYRO PULSES)/(CS) X 2(-5)
 01485  REF   1              06,3334  0 3454 1           TC     DRIFTSUB         -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

 01486  REF   1              06,3335  0 3373 0           TC     IRIGY            COMPENSATE ACCELERATION TERMS

 01487  REF   1              06,3336  4 1461 1           CS     NBDY             (GYRO PULSES)/(CS) X 2(-5)
 01488  REF   2  LAST  328   06,3337  0 3454 1           TC     DRIFTSUB         -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

 01489  REF   1              06,3340  0 3410 1           TC     IRIGZ            COMPENSATE ACCELERATION TERMS

 01490  REF   1              06,3341  3 1462 0           CA     NBDZ             (GYRO PULSES)/(CS) X 2(-5)
 01491  REF   3  LAST  328   06,3342  0 3454 1           TC     DRIFTSUB         +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)


 01492  REF   3  LAST  328   06,3343  11'477 0           CCS    GCOMPSW          ARE GYRO COMMANDS GREATER THAN 2 PULSES
 01493                       06,3344  1 3346 1           TCF    +2               YES  SEND OUT GYRO TORQUING COMMANDS.
 01494  REF   2  LAST  326   06,3345  1 3353 0           TCF    IRIG1            NO   RETURN

 01495  REF   1              06,3346  3 5031 0           CA     PRIO21           PRIO GREATER THAN SERVICER
 01496  REF   4  LAST  260   06,3347  0 5072 1           TC     NOVAC            SEND OUT GYRO TORQUING COMMANDS.
 01497  REF   3  LAST  328   E3,1460                     EBANK= NBDX
 01498  REF   1              06,3350   03507 0           2CADR  1/GYRO
 01499  REF   1              06,3351   14063 1

 01499                       06,3352  0 0003 1           RELINT
 01500  REF   2  LAST  326   06,3353  3 0163 0  IRIG1    CA     MODE             RESTORE CALLERS EBANK
 01501  REF   9  LAST  326   06,3354  54 003 0           TS     EBANK
 01502  REF   2  LAST  244   06,3355  1 4631 0           TCF    SWRETURN
 0151                           06,3356  0 0006 1  IRIGX     EXTEND
 01511  REF  44  LAST  324      06,3357  22 156 0            QXCH    MPAC +2            SAVE Q
 01512                          06,3360  0 0006 1            EXTEND
 0152   REF   5  LAST  326      06,3361  4 0325 1            DCS     DELVX              (PIPA PULSES) X 2(+14)
 0153   REF  45  LAST  329      06,3362  52 155 1            DXCH    MPAC
 0154   REF   1                 06,3363  3 1463 1            CA      ADIAX              (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0155   REF   1                 06,3364  0 3425 1            TC      GCOMPSUB           -(ADIAX)(PIPAX)   (GYRO PULSES) X 2(+14)

 0156                           06,3365  0 0006 1            EXTEND
 0157   REF   1                 06,3366  4 0327 0            DCS     DELVY              (PIPA PULSES) X 2(+14)
 0158   REF  46  LAST  329      06,3367  52 155 1            DXCH    MPAC
 0159   REF   1                 06,3370  4 1466 0            CS      ADSRAX             (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0160   REF   2  LAST  329      06,3371  0 3425 1            TC      GCOMPSUB           +(ADSRAX)(PIPAY)  (GYRO PULSES) X 2(+14)

A01603                                                       EXTEND          ***
A01604                                                       DCS     DELVZ   ***        (PIPA PULSES) X 2(+14)
A01605                                                       DXCH    MPAC    ***
A01606                                                       CA      ADOAX   ***        (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
A01607                                                       TC      GCOMPSUB ***       -(ADOAX)(PIPAZ)   (GYRO PULSES) X 2(+14)

 0161   REF  47  LAST  329      06,3372  0 0156 0            TC      MPAC +2

 0163                           06,3373  0 0006 1  IRIGY     EXTEND
 01631  REF  48  LAST  329      06,3374  22 156 0            QXCH    MPAC +2            SAVE Q
 01632                          06,3375  0 0006 1            EXTEND
 0164   REF   2  LAST  329      06,3376  4 0327 0            DCS     DELVY              (PIPA PULSES) X 2(+14)
 0165   REF  49  LAST  329      06,3377  52 155 1            DXCH    MPAC
 0166   REF   1                 06,3400  3 1464 0            CA      ADIAY              (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0167   REF   3  LAST  329      06,3401  0 3425 1            TC      GCOMPSUB           -(ADIAY)(PIPAY)   (GYRO PULSES) X 2(+14)

 0168                           06,3402  0 0006 1            EXTEND
 0169   REF   1                 06,3403  4 0331 1            DCS     DELVZ              (PIPA PULSES) X 2(+14)
 0170   REF  50  LAST  329      06,3404  52 155 1            DXCH    MPAC
 0171   REF   1                 06,3405  4 1467 1            CS      ADSRAY             (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0172   REF   4  LAST  329      06,3406  0 3425 1            TC      GCOMPSUB           +(ADSRAY)(PIPAZ)  (GYRO PULSES) X 2(+14)

A01723                                                       EXTEND          ***
A01724                                                       DCS     DELVX   ***        (PIPA PULSES) X 2(+14)
A01725                                                       DXCH    MPAC    ***
A01726                                                       CA      ADOAY   ***        (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
A01727                                                       TC      GCOMPSUB ***       -(ADOAY)(PIPAX)   (GYRO PULSES) X 2(+14)

 0173   REF  51  LAST  329      06,3407  0 0156 0            TC      MPAC +2

 0175                           06,3410  0 0006 1  IRIGZ     EXTEND
 01751  REF  52  LAST  329      06,3411  22 156 0            QXCH    MPAC +2            SAVE Q
 01752                          06,3412  0 0006 1            EXTEND
 0176   REF   3  LAST  329      06,3413  4 0327 0            DCS     DELVY              (PIPA PULSES) X 2(+14)
 0177   REF  53  LAST  329      06,3414  52 155 1            DXCH    MPAC
 0178   REF   1                 06,3415  3 1470 0            CA      ADSRAZ             (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0179    REF    5  LAST  329    06,3416  0 3425 1         TC      GCOMPSUB             -(ADSRAZ)(PIPAY)  (GYRO PULSES) X 2(+14)

 0180                           06,3417  0 0006 1         EXTEND
 0181    REF    2  LAST  329    06,3420  4 0331 1         DCS     DELVZ                (PIPA PULSES) X 2(+14)
 0182    REF   54  LAST  329    06,3421  52 155 1         DXCH    MPAC
 0183    REF    1               06,3422  3 1465 1         CA      ADIAZ                (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0184    REF    6  LAST  330    06,3423  0 3425 1         TC      GCOMPSUB             -(ADIAZ)(PIPAZ)   (GYRO PULSES) X 2(+14)

A01843                                                    EXTEND           ***
A01844                                                    DCS     DELVX    ***         (PIPA PULSE) X 2(+14)
A01845                                                    DXCH    MPAC     ***
A01846                                                    CS      ADOAZ    ***         (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
A01847                                                    TC      GCOMPSUB ***         +(ADOAZ)(PIPAX)   (GYRO PULSES) X 2(+14)

 0185    REF   55  LAST  330    06,3424  0 0156 0         TC      MPAC +2
 0199   REF  56  LAST  330   06,3425  56 154 1  GCOMPSUB XCH     MPAC          ADIA OR ADSRA COEFFICIENT ARRIVES IN A
 0200                        06,3426  0 0006 1           EXTEND                C(MPAC) = (PIPA PULSES) X 2(+14)
 0201   REF  57  LAST  331   06,3427  7 0154 0           MP       MPAC         (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0202   REF  18  LAST   98   06,3430  52 123 0           DXCH     VBUF         NOW = (GYRO PULSES) X 2(+8)             *

 0203   REF  58  LAST  331   06,3431  3 0155 0           CA       MPAC +1      MINOR PART PIPA PULSES
 0204                        06,3432  0 0006 1           EXTEND
 0205   REF  59  LAST  331   06,3433  7 0154 0           MP       MPAC         ADIA OR ADSRA
 0206   REF  27  LAST  326   06,3434  54 001 1           TS       L
 0207   REF  33  LAST  298   06,3435  3 4755 1           CAF      ZERO
 0208   REF  19  LAST  331   06,3436  20 123 0           DAS      VBUF         NOW = (GYRO PULSES) X 2(+8)             *

 0209   REF  20  LAST  331   06,3437  3 0122 0           CA       VBUF         PARTIAL RESULT - MAJOR
 0210                        06,3440  0 0006 1           EXTEND
 0211   REF  17  LAST  246   06,3441  7 4743 1           MP       BIT9         SCALE 2(+6)       SHIFT RIGHT 6         *
 0212   REF  18  LAST  329   06,3442  50 130 0           INDEX    BUF          RESULT = (GYRO PULSES) X 2(+14)
 0213   REF   3  LAST  110   06,3443  21'472 0           DAS      GCOMP        HI(ADIA)(PIPAI)  OR  HI(ADSRA)(PIPAI)

 0214   REF  21  LAST  331   06,3444  3 0123 1           CA       VBUF +1      PARTIAL RESULT - MINOR
 0215                        06,3445  0 0006 1           EXTEND
 0216   REF  18  LAST  331   06,3446  7 4743 1           MP       BIT9         SCALE 2(+6)       SHIFT RIGHT 6         *
 0217   REF  28  LAST  331   06,3447  54 001 1           TS       L
 0218   REF  34  LAST  331   06,3450  3 4755 1           CAF      ZERO
 0219   REF  19  LAST  331   06,3451  50 130 0           INDEX    BUF          RESULT = (GYRO PULSES) X 2(+14)
 0220   REF   4  LAST  331   06,3452  21'472 0           DAS      GCOMP        (ADIA)(PIPAI)  OR  (ADSRA)(PIPAI)

 0221   REF  32  LAST  326   06,3453  0 0002 0           TC       Q
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0222                          06,3454  0 0006 1  DRIFTSUB EXTEND                        
0223  REF  20  LAST  331      06,3455  22 131 1           QXCH    BUF +1

0224                          06,3456  0 0006 1           EXTEND                    C(A) = NBD    (GYRO PULSES)/(CS) X 2(-5)
0225  REF   3  LAST  326      06,3457  7 1075 0           MP      1/PIPADT          (CS) X 2(+8)    NOW (GYRO PULSES) X 2(+3)
0226  REF  60  LAST  331      06,3460  22 155 0           LXCH    MPAC +1           SAVE FOR FRACTIONAL COMPENSATION
0227                          06,3461  0 0006 1           EXTEND
0228  REF  20  LAST  326      06,3462  7 4750 0           MP      BIT4              SCALE 2(+11)     SHIFT RIGHT 11
0229  REF  21  LAST  332      06,3463  50 130 0           INDEX   BUF
0230  REF   5  LAST  331      06,3464  21'472 0           DAS     GCOMP             HI(NBD)(DELTAT)    (GYRO PULSES) X 2(+14)

0231  REF  61  LAST  332      06,3465  3 0155 0           CA      MPAC +1           NOW MINOR PART
0232                          06,3466  0 0006 1           EXTEND
0233  REF  21  LAST  332      06,3467  7 4750 0           MP      BIT4              SCALE 2(+11)     SHIFT RIGHT 11
0234  REF  29  LAST  331      06,3470  54 001 1           TS      L
0235  REF  35  LAST  331      06,3471  3 4755 1           CAF     ZERO
0236  REF  22  LAST  332      06,3472  50 130 0           INDEX   BUF               ADD IN FRACTIONAL COMPENSATION
0237  REF   6  LAST  332      06,3473  21'472 0           DAS     GCOMP             (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

0238  REF  12  LAST  304      06,3474  3 4752 0  DRIFTSUB2 CAF    TWO               PIPAX, PIPAY, PIPAZ
0239  REF  23  LAST  332      06,3475  6 0130 0           AD      BUF
0240  REF  24  LAST  332      06,3476  56 130 0           XCH     BUF
0241  REF  95  LAST  323      06,3477  50 000 1           INDEX   A
0242  REF   7  LAST  332      06,3500  11'471 0           CCS     GCOMP             ARE GYRO COMMANDS 1 PULSE OR GREATER
0243                          06,3501  1 3503 0           TCF     +2                YES
0244  REF  25  LAST  332      06,3502  0 0131 1           TC      BUF +1            NO

0245  REF   1                 06,3503  7 3553 0           MASK    COMPCHK           DEC -1
0246  REF  96  LAST  332      06,3504  10 000 0           CCS     A                 ARE GYRO COMMANDS GREATER THAN 2 PULSES
0247  REF   4  LAST  328      06,3505  55'477 0           TS      GCOMPSW           YES - SET GCOMPSW POSITIVE
0248  REF  26  LAST  332      06,3506  0 0131 1           TC      BUF +1            NO
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 0249    REF   5  LAST  326   06,3507  3 4751 0  1/GYRO    CAF     FOUR                PIPAZ, PIPAY, PIPAX
 0250    REF  27  LAST  332   06,3510  54 130 1            TS      BUF

 0251    REF  28  LAST  333   06,3511  50 130 0            INDEX   BUF                 SCALE GYRO COMMANDS FOR IMUPULSE
 0252    REF   8  LAST  332   06,3512  3 1472 1            CA      GCOMP +1            FRACTIONAL PULSES
 0253                         06,3513  0 0006 1            EXTEND
 0254    REF  20  LAST  279   06,3514  7 4744 0            MP      BIT8                SHIFT RIGHT 7
 0255    REF  29  LAST  333   06,3515  50 130 0            INDEX   BUF
 0256    REF   9  LAST  333   06,3516  55'472 0            TS      GCOMP +1            FRACTIONAL PULSES SCALED

 0257    REF  36  LAST  332   06,3517  3 4755 1            CAF     ZERO                SET GCOMP = 0 FOR DAS INSTRUCTION
 0258    REF  30  LAST  333   06,3520  50 130 0            INDEX   BUF
 0259    REF  10  LAST  333   06,3521  57'471 1            XCH     GCOMP               GYRO PULSES
 0260                         06,3522  0 0006 1            EXTEND
 0261    REF  21  LAST  333   06,3523  7 4744 0            MP      BIT8                SHIFT RIGHT 7
 0262    REF  31  LAST  333   06,3524  50 130 0            INDEX   BUF
 0263    REF  11  LAST  333   06,3525  21'472 0            DAS     GCOMP               ADD THESE TO FRACTIONAL PULSES ABOVE

 0264    REF  32  LAST  333   06,3526  10 130 1            CCS     BUF                 PIPAZ, PIPAY, PIPAX
 0265    REF   2  LAST  326   06,3527  6 7747 1            AD      NEG1
 0266    REF   2  LAST  326   06,3530  1 3510 1            TCF     1/GYRO +1
 0267    REF  12  LAST  333   06,3531   01471 1  LGCOMP    ECADR   GCOMP               LESS THAN ZERO IMPOSSIBLE

 0268    REF   2  LAST  326   06,3532  3 3531 0            CAF     LGCOMP
 0269    REF  55  LAST  300   06,3533  0 4616 1            TC      BANKCALL
 0270    REF   2  LAST  273   06,3534   17323 0            CADR    IMUPULSE            CALL GYRO TORQUING ROUTINE
 0271    REF  56  LAST  333   06,3535  0 4616 1            TC      BANKCALL
 0272    REF   6  LAST  273   06,3536   17716 1            CADR    IMUSTALL            WAIT FOR PULSES TO GET OUT
 0273    REF  23  LAST  299   06,3537  1 5155 1            TCF     ENDOFJOB            TEMPORARY

 0274    REF   6  LAST  333   06,3540  3 4751 0  GCOMP1    CAF     FOUR                PIPAZ, PIPAY, PIPAX
 0275    REF  33  LAST  333   06,3541  54 130 1            TS      BUF

 0276    REF  34  LAST  333   06,3542  50 130 0            INDEX   BUF                 RESCALE
 0277    REF  13  LAST  333   06,3543  3 1472 1            CA      GCOMP +1
 0278                         06,3544  0 0006 1            EXTEND
 0279    REF  22  LAST  333   06,3545  7 4744 0            MP      BIT8                SHIFT MINOR PART LEFT 7 - MAJOR PART = 0
 0280    REF  35  LAST  333   06,3546  50 130 0            INDEX   BUF
 0281    REF  14  LAST  333   06,3547  23'472 1            LXCH    GCOMP +1            BITS 8-14 OF MINOR PART WERE = 0

 0282    REF  36  LAST  333   06,3550  10 130 1            CCS     BUF                 PIPAZ, PIPAY, PIPAX
 0283    REF   3  LAST  333   06,3551  6 7747 1            AD      NEG1
 0284    REF   1              06,3552  1 3541 0            TCF     GCOMP1 +1
 0285                         06,3553   77776 1  COMPCHK   DEC     -1                  LESS THAN ZERO IMPOSSIBLE
 0286    REF  24  LAST  333   06,3554  1 5155 1            TCF     ENDOFJOB
 0287    REF   5  LAST  332   06,3555  11'477 0  NBDONLY  CCS    GCOMPSW          BYPASS IF GCOMPSW NEGATIVE
 0288                         06,3556  1 3561 1           TCF    +3
 0289                         06,3557  1 3561 1           TCF    +2
 0290    REF  25  LAST  333   06,3560  1 5155 1           TCF    ENDOFJOB

 029005                       06,3561  0 0004 0           INHINT
 02901   REF   6  LAST  229   06,3562  10 076 1           CCS    FLAGWRD2         PREREAD T3RUPT MAY COINCIDE
 02902   REF  26  LAST  334   06,3563  1 5155 1           TCF    ENDOFJOB
 02903   REF  27  LAST  334   06,3564  1 5155 1           TCF    ENDOFJOB
 02904                        06,3565  1 3566 0           TCF    +1

 02905   REF   2  LAST  258   06,3566  3 0104 1           CA     FLAGWRD8         IF SURFACE FLAG IS SET, SET TEM1
 02906   REF  23  LAST  333   06,3567  7 4744 0           MASK   BIT8             POSITIVE SO THAT THE ACCELERATION TERMS
 02907   REF   4  LAST   98   06,3570  54 141 1           TS     TEM1             WILL BE COMPENSATED.
 02908                        06,3571  0 0006 1           EXTEND
 0291                         06,3572  1 3575 1           BZF    +3               ARE WE ON THE SURFACE

 0292    REF  16  LAST  295   06,3573  0 4674 0           TC     IBNKCALL         ON THE SURFACE
 02925   REF   1              06,3574   77544 1           CADR   PIPASR +3        READ PIPAS, BUT DO NOT SCALE THEM

 0293    REF   2  LAST  165   06,3575  3 0025 0           CA     TIME1            (CS) X 2(+14)
 0294    REF   4  LAST  332   06,3576  57'075 1           XCH    1/PIPADT         PREVIOUS TIME
 0295                         06,3577  0 0003 1           RELINT
 0296                         06,3600  4 0000 0           COM
 0297    REF   5  LAST  334   06,3601  6 1075 1           AD     1/PIPADT         PRESENT TIME - PREVIOUS TIME
 0298    REF   1              06,3602  6 4736 1  NBD2     AD     HALF             CORRECT FOR POSSIBLE TIME1 TICK
 0299    REF   2  LAST  334   06,3603  6 4736 1           AD     HALF
 0300    REF  30  LAST  332   06,3604  56 001 0           XCH    L                IF TIME1 DID NOT TICK, REMOVE RESULTING
 0301    REF  31  LAST  334   06,3605  56 001 0           XCH    L                OVERFLOW.

 0302                         06,3606  0 0006 1  NBD3     EXTEND                  C(A) = DELTAT     (CS) X 2(+14)
 0303    REF  18  LAST  255   06,3607  7 4742 0           MP     BIT10            SHIFT RIGHT 5
 0304    REF  22  LAST  331   06,3610  52 125 0           DXCH   VBUF +2

 03041   REF  37  LAST  333   06,3611  3 4755 1           CA     ZERO
 03042   REF   6  LAST  334   06,3612  55'477 0           TS     GCOMPSW          INDICATE COMMANDS 2 PULSES OR LESS.
 03043   REF  37  LAST  333   06,3613  54 130 1           TS     BUF              INDEX  X, Y, Z.

 03044   REF   5  LAST  334   06,3614  10 141 1           CCS    TEM1             IF SURFACE FLAG IS SET,
 03045   REF   2  LAST  328   06,3615  0 3356 1           TC     IRIGX            COMPENSATE ACCELERATION TERMS.

 0305                         06,3616  0 0006 1           EXTEND
 0306    REF  23  LAST  334   06,3617  3 0125 1           DCA    VBUF +2
 0307    REF  62  LAST  332   06,3620  52 155 1           DXCH   MPAC             DELTAT NOW SCALED (CS) X 2(+19)

 0311    REF   4  LAST  328   06,3621  4 1460 0           CS     NBDX             (GYRO PULSES)/(CS) X 2(-5)
 0312    REF   1              06,3622  0 3644 1           TC     FBIASSUB         -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

 03121   REF   6  LAST  334   06,3623  10 141 1           CCS    TEM1             IF SURFACE FLAG IS SET,
 03122   REF   2  LAST  328   06,3624  0 3373 0           TC     IRIGY            COMPENSATE ACCELERATION TERMS.
 0313                           06,3625  0 0006 1          EXTEND
 0314   REF  24  LAST  334     06,3626  4 0125 0          DCS     VBUF +2
 0315   REF  63  LAST  334     06,3627  52 155 1          DXCH    MPAC              DELTAT SCALED (CS) X 2(+19)
 0316   REF   2  LAST  328     06,3630  3 1461 0          CA      NBDY              (GYRO PULSES)/(CS) X 2(-5)
 0317   REF   2  LAST  334     06,3631  0 3644 1          TC      FBIASSUB          -(NBDY)(DELTAT)    (GYRO PULSES) X 2(+14)

 03171  REF   7  LAST  334     06,3632  10 141 1          CCS     TEM1              IF SURFACE FLAG IS SET,
 03172  REF   2  LAST  328     06,3633  0 3410 1          TC      IRIGZ             COMPENSATE ACCELERATION TERMS

 0318                           06,3634  0 0006 1          EXTEND
 0319   REF  25  LAST  335     06,3635  4 0125 0          DCS     VBUF +2
 0320   REF  64  LAST  335     06,3636  52 155 1          DXCH    MPAC              DELTAT SCALED (CS) X 2(+19)
 0321   REF   2  LAST  328     06,3637  4 1462 1          CS      NBDZ              (GYRO PULSES)/(CS) X 2(-5)
 0322   REF   3  LAST  335     06,3640  0 3644 1          TC      FBIASSUB          +(NBDZ)(DELTAT)    (GYRO PULSES) X 2(+14)

 0323   REF   7  LAST  334     06,3641  11'477 0          CCS     GCOMPSW           ARE GYRO COMMANDS GREATER THAN 2 PULSES
 0324   REF   3  LAST  333     06,3642  1 3507 1          TCF     1/GYRO            YES
 0325   REF  28  LAST  334     06,3643  1 5155 1          TCF     ENDOFJOB          NO
 0326    REF  33  LAST  331    06,3644  56 002 0  FBIASSUB XCH     Q
 0327    REF  38  LAST  334    06,3645  54 131 0           TS      BUF +1

 0328    REF  34  LAST  336    06,3646  3 0002 0           CA      Q              NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
 0329                          06,3647  0 0006 1           EXTEND
 0330    REF  65  LAST  335    06,3650  7 0154 0           MP      MPAC           DELTAT SCALED (CS) X 2(+19)
 0331    REF  39  LAST  336    06,3651  50 130 0           INDEX   BUF
 0332    REF  15  LAST  333    06,3652  21'472 0           DAS     GCOMP          HI(NBD)(DELTAT)    (GYRO PULSES) X 2(+14)

 0333    REF  35  LAST  336    06,3653  3 0002 0           CA      Q              NOW FRACTIONAL PART
 0334                          06,3654  0 0006 1           EXTEND
 0335    REF  66  LAST  335    06,3655  7 0155 1           MP      MPAC +1
 0336    REF  32  LAST  334    06,3656  54 001 1           TS      L
 0337    REF  38  LAST  334    06,3657  3 4755 1           CAF     ZERO
 0338    REF  40  LAST  336    06,3660  50 130 0           INDEX   BUF
 0339    REF  16  LAST  336    06,3661  21'472 0           DAS     GCOMP          (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

 0340    REF   1               06,3662  1 3474 1           TCF     DRFTSUB2       CHECK MAGNITUDE OF COMPENSATION


 0341    REF  57  LAST  333    06,3663  0 4616 1  LASTBIAS TC      BANKCALL
 03411   REF   1               06,3664   17277 0           CADR    PIPUSE1

 03412   REF   8  LAST  335    06,3665  11'477 0           CCS     GCOMPSW
 0342                          06,3666  1 3671 0           TCF     +3
 0343                          06,3667  1 3671 0           TCF     +2
 0344    REF  29  LAST  335    06,3670  1 5155 1           TCF     ENDOFJOB

 03441   REF   3  LAST  334    06,3671  3 0104 1           CA      FLAGWRD8       IF SURFACE FLAG IS SET, SET TEM1
 03442   REF   2  LAST  213    06,3672  7 4744 0           MASK    SURFFBIT       POSITIVE SO THAT THE ACCELERATION TERMS
 03443   REF   8  LAST  335    06,3673  54 141 1           TS      TEM1           WILL BE COMPENSATED.

 0345    REF   1               06,3674  3 7716 0           CAF     PRIO31         2 SECONDS SCALED (CS) X 2(+8)
 0346    REF   6  LAST  334    06,3675  57'075 1           XCH     1/PIPADT
 0347                          06,3676  4 0000 0           COM
 0348    REF   3  LAST  320    06,3677  6 1235 1           AD      PIPTIME +1
 0349    REF   1               06,3700  1 3602 1           TCF     NBD2


 0350    REF   3  LAST  333    06,3701  3 3531 0  GCOMPZER CAF     LGCOMP          ROUTINE TO ZERO GCOMP BEFORE FIRST
 0351    REF  10  LAST  328    06,3702  56 003 1           XCH     EBANK           CALL TO 1/PIPA
 0352    REF   3  LAST  328    06,3703  54 163 1           TS      MODE

 0353    REF  39  LAST  336    06,3704  3 4755 1           CAF     ZERO
 0354    REF   9  LAST  336    06,3705  55'477 0           TS      GCOMPSW
 0355    REF  17  LAST  336    06,3706  55'471 0           TS      GCOMP
 0356    REF  18  LAST  336    06,3707  55'472 0           TS      GCOMP +1
 0357    REF  19  LAST  336    06,3710  55'473 1           TS      GCOMP +2
 0358    REF  20  LAST  336    06,3711  55'474 0           TS      GCOMP +3
 0359    REF  21  LAST  336    06,3712  55'475 1           TS      GCOMP +4
 0360    REF  22  LAST  336   06,3713  55'476 1          TS       GCOMP +5
 0361    REF   3  LAST  328   06,3714   1 3353 0          TCF      IRIG1             RESTORE EBANK AND RETURN
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P0010   SUBROUTINE NAME:    V89CALL
R0011   MOD NO:  0                       DATE: 9 JAN 1968
R0012   MOD BY:  DIGITAL DEVEL GROUP     LOG SECTION: R63

R0013   FUNCTIONAL DESCRIPTION:

R0014   CALLED BY VERB 89 ENTER DURING POO. PRIO 10 USED.  CALCULATES AND
R0015   DISPLAYS FINAL FDAI BALL ANGLES TO POINT LM +X OR +Z AXIS AT CSM.

R0016   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN POO, OPERATOR ERROR AND
R0017   EXIT R63, OTHERWISE CONTINUE.

R0018   2. IF IN POO, DO IMU STATUS CHECK ROUTINE (R02BOTH). IF IMU ON AND ITS
R0019   ORIENTATION KNOWN TO LGC, CONTINUE.

R0020   3. FLASH DISPLAY V 04 N 06.  R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0021   BE POINTED AT CSM.  INITIAL CHOICE IS PREFERRED (+Z) AXIS (R2=1).
R0022   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT = 1) BY V 22 E 2 E.  CONTINUE
R0023   AFTER KEYING IN PROCEED.

R0024   4. BOTH VEHICLE STATE VECTORS UPDATED BY CONIC EQS.

R0025   5. HALF MAGNITUDE UNIT LOS VECTOR (IN STABLE MEMBER COORDINATES) AND
R0026   HALF MAGNITUDE UNIT SPACECRAFT AXIS VECTOR (IN BODY COORDINATES)
R0027   PREPARED FOR VECPOINT.

R0028   6. GIMBAL ANGLES FROM VECPOINT TRANSFORMED INTO FDAI BALL ANGLES BY
R0029   BALLANGS. FLASH DISPLAY V 06 N 18 AND AWAIT RESPONSE.

R0030   7. RECYCLE - RETURN TO STEP 4.
R0031      TERMINATE - EXIT R63.
R0032      PROCEED - RESET 3AXISFLG AND CALL R60LEM FOR ATTITUDE MANEUVER.


R0033   CALLING SEQUENCE:  V 89 E.

R0034   SUBROUTINES CALLED:  CHKPOOH, R02BOTH, GOXDSPF, CSMCONIC, LEMCONIC,
R0035                        VECPOINT, BALLANGS, R60LEM.

R0036   NORMAL EXIT MODES:  TC ENDEXT

R0037   ALARMS:  1. OPERATOR ERROR IF NOT IN POO.
R0038            2. PROGRAM ALARM IF IMU IS OFF.
R0039            3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN.

R0040   OUTPUT:  NONE

R0041   ERASABLE INITIALIZATION REQUIRED:  NONE

R0042   DEBRIS:  OPTION1, +1, TDEC1, POINTVSM, SCAXIS, CPHI, CTHETA, CPSI,
R0043            3AXISFLG.

 0044    REF    4  LAST  284    E4,1606                       EBANK= RONE
 0045                           32,2217                       BANK    32
 0046    REF    1               26,2000                       SETLOC BAWLANGS
 0047                           26,2022                       BANK

 0048    REF    1                                             COUNT* $$/R63
 0049    REF   58  LAST  336    26,2022  0 4616 1  V89CALL    TC      BANKCALL         IMU STATUS CHECK. RETURNS IF ORIENTATION
 0050    REF    1               26,2023   11254 1             CADR    R02BOTH          KNOWN. ALARMS IF NOT.
 0051    REF    3  LAST  293    26,2024  3 6245 1             CAF     THREE            ALLOW ASTRONAUT TO SELECT DESIRED
 0052    REF    8  LAST  305    26,2025  55'051 0             TS      OPTIONX          TRACKING ATTITUDE AXIS.
 0053    REF   15  LAST  304    26,2026  3 4753 1             CAF     ONE
 0054    REF    9  LAST  339    26,2027  55'052 0             TS      OPTIONX +1
 0055    REF    1               26,2030  3 2117 1             CAF     VB04N12          V 04 N 12
 0056    REF   59  LAST  339    26,2031  0 4616 1             TC      BANKCALL
 0057    REF    2  LAST  225    26,2032   20476 0             CADR    GOFLASH
 0058    REF   26  LAST  300    26,2033  0 5472 0             TC      ENDEXT           TERMINATE
 0059                           26,2034  0 2036 0             TC      +2               PROCEED
 0060                           26,2035  0 2030 0             TC      -5               DATA IN. OPTION1+1 = 1 FOR Z AXIS
 0061    REF   11  LAST  323    26,2036  0 6037 0  V89RECL    TC      INTPRET                             = 2 FOR X AXIS
 0062                           26,2037   43234 0             RTB     DAD
 0063    REF    2  LAST  207    26,2040   21573 0                     LOADTIME         READ PRESENT TIME
 00635   REF    1               26,2041   14122 0                     DP1MIN
 0064    REF    1               26,2042   02205 1             STORE   TSTART82         SAVE TIME FOR LEMCONIC CALL
 0065    REF    4  LAST  236    26,2043   34041 0             STCALL  TDEC1            STORE TIME FOR CSMCONIC CALL
 0066    REF    1               26,2044   27066 1                     CSMCONIC         CSM STATE VECTOR UPDATE
 0067                           26,2045   77775 1             VLOAD                    CSMCONIC LEFT R VECTOR IN RATT
 0068    REF    1               26,2046   00001 0                     RATT
 0069    REF    5  LAST  339    26,2047   16207 0             STODL   RONE             SAVE FOR LINE OF SIGHT (LOS) COMPUTATION
 0070    REF    2  LAST  339    26,2050   02205 1                     TSTART82
 0071    REF    5  LAST  339    26,2051   34041 0             STCALL  TDEC1            STORE TIME FOR LEMCONIC CALL
 0072    REF    1               26,2052   27100 0                     LEMCONIC         LEM STATE VECTOR UPDATE
 0073                           26,2053   52375 1             VLOAD   VSU              CSM POSITION - LEM POSITION = LOS
 0074    REF    6  LAST  339    26,2054   02207 0                     RONE             LOS VECTOR LEFT IN MPAC
 0075    REF    2  LAST  339    26,2055   00001 0                     RATT
 0076                           26,2056   47121 0             MXV     RTB              (REFSMMAT X LOS). TRANSFORMS LOS FROM
 0077    REF    6  LAST  209    26,2057   01734 0                     REFSMMAT         REFERENCE COORD TO STAB MEMB COORD.
 00771   REF    1               26,2060   21726 1                     NORMUNIT
 0078    REF    2  LAST  152    26,2061   03773 1             STORE   POINTVSM         STORE LOS FOR VECPOINT CALL
 0079                           26,2062   77776 1             EXIT
 0080    REF   10  LAST  339    26,2063  4 1052 0             CS      OPTIONX +1       1 FOR Z AXIS. 2 FOR X AXIS.
 0081    REF   16  LAST  339    26,2064  6 4753 1             AD      ONE
 0082                           26,2065  0 0006 1             EXTEND
 0083    REF    1               26,2066  1 2113 1             BZF     ALINEZ
 0084    REF   12  LAST  339    26,2067  0 6037 0  ALINEX     TC      INTPRET          X AXIS ALIGNMENT
 0085                           26,2070   77775 1             VLOAD
 0086    REF    4  LAST  299    26,2071   06520 0                     UNITX            READ (.5, 0, 0)
 0087   REF  11  LAST  251   26,2072   37765 1  V89CALL1 STCALL SCAXIS        STORE SELECTED ALIGNMENT AXIS
 0088   REF   1              26,2073   56040 0                  VECPOINT      PUTS DESIRED GIM ANG (OG,IG,MG) IN TMPAC
 0089   REF   1              26,2074   00322 1           STORE  CPHI          STORE GIMBAL ANGLES FOR BALLANGS CALL.
 0090                        26,2075   77776 1           EXIT
 00905  REF  60  LAST  339   26,2076  0 4616 1           TC     BANKCALL
 0091   REF   1              26,2077   54266 1           CADR   BALLANGS      PUTS DESIRED BALL ANGLES IN FDAIX,Y,Z
 0092   REF   1              26,2100  3 2120 0           CAF    V06N18        V 06 N 18
 0093   REF  61  LAST  340   26,2101  0 4616 1           TC     BANKCALL      NOUN 18 REFERS TO FDAIX,Y,Z
 0094   REF   3  LAST  339   26,2102   20476 0           CADR   GOFLASH
 0095   REF  27  LAST  339   26,2103  0 5472 0           TC     ENDEXT        TERMINATE
 0096                        26,2104  0 2106 1           TC     +2            PROCEED
 0097   REF   1              26,2105  0 2036 0           TC     V89RECL       RECYCLE
 0098   REF  25  LAST  298   26,2106  0 5516 0           TC     DOWNFLAG      RESET 3 AXIS FLAG
 0099   REF   2  LAST  229   26,2107   00124 0           ADRES  3AXISFLG      RESET BIT6 FLAG WORD 5
 0100   REF  62  LAST  340   26,2110  0 4616 1           TC     BANKCALL      PERFORMS LEM MANEUVER TO ALIGN SELECTED
 0101   REF   1              26,2111   54123 0           CADR   R60LEM        SPACECRAFT AXIS TO CSM.
 0102   REF  28  LAST  340   26,2112  1 5472 1           TCF    ENDEXT        TERMINATE R63


 0103   REF  13  LAST  339   26,2113  0 6037 0  ALINEZ   TC     INTPRET       Z AXIS ALIGNMENT
 0104                        26,2114   52175 0           VLOAD  GOTO
 0105   REF   4  LAST  299   26,2115   06514 1                  UNITZ         READ (0, 0, .5)
 0106   REF   1              26,2116   54072 0                  V89CALL1


 0107                        26,2117   01014 0  VB04N12  VN     412
 0108                        26,2120   01422 1  VB06N18  VN     0618
 01085                    26,2121    00000 1   DP1MIN   2DEC    6000
 01085                    26,2122    13560 0
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P0001    BLOCK 2 LGC ATTITUDE MANEUVER ROUTINE-KALCMANU


R0002    MOD 2             DATE  5/1/67      BY DON KEENE
R0003    PROGRAM DESCRIPTION

R0004         KALCMANU IS A ROUTINE WHICH GENERATES COMMANDS FOR THE LM DAP TO CHANGE THE ATTITUDE OF THE SPACECRAFT
R0006    DURING FREE FALL.  IT IS DESIGNED TO MANEUVER THE SPACECRAFT FROM ITS INITIAL ORIENTATION TO SOME DESIRED
R0008    ORIENTATION SPECIFIED BY THE PROGRAM WHICH CALLS KALCMANU, AVOIDING GIMBAL LOCK IN THE PROCESS.  IN THE
R0010    MOD 2 VERSION, THIS DESIRED ATTITUDE IS SPECIFIED BY A SET OF THREE COMMANDED CDU ANGLES STORED AS 2S COMPLEMENT
R0012    SINGLE PRECISION ANGLES IN THE THREE CONSECUTIVE LOCATIONS, CPHI, CTHETA, CPSI, WHERE

R0014         CPHI = COMMANDED OUTER GIMBAL ANGLE
R0015         CTHETA = COMMANDED INNER GIMBAL ANGLE
R0016         CPSI = COMMANDED MIDDLE GIMBAL ANGLE

R0017        WHEN POINTING A SPACECRAFT AXIS (E.I. X, Y, Z, THE AOT, THRUST AXIS, ETC) THE SUBROUTINE VECPOINT MAY BE
R0019    USED TO GENERATE THIS SET OF DESIRED CDU ANGLES (SEE DESCRIPTION IN R60)    -
R0021     WITH THIS INFORMATION KALCMANU DETERMINES THE DIRECTION OF THE SINGLE EQUIVALENT ROTATION (COF ALSO U) AND THE
R0023    MAGNITUDE OF THE ROTATION (AM) TO BRING THE S/C FROM ITS INITIAL ORIENTATION TO ITS FINAL ORIENTATION.
R0025    THIS DIRECTION REMAINS FIXED BOTH IN INERTIAL COORDINATES AND IN COMMANDED S/C AXES THROUGHOUT THE
R0027                                -
R0029    MANEUVER.  ONCE COF AND AM HAVE BEEN DETERMINED, KALCMANU THEN EXAMINES THE MANEUVER TO SEE IF IT WILL BRING
R0030                                                            -
R0031    THE S/C THROUGH GIMBAL LOCK.  IF SO, COF AND AM ARE READJUSTED SO THAT THE S/C WILL JUST SKIM THE GIMBAL
R0033    LOCK ZONE AND ALIGN THE X-AXIS.  IN GENERAL A FINAL YAW  ABOUT X WILL BE NECESSARY TO COMPLETE THE MANEUVER.
R0035    NEEDLESS TO SAY, NEITHER THE INITIAL NOR THE FINAL ORIENTATION CAN BE IN GIMBAL LOCK.
R0037
R0038         FOR PROPER ATTITUDE CONTROL THE DIGITAL AUTOPILOT MUST BE GIVEN AN ATTITUDE REFERENCE WHICH IT CAN TRACK.
R0040    KALCMANU DOES THIS BY GENERATING A REFERENCE OF DESIRED GIMBAL ANGLES (CDUXD, CDUYD, CDUZD) WHICH ARE UPDATED
R0042    EVERY ONE SECOND DURING THE MANEUVER.  TO ACHIEVE A SMOOTHER SEQUENCE OF COMMANDS BETWEEN SUCCESSIVE UPDATES,
R0044    THE PROGRAM ALSO GENERATES A SET OF INCREMENTAL CDU ANGLES (DELDCDU) TO BE ADDED TO CDU DESIRED BY THE DIGITAL
R0046    AUTOPILOT.  KALCMANU ALSO CALCULATES THE COMPONENT MANEUVER RATES (OMEGAPD, OMEGAQD, OMEGARD), WHICH CAN
R0048                                                            -
R0049    BE DETERMINED SIMPLY BY MULTIPLYING COF BY SOME SCALAR (ARATE) CORRESPONDING TO THE DESIRED ROTATIONAL RATE.
R0051
R0052         AUTOMATIC MANEUVERS ARE TIMED WITH THE HELP OF WAITLIST SO THAT AFTER A SPECIFIED INTERVAL THE Y AND Z
R0054    DESIRED RATES ARE SET TO ZERO AND THE DESIRED CDU ANGLES (CDUYD, CDUZD) ARE SET EQUAL TO THE FINAL DESIRED CDU
R0056    ANGLES (CTHETA, CPSI).  IF ANY YAW  REMAINS DUE TO GIMBAL LOCK AVOIDANCE, THE FINAL YAW  MANEUVER IS
R0058    CALCULATED AND THE DESIRED YAW  RATE SET TO SOME FIXED VALUE (ROLLRATE = + OR - 2 DEGREES PER SEC).
R0060    IN THIS CASE ONLY AN INCREMENTAL CDUX ANGLE (DELFROLL) IS SUPPLIED TO THE DAP.  AT THE END OF THE YAW
R0062    MANEUVER OR IN THE EVENT THAT THERE WAS NO FINAL YAW,  CDUXD IS SET EQUAL TO CPHI AND THE X-AXIS DESIRED
R0064    RATE SET TO ZERO.  THUS, UPON COMPLETION OF THE MANEUVER THE S/C WILL FINISH UP IN A LIMIT CYCLE ABOUT THE
R0066    DESIRED FINAL GIMBAL ANGLES.


R0067    PROGRAM LOGIC FLOW

R0068         KALCMANU IS CALLED AS A HIGH PRIORITY JOB WITH ENTRY POINTS AT KALCMAN3 AND VECPOINT.  IT FIRST PICKS
R0070    UP THE CURRENT CDU ANGLES TO BE USED AS THE BASIS FOR ALL COMPUTATIONS INVOLVING THE INITIAL S/C ORIENTATION.
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R0072   IT THEN DETERMINES THE DIRECTION COSINE MATRICES RELATING BOTH THE INITIAL AND FINAL S/C ORIENTATION TO STABLE
R0074                  *    *                                                                                  *
R0076   MEMBER AXES (MIS, MFS).  IT ALSO COMPUTES THE MATRIX RELATING FINAL S/C AXES TO INITIAL S/C AXES (MFI).  THE
R0078   ANGLE OF ROTATION (AM) IS THEN EXTRACTED FROM THIS MATRIX, AND TESTS ARE MADE TO DETERMINE IF
R0080
R0081        A)  AM LESS THAN .25 DEGREES (MINANG)
R0082        B)  AM GREATER THAN 170 DEGREES (MAXANG)

R0083        IF AM LESS THAN .25 DEGREES, NO COMPLICATED AUTOMATIC MANEUVERING IS NECESSARY.  THEREFORE WE CAN SIMPLY
R0085   SET CDU DESIRED EQUAL TO THE FINAL CDU DESIRED ANGLES AND TERMINATE THE JOB.
R0087
R0088        IF AM IS GREATER THAN .25 DEGREES BUT LESS THAN 170 DEGREES, THE AXES OF THE SINGLE EQUIVALENT ROTATION
R0090     -                                                        *
R0091   (COF) IS EXTRACTED FROM THE SKEW SYMMETRIC COMPONENTS OF MFI.                                  *     *
R0093        IF AM GREATER THAN 170 DEGREES AN ALTERNATE METHOD EMPLOYING THE SYMMETRIC PART OF MFI (MFISYM) IS USED
R0095                 -
R0096   TO DETERMINE COF.

R0097        THE PROGRAM THEN CHECKS TO SEE IF THE MANEUVER AS COMPUTED WILL BRING THE S/C THROUGH GIMBAL LOCK.  IF
R0099   SO, A NEW MANEUVER IS CALCULATED WHICH WILL JUST SKIM THE GIMBAL LOCK ZONE AND ALIGN THE S/C X-AXIS.  THIS
R0101   METHOD ASSURES THAT THE ADDITIONAL MANEUVERING TO AVOID GIMBAL LOCK WILL BE KEPT TO A MINIMUM.  SINCE A FINAL
R0103   P AXIS YAW WILL BE NECESSARY, A SWITCH IS RESET (STATE SWITCH 31) TO ALLOW FOR THE COMPUTATION OF THIS FINAL
R0105   YAW.

R0106        AS STATED PREVIOUSLY KALCMANU GENERATES A SEQUENCE OF DESIRED GIMBAL ANGLES WHICH ARE UPDATED EVERY
R0108                                                                                                 -
R0110   SECOND.  THIS IS ACCOMPLISHED BY A SMALL ROTATION OF THE DESIRED S/C FRAME ABOUT THE VECTOR COF.  THE NEW
R0112   DESIRED REFERENCE MATRIX IS THEN,

R0113                     *               *         *
R0114                    MIS        =    MIS       DEL
R0115                       N+1             N

R0116          *
R0117   WHERE DEL IS THE MATRIX CORRESPONDING TO THIS SMALL ROTATION.  THE NEW CDU ANGLES CAN THEN BE EXTRACTED
R0118         *
R0120   FROM MIS.

R0121        AT THE BEGINNING OF THE MANEUVER THE AUTOPILOT DESIRED RATES (OMEGAPD, OMEGAQD, OMEGARD) AND THE
R0123   MANEUVER TIMINGS ARE ESTABLISHED.  ON THE FIRST PASS AND ON ALL SUBSEQUENT UPDATES THE CDU DESIRED
R0125   ANGLES ARE LOADED WITH THE APPROPRIATE VALUES AND THE INCREMENTAL CDU ANGLES ARE COMPUTED.  THE AGC CLOCKS
R0127   (TIME1 AND TIME2) ARE THAN CHECKED TO SEE IF THE MANEUVER WILL TERMINATE BEFORE THE NEXT UPDATE.  IF
R0129   NOT, KALCMANU CALLS FOR ANOTHER UPDATE (RUN AS A JOB WITH PRIORITY TBD) IN ONE SECOND.  ANY DELAYS IN THIS
R0131   CALLING SEQUENCE ARE AUTOMATICALLY COMPENSATED IN CALLING FOR THE NEXT UPDATE.
R0133
R0134        IF IT IS FOUND THAT THE MANEUVER IS TO TERMINATE BEFORE THE NEXT UPDATE A ROUTINE IS CALLED (AS A WAIT-
R0136   LIST TASK) TO STOP THE MANEUVER AT THE APPROPRIATE TIME AS EXPLAINED ABOVE.
R0138
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R0139   CALLING SEQUENCE

R0140        IN ORDER TO PERFORM A KALCMANU SUPERVISED MANEUVER, THE COMMANDED GIMBAL ANGLES MUST BE PRECOMPUTED AND
R0142   STORED IN LOCATIONS CPHI, CTHETA, CPSI.  THE USER:S PROGRAM MUST THEN CLEAR STATE SWITCH NO 33 TO ALLOW THE
R0144   ATTITUDE MANEUVER ROUTINE TO PERFORM ANY FINAL P-AXIS YAW INCURRED BY AVOIDING GIMBAL LOCK.  THE MANEUVER IS
R0146   THEN INITIATED BY ESTABLISHING THE FOLLOWING EXECUTIVE JOB

R0147                               *
R0148        CAF       PRIO      XX
R0149                            --
R0150        INHINT
R0151        TC          FINDVAC
R0152        2CADR       KALCMAN3
R0153        RELINT

R0154   THE USER:S PROGRAM MAY EITHER CONTINUE OR WAIT FOR THE TERMINATION OF THE MANEUVER.  IF THE USER WISHES TO
R0156   WAIT, HE MAY PUT HIS JOB TO SLEEP WITH THE FOLLOWING INSTRUCTIONS

R0157        L           TC          BANKCALL
R0158        L+1         CADR        ATTSTALL
R0159        L+2         (BAD        RETURN)
R0160        L+3         (GOOD       RETURN)

R0161        UPON COMPLETION OF THE MANEUVER, THE PROGRAM WILL BE AWAKENED AT L+3 IF THE MANEUVER WAS COMPLETED
R0163   SUCCESSFULLY, OR AT L+2 IF THE MANEUVER WAS ABORTED.  THIS ABORT WOULD OCCUR IF THE INITIAL OR FINAL ATTITUDE
R0165   WAS IN GIMBAL LOCK.

R0166   ***NOTA BENE***  IT IS ASSUMED THAT THE DESIRED MANEUVERING RATE (0.5, 2, 5, 10, DEG/SEC) HAS BEEN SELECTED BY
R0168   KEYBOARD ENTRY PRIOR TO THE EXECUTION OF KALCMANU.
R0169      IT IS ALSO ASSUMED THAT THE AUTOPILOT IS IN THE AUTO MODE.  IF THE MODE SWITCH IS CHANGED DURING THE
R0171   MANEUVER, KALCMANU WILL TERMINATE VIA GOODEND WITHIN 1 SECOND SO THAT R60 MAY REQUEST A TRIM OF THE S/C ATTITUDE
R0173   THIS IS THE ONLY MEANS FOR MANUALLY TERMINATING A KALCMANU SUPERVISED MANEUVER.
R0175   SUBROUTINES

R0176        KALCMANU USES A NUMBER OF INTERPRETIVE SUBROUTINES WHICH MAY BE OF GENERAL INTEREST.  SINCE THESE ROUTINES
R0178   WERE PROGRAMMED EXCLUSIVELY FOR KALCMANU, THEY ARE NOT, AS YET, GENERALLY AVAILABLE FOR USE BY OTHER PROGRAMS.
R0180
R0181        MXM3
R0182        ----

R0183        THIS SUBROUTINE MULTIPLIES TWO 3X3 MATRICES AND LEAVES THE RESULT IN THE FIRST 18 LOCATIONS OF THE PUSH
R0185   DOWN LIST, I.E.,

R0186                   (M     M     M )
R0187                   ( 0     1     2)
R0188         *         (              )         *         *
R0189         M    =    (M     M     M )   =    M1    X    M2
R0190                   ( 3     4     5)
R0191                   (              )
R0192                   (M     M     M )
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R0193                  ( 6    7    8)

R0194                                                                                         *
R0196        INDEX REGISTER X1 MUST BE LOADED WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR M1, AND X2 MUST BE
R0198                                                          *
R0199   LOADED WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR M2.  THE ROUTINE USES THE FIRST 20 LOCATIONS OF THE PUSH
R0201   DOWN LIST.  THE FIRST ELEMENT OF THE MATRIX APPEARS IN PD0.  PUSH UP FOR M .
R0203                                                                                 8
R0205
R0206        TRANSPOS
R0207        --------

R0208        THIS ROUTINE TRANSPOSES A 3X3 MATRIX AND LEAVES THE RESULT IN THE PUSH DOWN LIST, I.E.,
R0210
R0211         *         * T
R0212         M    =    M1

R0213   INDEX REGISTER X1 MUST CONTAIN THE COMPLEMENT OF THE STARTING ADDRESS FOR M1.  PUSH UP FOR THE FIRST AND SUB-
R0215                         *
R0216   SEQUENT COMPONENTS OF M.   THIS SUBROUTINE ALSO USES THE FIRST 20 LOCATIONS OF THE PUSH DOWN LIST.
R0218
R0219        CDU TO DCM
R0220        ----------

R0221        THIS SUBROUTINE CONVERTS THREE CDU ANGLES IN T(MPAC) TO A DIRECTION COSINE MATRIX (SCALED BY 2) RELATING
R0223   THE CORRESPONDING S/C ORIENTATIONS TO THE STABLE MEMBER FRAME.  THE FORMULAS FOR THIS CONVERSION ARE
R0225
R0226         M    =    COSY  COSZ
R0227          0

R0228         M    =    -COSY  SINZ  COSX  +  SINY  SINX
R0229          1

R0230         M    =    COSY  SINZ  SINX  +  SINY  COSX
R0231          2

R0232         M    =    SINZ
R0233          3

R0234         M    =    COSZ  COSX
R0235          4

R0236         M    =    -COSZ  SINX
R0237          5

R0238         M    =    -SINY  COSZ
R0239          6

R0240         M    =    SINY  SINZ  COSX  +  COSY  SINX
R0241          7
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R0242          M   =    -SINY  SINZ  SINX  +  COSY  COSX
R0243          8

R0244   WHERE      X    =    OUTER GIMBAL ANGLE
R0245              Y    =    INNER GIMBAL ANGLE
R0246              Z    =    MIDDLE GIMBAL ANGLE

R0247        THE INTERPRETATION OF THIS MATRIX IS AS FOLLOWS

R0248        IF A , A , A  REPRESENT THE COMPONENTS OF A VECTOR IN S/C AXES THEN THE COMPONENTS OF THE SAME VECTOR IN
R0250            X   Y   Z
R0251   STABLE MEMBER AXES (B , B , B ) ARE
R0252                         X   Y   Z

R0253              (B )                (A )
R0254              ( X)                ( X)
R0255              (  )                (  )
R0256              (  )           *    (  )
R0257              (B )      =    M    (A )
R0258              ( Y)                ( Y)
R0259              (  )                (  )
R0260              (B )                (A )
R0261              ( Z)                ( Z)

R0262       THE SUBROUTINE WILL STORE THIS MATRIX IN SEQUENTIAL LOCATIONS OF ERASABLE MEMORY AS SPECIFIED BY THE CALLING
R0264                                                                                                               *
R0266   PROGRAM.  TO DO THIS THE CALLING PROGRAM MUST FIRST LOAD X2 WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR M.
R0268
R0269        INTERNALLY, THE ROUTINE USES THE FIRST 16 LOCATIONS OF THE PUSH DOWN LIST, ALSO STEP REGISTER S1 AND INDEX
R0271   REGISTER X2.


R0272        DCM TO CDU
R0273        ----------
R0274                                                                              *
R0276        THIS ROUTINE EXTRACTS THE CDU ANGLES FROM A DIRECTION COSINE MATRIX (M SCALED BY 2) RELATING S/C AXIS TO
R0278                                                                                   *
R0280   STABLE MEMBER AXES.  X1 MUST CONTAIN THE COMPLEMENT OF THE STARTING ADDRESS FOR M.  THE SUBROUTINE LEAVES THE
R0282   CORRESPONDING GIMBAL ANGLES IN V(MPAC) AS DOUBLE PRECISION 1:S COMPLEMENT ANGLES SCALED BY 2PI.  THE FORMULAS
R0284   FOR THIS CONVERSION ARE

R0285         Z    =    ARCSIN (M )
R0286                            3

R0287         Y    =    ARCSIN (-M /COSZ)
R0288                             6

R0289   IF M  IS NEGATIVE, Y IS REPLACED BY PI SGN Y - Y
R0290       0
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R0291         X    =    ARCSIN (-M /COSZ)
R0292                             5

R0293   IF M  IS NEGATIVE X IS REPLACED BY PI SGN X - X
R0294       4

R0295        THIS ROUTINE DOES NOT SET THE PUSH DOWN POINTER, BUT USES THE NEXT 8 LOCATIONS OF THE PUSH DOWN LIST AND
R0297   RETURNS THE POINTER TO ITS ORIGINAL SETTING.  THIS PROCEDURE ALLOWS THE CALLER TO STORE THE MATRIX AT THE TOP OF
R0299   THE PUSH DOWN LIST.


R0300        DELCOMP
R0301        -------

R0302                                                           *
R0303        THIS ROUTINE COMPUTES THE DIRECTION COSINE MATRIX (DEL) RELATING ON
R0304                                                                           -
R0306   IS ROTATED WITH RESPECT TO THE FIRST BY AN ANGLE, A, ABOUT A UNIT VECTOR, U.  THE FORMULA FOR THIS MATRIX IS
R0308
R0309         *         *          --T           *
R0310         DEL  =    I  COSA  +  UU (1-COSA) + V SINA
R0311                                             X

R0312   WHERE      *        (1   0    0)
R0313              I    =   (0   1    0)
R0314                       (0   0    1)


R0315                          2
R0316                       (U        U U       U U )
R0317                       ( X        X Y       X Z)
R0318                       (                       )
R0319             --T       (           2           )
R0320             UU    =   (U U      U         U U )
R0321                       ( Y X      Y         Y Z)
R0322                       (                       )
R0323                       (                     2 )
R0324                       (U U      U U       U   )
R0325                       ( Z X      Z Y       Z  )


R0326                       (0        -U        U  )
R0327                       (           Z        Y )
R0328              *        (                      )
R0329              V    =   (U        0         -U )
R0330               X       ( Z                   X)
R0331                       (                      )
R0332                       (-U       U         0  )
R0333                       (  Y       X           )
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R0334                   -
R0335                   U     =     UNIT ROTATION VECTOR RESOLVED INTO S/C  AXES
R0336                   A     =     ROTATION ANGLE

R0337                                         *
R0338           THE INTERPRETATION OF DEL IS AS FOLLOWS

R0339           IF A , A , A  REPRESENT THE COMPONENT OF A VECTOR IN THE ROTATED FRAME, THEN THE COMPONENTS OF THE SAME
R0341               X   Y   Z
R0342       VECTOR IN THE ORIGINAL S/C AXES (B , B , B ) ARE
R0343                                         X   Y   Z

R0344                   (B  )                      (A  )
R0345                   ( X)                       ( X)
R0346                   (   )            *         (   )
R0347                   (B  )      =     DEL       (A  )
R0348                   ( Y)                       ( Y)
R0349                   (   )                      (   )
R0350                   (B  )                      (A  )
R0351                   ( Z)                       ( Z)

R0352           THE ROUTINE WILL STORE THIS MATRIX (SCALED UNITY) IN SEQUENTIAL LOCATIONS OF ERASABLE MEMORY BEGINNING WITH
R0354                                                                                                         -
R0356       THE LOCATION CALLED DEL.  IN ORDER TO USE THE ROUTINE, THE CALLING PROGRAM MUST FIRST STORE U (A HALF UNIT
R0358       DOUBLE PRECISION VECTOR) IN THE SET OF ERASABLE LOCATIONS BEGINNING WITH THE ADDRESS CALLED COF.  THE ANGLE, A,
R0360       MUST THEN BE LOADED INTO D(MPAC).

R0361           INTERNALLY, THE PROGRAM ALSO USES THE FIRST 10 LOCATIONS OF THE PUSH DOWN LIST.
R0363


R0364           READCDUK
R0365           --------

R0366           THIS BASIC LANGUAGE SUBROUTINE LOADS T(MPAC) WITH THE THREE CDU ANGLES.
R0368


R0369          SIGNMPAC
R0370           --------

R0371           THIS IS A BASIC LANGUAGE SUBROUTINE WHICH LIMITS THE MAGNITUDE OF D(MPAC) TO + OR - DPOSMAX ON OVERFLOW.
R0373


R0374           PROGRAM STORAGE ALLOCATION

R0375                   1)    FIXED MEMORY                    1059 WORDS
R0376                   2)    ERASABLE MEMORY                   98
R0377                   3)    STATE SWITCHES                     3
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R0378               4)   FLAGS                              1


R0379          JOB PRIORITIES

R0380               1)   KALCMANU                           TBD
R0381               2)   ONE SECOND UPDATE                  TBD


R0382          SUMMARY OF STATE SWITCHES AND FLAGWORDS USED BY KALCMANU.


R0383     STATE                 FLAGWRD 2       SETTING              MEANING
R0384     SWITCH NO.             BIT NO.

R0385       *
R0386     31                       14              0       MANEUVER WENT THROUGH GIMBAL LOCK
R0388                                              1       MANEUVER DID NOT GO THROUGH GIMBAL LOCK
R0390
R0391       *
R0392     32                       13              0       CONTINUE UPDATE PROCESS
R0393                                              1       START UPDATE PROCESS

R0394     33                       12              0       PERFORM FINAL P-AXIS YAW IF REQUIRED
R0396                                              1       IGNORE ANY FINAL P-AXIS YAW
R0398
R0399     34                       11              0       SIGNAL END OF KALCMANU
R0400                                              1       KALCMANU IN PROCESS       USER MUST SET SWITCH BEFORE INITIATING


R0402              *  INTERNAL TO KALCMANU


R0403          SUGGESTIONS FOR PROGRAM INTEGRATION

R0404          THE FOLLOWING VARIABLES SHOULD BE ASSIGNED TO UNSWITCH ERASABLE

R0405                           CPHI
R0406                           CTHETA
R0407                           CPSI
R0408                           POINTVSM   +5
R0409                           SCAXIS     +5
R0410                           DELDCDU
R0411                           DELDCDU1
R0412                           DELDCDU2
R0413                           RATEINDX

R0414          THE FOLLOWING SUBROUTINES MAY BE PUT IN A DIFFERENT BANK

R0415                           MXM3
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R0416                     TRANSPOS
R0417                     SIGNMPAC
R0418                     READCDUK
R0419                     CDUTODCM
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 0420                            15,2050                     BANK     15
 0421   REF   1                  22,2000                     SETLOC  KALCMON1
 0422                            22,2004                     BANK

 0423   REF   3  LAST  286       E6,1676                     EBANK=  BCDU

R0424   THE THREE DESIRED CDU ANGLES MUST BE STORED AS SINGLE PRECISION TWOS COMPLEMENT ANGLES IN THE THREE SUCCESSIVE
R0426   LOCATIONS, CPHI, CTHETA, CPSI.

 0427   REF   1                                              COUNT*  $$/KALC
 0428   REF  14  LAST  340       22,2004   06037 0  KALCMAN3 TC      INTPRET        PICK UP THE CURRENT CDU ANGLES AND
 0429                            22,2005   77634 0           RTB                      COMPUTE THE MATRIX FROM INITIAL S/C
 0430   REF   1                  22,2006   44403 0                   READCDUK         AXES TO FINAL S/C AXES
 0431   REF   4  LAST  351       22,2007   03277 0           STORE   BCDU           STORE INITIAL S/C ANGLES
 0437                            22,2010   51535 0           SLOAD   ABS            CHECK THE MAGNITUDE OF THE DESIRED
 0438   REF   1                  22,2011   00324 1                   CPSI           MIDDLE GIMBAL ANGLE
 0439                            22,2012   [illegible]1025 1           DSU     BPL
 0440   REF   1                  22,2013   04403 1                   LOCKANGL       IF GREATER THAN 70 DEG ABORT MANEUVER
 0441   REF   1                  22,2014   44724 0                   TOOBADF
 0442                            22,2015   72364 0           AXC,2   TLOAD
 0443   REF   3  LAST  136       22,2016   03246 1                   MIS
 0444   REF   5  LAST  351       22,2017   03277 0                   BCDU
 0445                            22,2020   77624 1           CALL                   COMPUTE THE TRANSFORMATION FROM INITIAL
 0446   REF   1                  22,2021   44410 1                   CDUTODCM       S/C AXES TO STABLE MEMBER AXES
 0447                            22,2022   72364 0           AXC,2   TLOAD
 0448   REF   4  LAST  116       22,2023   02230 1                   MFS            PREPARE TO CALCULATE ARRAY MFS
 0449   REF   2  LAST  340       22,2024   00322 1                   CPHI
 0450                            22,2025   77624 1           CALL
 0451   REF   2  LAST  351       22,2026   44410 1                   CDUTODCM
 0452                            22,2027   45160 1  SECAD    AXC,1   CALL           MIS AND MFS ARRAYS CALCULATED          $2
 0453   REF   4  LAST  351       22,2030   03246 1                   MIS
 0454   REF   1                  22,2031   44326 0                   TRANSPOS
 0455                            22,2032   45575 1           VLOAD   STADR
 0456   REF  12  LAST  135       22,2033   50457 1           STOVL   TMIS +12D
 0457                            22,2034   77626 0           STADR
 0458   REF  13  LAST  351       22,2035   50465 0           STOVL   TMIS +6
 0459                            22,2036   77626 0           STADR
 0460   REF  14  LAST  351       22,2037   74473 1           STORE   TMIS           TMIS = TRANSPOSE(MIS) SCALED BY 2
 0461                            22,2040   75160 1           AXC,1   AXC,2
 0462   REF  15  LAST  351       22,2041   03303 1                   TMIS
 0463   REF   5  LAST  351       22,2042   02230 1                   MFS
 0464                            22,2043   77624 1           CALL
 0465   REF   1                  22,2044   44312 1                   MXM3
 0466                            22,2045   45575 1           VLOAD   STADR
 0467   REF   1                  22,2046   51532 1           STOVL   MFI +12D
 0468                            22,2047   77626 0           STADR
 0469   REF   2  LAST  351       22,2050   51540 1           STOVL   MFI +6
 0470                            22,2051   77626 0           STADR
 0471   REF   3  LAST  351       22,2052   75546 1           STORE   MFI            MFI = TMIS MFS (SCALED BY 4)
 0472                            22,2053   45001 1           SETPD   CALL           TRANSPOSE MFI IN PD LIST
 0473                       22,2054   00023 0                  18D
 0474  REF   1              22,2055   44335 1                  TRNSPSPD
 0475                       22,2056   45575 1          VLOAD   STADR
 0476  REF   1              22,2057   50457 1          STOVL   TMFI  +12D
 0477                       22,2060   77626 0          STADR
 0478  REF   2  LAST  352   22,2061   50465 0          STOVL   TMFI  +6
 0479                       22,2062   77626 0          STADR
 0480  REF   3  LAST  352   22,2063   74473 1          STORE   TMFI               TMFI = TRANSPOSE (MFI)  SCALED BY 4
R0481
R0482  CALCULATE COFSKEW AND MFISYM
R0483
 0484                       22,2064   45345 1          DLOAD   DSU
 0485  REF   4  LAST  352   22,2065   03306 1                  TMFI  +2
 0486  REF   4  LAST  351   22,2066   02233 1                  MFI  +2
 0487                       22,2067   45325 1          PDDL    DSU                CALCULATE COF SCALED BY 2/SIN(AM)
 0488  REF   5  LAST  352   22,2070   02235 1                  MFI  +4
 0489  REF   5  LAST  352   22,2071   03310 0                  TMFI  +4
 0490                       22,2072   45325 1          PDDL    DSU
 0491  REF   6  LAST  352   22,2073   03316 0                  TMFI  +10D
 0492  REF   6  LAST  352   22,2074   02243 0                  MFI  +10D
 0493                       22,2075   77666 1          VDEF
 0494  REF   5  LAST  136   22,2076   03326 0          STORE   COFSKEW            EQUALS MFISKEW
R0495
R0496  CALCULATE AM AND PROCEED ACCORDING TO ITS MAGNITUDE
R0497
 0498                       22,2077   43345 1          DLOAD   DAD
 0499  REF   7  LAST  352   22,2100   02231 0                  MFI
 0500  REF   8  LAST  352   22,2101   02251 0                  MFI  +16D
 0501                       22,2102   43225 0          DSU     DAD
 0502  REF   2  LAST   37   22,2103   06512 1                  DP1/4TH
 0503  REF   9  LAST  352   22,2104   02241 1                  MFI  +8D
 0504  REF   2  LAST  135   22,2105   03334 0          STORE   CAM                CAM = (MFI0+MFI4+MFI8-1)/2 HALF SCALE
 0505                       22,2106   77726 1          ARCCOS
 0506  REF   1              22,2107   03336 1          STORE   AM                 AM=ARCCOS(CAM)  (AM SCALED BY 2)
 0507                       22,2110   51025 1          DSU     BPL
 0508  REF   1              22,2111   04363 0                  MINANG
 0509  REF   1              22,2112   44117 0                  CHECKMAX
 0510                       22,2113   77751 1          TLOAD                      MANEUVER LESS THAN .25 DEGREES
 0511  REF   3  LAST  351   22,2114   00322 1                  CPHI               GO DIRECTLY INTO ATTITUDE HOLD
 0512  REF   6  LAST  195   22,2115   37236 1          STCALL  CDUXD              ABOUT COMMANDED ANGLES
 0513  REF   1              22,2116   44742 0                  TOOBADI            STOP RATE AND EXIT

 0514                       22,2117   45345 1 CHECKMAX DLOAD   DSU
 0515  REF   2  LAST  352   22,2120   03336 1                  AM
 0516  REF   1              22,2121   04365 0                  MAXANG
 0517                       22,2122   77244 0          BPL     VLOAD
 0518  REF   1              22,2123   44131 1                  ALTCALC            UNIT
 0519  REF   6  LAST  352   22,2124   03326 0                  COFSKEW            COFSKEW
 0520                       22,2125   77656 1          UNIT
 0521  REF   1              22,2126   03271 0          STORE   COF                COF IS THE MANEUVER AXIS
 0522                          22,2127   77650 1             GOTO                 SEE IF MANEUVER GOES THRU GIMBAL LOCK
 0523   REF   1                22,2130   44744 0                    LOCSKIRT
 0524                          22,2131   53375 0  ALTCALC   VLOAD   VAD            IF AM GREATER THAN 170 DEGREES
 0525   REF  10  LAST  352     22,2132   02231 0                    MFI
 0526   REF   7  LAST  352     22,2133   03304 0                    TMFI
 0527                          22,2134   77762 1            VSR1
 0528   REF   1                22,2135   27304 0            STOVL   MFISYM
 0529   REF  11  LAST  353     22,2136   02237 0                    MFI +6
 0530                          22,2137   74455 0            VAD     VSR1
 0531   REF   8  LAST  353     22,2140   03312 1                    TMFI +6
 0532   REF   2  LAST  353     22,2141   27312 1            STOVL   MFISYM +6
 0533   REF  12  LAST  353     22,2142   02245 0                    MFI +12D
 0534                          22,2143   74455 0            VAD     VSR1
 0535   REF   9  LAST  353     22,2144   03320 0                    TMFI +12D
 0536   REF   3  LAST  353     22,2145   03320 0            STORE   MFISYM +12D    MFISYM=(MFI+TMFI)/2  SCALED BY 4
R0537
R0538
R0539   CALCULATE COF
R0540
 0541                          22,2146   70545 1            DLOAD   SP1
 0542   REF   3  LAST  352     22,2147   03334 0                    CAM
 0543                          22,2150   45325 1            PDDL    DSU            PD0 CAM                          $4
 0544   REF   1                22,2151   06520 0                    DPHALF
 0545   REF   4  LAST  353     22,2152   03334 0                    CAM
 0546                          22,2153   65204 1            BOVB    PDDL           PD2 1 - CAM                      $2
 0547   REF   1                22,2154   21712 0                    SIGNMPAC
 0548   REF   4  LAST  353     22,2155   03324 1                    MFISYM +16D
 0549                          22,2156   56225 1            DSU     DDV
 0550                          22,2157   00001 0                    0
 0551                          22,2160   00003 1                    2
 0552                          22,2161   65366 1            SQRT    PDDL           COFZ = SQRT(MFISYM8-CAM)/1-CAM)
 0553   REF   5  LAST  353     22,2162   03314 1                    MFISYM +8D                                   $ ROOT 2
 0554                          22,2163   56225 1            DSU     DDV
 0555                          22,2164   00001 0                    0
 0556                          22,2165   00003 1                    2
 0557                          22,2166   65366 1            SQRT    PDDL           COFY = SQRT(MFISYM4-CAM)/(1-CAM)  $ROOT2
 0558   REF   6  LAST  353     22,2167   03304 0                    MFISYM
 0559                          22,2170   56225 1            DSU     DDV
 0560                          22,2171   00001 0                    0
 0561                          22,2172   00003 1                    2
 0562                          22,2173   55566 1            SQRT    VDEF           COFX = SQRT(MFISYM-CAM)/(1-CAM)  $ROOT 2
 0563                          22,2174   77656 1            UNIT
 0564   REF   2  LAST  352     22,2175   03271 0            STORE   COF
R0565
R0566   DETERMINE  LARGEST COF AND ADJUST ACCORDINGLY
R0567
 0568                          22,2176   45345 1  COFMAXGO  DLOAD   DSU
 0569   REF   3  LAST  353     22,2177   03271 0                    COF
 0570   REF   4  LAST  353     22,2200   03273 1                    COF +2
 0571                          22,2201   71240 1            BMN     DLOAD          COFY G COFX
 0572   REF   1              22,2202   44211 0                    COMP12
 0573   REF   5  LAST  353   22,2203   03271 0                    COF
 0574                        22,2204   50025 0           DSU      BMN
 0575   REF   6  LAST  354   22,2205   03275 1                    COF  +4
 0576   REF   1              22,2206   44266 0                    METHOD3          COFZ G COFX OR COFY
 0577                        22,2207   77650 1           GOTO
 0578   REF   1              22,2210   44242 0                    METHOD1          COFX G COFY OR COFZ
 0579                        22,2211   45345 1  COMP12   DLOAD    DSU
 0580   REF   7  LAST  354   22,2212   03273 1                    COF  +2
 0581   REF   8  LAST  354   22,2213   03275 1                    COF  +4
 0582                        22,2214   77640 0           BMN
 0583   REF   2  LAST  354   22,2215   44266 0                    METHOD3          COFZ G COFY OR COFX

 0584                        22,2216   51145 0  METHOD2  DLOAD    BPL              COFY MAX
 0585   REF   7  LAST  352   22,2217   03330 1                    COFSKEW +2       UY
 0586   REF   1              22,2220   44224 0                    U2POS
 0587                        22,2221   57575 1           VLOAD    VCOMP
 0588   REF   9  LAST  354   22,2222   03271 0                    COF
 0589   REF  10  LAST  354   22,2223   03271 0           STORE    COF
 0590                        22,2224   51145 0  U2POS    DLOAD    BPL
 0591   REF   7  LAST  353   22,2225   03306 1                    MFISYM +2        UX UY
 0592   REF   1              22,2226   44232 1                    OKU21
 0593                        22,2227   57545 1           DLOAD    DCOMP            SIGN OF UX OPPOSITE TO UY
 0594   REF  11  LAST  354   22,2230   03271 0                    COF
 0595   REF  12  LAST  354   22,2231   03271 0           STORE    COF
 0596                        22,2232   51145 0  OKU21    DLOAD    BPL
 0597   REF   3  LAST  354   22,2233   03316 0                    MFISYM +10D      UY UZ
 0598   REF   2  LAST  353   22,2234   44744 0                    LOCSKIRT
 0599                        22,2235   57545 1           DLOAD    DCOMP            SIGN OF UZ OPPOSITE TO UY
 0600   REF  13  LAST  354   22,2236   03275 1                    COF  +4
 0601   REF  14  LAST  354   22,2237   03275 1           STORE    COF  +4
 0602                        22,2240   77650 1           GOTO
 0603   REF   3  LAST  354   22,2241   44744 0                    LOCSKIRT
 0604                        22,2242   51145 0  METHOD1  DLOAD    BPL              COFX MAX
 0605   REF   8  LAST  354   22,2243   03326 0                    COFSKEW          UX
 0606   REF   1              22,2244   44250 0                    U1POS
 0607                        22,2245   57575 1           VLOAD    VCOMP
 0608   REF  15  LAST  354   22,2246   03271 0                    COF
 0609   REF  16  LAST  354   22,2247   03271 0           STORE    COF
 0610                        22,2250   51145 0  U1POS    DLOAD    BPL
 0611   REF   9  LAST  354   22,2251   03306 1                    MFISYM +2        UX UY
 0612   REF   1              22,2252   44256 0                    OKU12
 0613                        22,2253   57545 1           DLOAD    DCOMP
 0614   REF  17  LAST  354   22,2254   03273 1                    COF  +2          SIGN OF UY OPPOSITE TO UX
 0615   REF  18  LAST  354   22,2255   03273 1           STORE    COF  +2
 0616                        22,2256   51145 0  OKU12    DLOAD    BPL
 0617   REF  10  LAST  354   22,2257   03310 0                    MFISYM +4        UX UZ
 0618   REF   4  LAST  354   22,2260   44744 0                    LOCSKIRT
 0619                        22,2261   57545 1           DLOAD    DCOMP            SIGN OF UZ OPPOSITE TO UY
 0620   REF  19  LAST  354   22,2262   03275 1                    COF  +4
 0621     REF  20  LAST  354   22,2263   03275 1               STORE  COF +4
 0622                          22,2264   77650 1               GOTO
 0623     REF   5  LAST  354   22,2265   44744 0                      LOCSKIRT
 0624                          22,2266   51145 0  METHOD3      DLOAD  BPL                COFZ MAX
 0625     REF   9  LAST  354   22,2267   03332 0                      COFSKEW +4         UZ
 0626     REF   1              22,2270   44274 0                      U3POS
 0627                          22,2271   57575 1               VLOAD  VCOMP
 0628     REF  21  LAST  355   22,2272   03271 0                      COF
 0629     REF  22  LAST  355   22,2273   03271 0               STORE  COF
 0630                          22,2274   51145 0  U3POS        DLOAD  BPL
 0631     REF  11  LAST  354   22,2275   03310 0                      MFISYM +4          UX UZ
 0632     REF   1              22,2276   44302 0                      OKU31
 0633                          22,2277   57545 1               DLOAD  DCOMP
 0634     REF  23  LAST  355   22,2300   03271 0                      COF                SIGN OF UX OPPOSITE TO UZ
 0635     REF  24  LAST  355   22,2301   03271 0               STORE  COF
 0636                          22,2302   51145 0  OKU31        DLOAD  BPL
 0637     REF  12  LAST  355   22,2303   03316 0                      MFISYM +10D        UY UZ
 0638     REF   6  LAST  355   22,2304   44744 0                      LOCSKIRT
 0639                          22,2305   57545 1               DLOAD  DCOMP
 0640     REF  25  LAST  355   22,2306   03273 1                      COF +2             SIGN OF UY OPPOSITE TO UZ
 0641     REF  26  LAST  355   22,2307   03273 1               STORE  COF +2
 0642                          22,2310   77650 1               GOTO
 0643     REF   7  LAST  355   22,2311   44744 0                      LOCSKIRT
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L        ATTITUDE MANEUVER ROUTINE                                                                 USER'S PAGE NO.  15      E6 S3

R0644    MATRIX OPERATIONS

 0645                          13,2207                         BANK     13
 0646    REF   1               22,2000                         SETLOC   KALCMON2
 0647                          22,2312                         BANK

 0648    REF   6  LAST   351   E6,1676                         EBANK=   BCDU

 0649                          22,2312   76601 1  MXM3         SETPD    VLOAD*              MXM3 MULTIPLIES 2 3X3 MATRICES
 0650                          22,2313   00001 0                        0                   AND LEAVES RESULT IN PD LIST
 0651                          22,2314   00001 0                        0,1                 AND MPAC
 0652                          22,2315   62703 1               VXM*     PDVL*
 0653                          22,2316   77776 1                        0,2
 0654                          22,2317   00007 0                        6,1
 0655                          22,2320   62703 1               VXM*     PDVL*
 0656                          22,2321   77776 1                        0,2
 0657                          22,2322   00015 0                        12D,1
 0658                          22,2323   41503 1               VXM*     PUSH
 0659                          22,2324   77776 1                        0,2
 0660                          22,2325   77616 0               RVQ


R0661                                            RETURN WITH M1XM2 IN PD LIST
R0662
 0663                          22,2326   76601 1  TRANSPOS     SETPD    VLOAD*              TRANSPOS TRANSPOSES A 3X3 MATRIX
 0664                          22,2327   00001 0                        0                    AND LEAVES RESULT IN PD LIST
 0665                          22,2330   00001 0                        0,1                 MATRIX ADDRESS IN XR1
 0666                          22,2331   62713 0               PDVL*    PDVL*
 0667                          22,2332   00007 0                        6,1
 0668                          22,2333   00015 0                        12D,1
 0669                          22,2334   77606 1               PUSH                         MATRIX IN PD
 0670                          22,2335   77776 1  TRNSPSPD     EXIT                         ENTER WITH MATRIX AT 0 IN PD LIST
 0671    REF   9  LAST   297   22,2336   50 120 1              INDEX    FIXLOC
 0672                          22,2337   52 013 1              DXCH     12
 0673    REF  10  LAST   356   22,2340   50 120 1              INDEX    FIXLOC
 0674                          22,2341   52 017 0              DXCH     16
 0675    REF  11  LAST   356   22,2342   50 120 1              INDEX    FIXLOC
 0676                          22,2343   52 013 1              DXCH     12
 0677    REF  12  LAST   356   22,2344   50 120 1              INDEX    FIXLOC
 0678                          22,2345   52 015 1              DXCH     14
 0679    REF  13  LAST   356   22,2346   50 120 1              INDEX    FIXLOC
 0680                          22,2347   52 005 0              DXCH     4
 0681    REF  14  LAST   356   22,2350   50 120 1              INDEX    FIXLOC
 0682                          22,2351   52 015 1              DXCH     14
 0683    REF  15  LAST   356   22,2352   50 120 1              INDEX    FIXLOC
 0684                          22,2353   52 003 0              DXCH     2
 0685    REF  16  LAST   356   22,2354   50 120 1              INDEX    FIXLOC
 0686                          22,2355   52 007 1              DXCH     6
 0687    REF  17  LAST   356   22,2356   50 120 1              INDEX    FIXLOC
 0688                          22,2357   52 003 0              DXCH     2
 0689    REF  15  LAST  351    22,2360  0 6037 0            TC       INTPRET
 0690                          22,2361   77616 0            RVQ

 0691                          15,2050                      BANK     15
 0692    REF   2  LAST  351    22,2000                      SETLOC   KALCMON1
 0693                          22,2362                      BANK

 0694    REF   7  LAST  356    E6,1676                      EBANK=   BCDU

 0695                          22,2362   00013 0  MINANG    2DEC     0.00069375
 0695                          22,2363   13563 0
 0696                          22,2364   17070 0  MAXANG    2DEC     0.472222222
 0696                          22,2365   34343 1
R0697              GIMBAL LOCK CONSTANTS

R0698    D = MGA CORRESPONDING TO GIMBAL LOCK = 60 DEGREES
R0699              NGL = BUFFER ANGLE (TO AVOID DIVISIONS BY ZERO) = 2 DEGREES

 0700                          22,2366   15666 0  SD        2DEC     .433015          = SIN(D)                     $2
 0700                          22,2367   20443 0
 0701                          22,2370   33555 1  K3S1      2DEC     .86603           = SIN(D)                     $1
 0701                          22,2371   01106 1
 0702                          22,2372   67777 1  K4        2DEC     -.25             = -COS(D)                    $2
 0702                          22,2373   77777 0
 0703                          22,2374   04000 0  K4SQ      2DEC     .125             = COS(D)COS(D)               $2
 0703                          22,2375   00000 1
 0704                          22,2376   00216 1  SNGLCD    2DEC     .008725          = SIN(NGL)COS(D)             $2
 0704                          22,2377   36323 0
 0705                          22,2400   17773 1  CNGL      2DEC     .499695          COS(NGL)                     $2
 0705                          22,2401   00057 0
 0706                          22,2402   14344 1  LOCKANGL  DEC      .388889          = 70 DEGREES
R0707    INTERPRETIVE SUBROUTINE TO READ THE CDU ANGLES

 0708    REF   5  LAST  254    22,2403  3 0034 0  READCDUK  CA       CDUZ             LOAD T(MPAC) WITH CDU ANGLES
 0709    REF  67  LAST  336    22,2404  54 156 1            TS       MPAC +2
 0710                          22,2405  0 0006 1            EXTEND
 0711    REF   7  LAST  305    22,2406  3 0033 1            DCA      CDUX             AND CHANGE MODE TO TRIPLE PRECISION
 0712    REF   1               22,2407  1 6476 0            TCF      TLOAD +6


 0713                          22,2410   66370 0  CDUTODCM  AXT,1    SSP
 0714                          22,2411   00003 1            OCT      3
 0715    REF   1               22,2412   00051 0                     S1
 0716                          22,2413   00001 0            OCT      1                SET XF1, S1, AND PD FOR LOOP
 0717                          22,2414   00010 0            STORE    7
 0718                          22,2415   77601 0            SETPD
 0719                          22,2416   00001 0                     0
 0720                          22,2417   47133 0  LOOPSIN   SLOAD*   RTB
 0721                          22,2420   00013 0                     10D,1
 0722    REF   9  LAST  324    22,2421   21576 0                     CDULOGIC
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0723                   22,2422   00013 0        STORE  10D          LOAD PD WITH 0 SIN(PHI)
0724                   22,2423   65356 1        SIN    PDDL                      2 COS(PHI)
0725                   22,2424   00013 0               10D                       4 SIN(THETA)
0726                   22,2425   41546 0        COS    PUSH                      6 COS(THETA)
0727                   22,2426   71300 1        TIX,1  DLOAD                     8 SIN(PSI)
0728    REF   1        22,2427   44417 0               LOOPSIN                  10 COS(PSI)
0729                   22,2430   00007 0               6
0730                   22,2431   72405 0        DMP    SL1
0731                   22,2432   00013 0               10D
0732                   22,2433   10001 1        STORE  0,2          C0=COS(THETA)COS(PSI)
0733                   22,2434   41345 0        DLOAD  DMP
0734                   22,2435   00005 1               4
0735                   22,2436   00001 0               0
0736                   22,2437   41325 0        PDDL   DMP          (PD6 SIN(THETA)SIN(PHI))
0737                   22,2440   00007 0               6
0738                   22,2441   00011 1               8D
0739                   22,2442   72405 0        DMP    SL1
0740                   22,2443   00003 1               2
0741                   22,2444   72421 0        BDSU   SL1
0742                   22,2445   00015 0               12D
0743                   22,2446   10003 0        STORE  2,2          C1=-COS(THETA)SIN(PSI)COS(PHI)
0744                   22,2447   41345 0        DLOAD  DMP
0745                   22,2450   00003 1               2
0746                   22,2451   00005 1               4
0747                   22,2452   41325 0        PDDL   DMP          (PD7 COS(PHI)SIN(THETA)) SCALED 4
0748                   22,2453   00007 0               6
0749                   22,2454   00011 1               8D
0750                   22,2455   72405 0        DMP    SL1
0751                   22,2456   00001 0               0
0752                   22,2457   72415 1        DAD    SL1
0753                   22,2460   00017 1               14D
0754                   22,2461   10005 0        STORE  4,2          C2=COS(THETA)SIN(PSI)SIN(PHI)
0755                   22,2462   77745 1        DLOAD
0756                   22,2463   00011 1               8D
0757                   22,2464   10007 1        STORE  6,2          C3=SIN(PSI)
0758                   22,2465   77745 1        DLOAD
0759                   22,2466   00013 0               10D
0760                   22,2467   72405 0        DMP    SL1
0761                   22,2470   00003 1               2
0762                   22,2471   10011 0        STORE  8D,2         C4=COS(PSI)COS(PHI)
0763                   22,2472   41345 0        DLOAD  DMP
0764                   22,2473   00013 0               10D
0765                   22,2474   00001 0               0
0766                   22,2475   72476 1        DCOMP  SL1
0767                   22,2476   10013 1        STORE  10D,2        C5=-COS(PSI)SIN(PHI)
0768                   22,2477   41345 0        DLOAD  DMP
0769                   22,2500   00005 1               4
0770                   22,2501   00013 0               10D
0771                   22,2502   72476 1        DCOMP  SL1
0772                   22,2503   10015 1        STORE  12D,2        C6=-SIN(THETA)COS(PSI)
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 0773                        22,2504   77745 1             DLOAD
 0774                        22,2505   72405 0             DMP      SL1            (PUSH UP 7)
 0775                        22,2506   00011 1                      8D
 0776                        22,2507   41325 0             PDDL     DMP            (PD7 COS(PHI)SIN(THETA)SIN(PSI)) SCALE4
 0777                        22,2510   00007 0                      6
 0778                        22,2511   00001 0                      0
 0779                        22,2512   72415 1             DAD      SL1            (PUSH UP 7)
 0780                        22,2513   77626 0             STADR                  C7=COS(PHI)SIN(THETA)SIN(PSI)
 0781                        22,2514   67760 1             STORE    14D,2          +COS(THETA)SIN(PHI)
 0782                        22,2515   77745 1             DLOAD
 0783                        22,2516   72405 0             DMP      SL1            (PUSH UP 6)
 0784                        22,2517   00011 1                      8D
 0785                        22,2520   41325 0             PDDL     DMP            (PD6 SIN(THETA)SIN(PHI)SIN(PSI)) SCALE4
 0786                        22,2521   00007 0                      6
 0787                        22,2522   00003 1                      2
 0788                        22,2523   72425 1             DSU      SL1            (PUSH UP 6)
 0789                        22,2524   77626 0             STADR
 0790                        22,2525   67756 1             STORE    16D,2         C8=-SIN(THETA)SIN(PHI)SIN(PSI)
 0791                        22,2526   77616 0             RVQ                     +COS(THETA)COS(PHI)

R0792  CALCULATION OF THE MATRIX DEL......

R0793          *      *               --T           *
R0794          DEL = (IDMATRIX)COS(A)+UU (1-COS(A))+UX SIN(A)         SCALED 1

R0795          -
R0796          WHERE U IS A UNIT VECTOR (DP SCALED 2) ALONG THE AXIS OF ROTATION.
R0798          A IS THE ANGLE OF ROTATION (DP SCALED 2)
R0799                                    -
R0800          HERE ON ENTRY THE STARTING ADDRESS OF U IS COF, AND A IS IN MPAC

 0801                        22,2527   41401 1  DELCOMP    SETPD    PUSH          MPAC CONTAINS THE ANGLE A
 0802                        22,2530   00001 0                      0
 0803                        22,2531   65356 1             SIN      PDDL          PD0 = SIN(A)
 0804                        22,2532   41546 0             COS      PUSH          PD2 = COS(A)
 0805                        22,2533   65302 0             SR2      PDDL          PD2 = COS(A)                      $8
 0806                        22,2534   41021 1             BDSU     BOVB
 0807  REF   2  LAST  353    22,2535   06520 0                      DPHALF
 0808  REF   2  LAST  353    22,2536   21712 0                      SIGNMPAC
 0809                        22,2537   77725 1             PDDL                   PD4 = 1-COS(A)

R0810  COMPUTE THE DIAGONAL COMPONENTS OF DEL

 0811  REF  27  LAST  355    22,2540   03271 0                      COF
 0812                        22,2541   41316 0             DSQ      DMP
 0813                        22,2542   00005 1                      4
 0814                        22,2543   52415 0             DAD      SL3
 0815                        22,2544   00003 1                      2
 0816                        22,2545   77604 0             BOVB
 0817  REF   3  LAST  359    22,2546   21712 0                      SIGNMPAC
 0818  REF   1                22,2547   16231 0        STODL    KEL               UX UX(1-COS(A)) +COS(A)          $1
 0819  REF  28  LAST  359     22,2550   03273 1                 COF +2
 0820                         22,2551   41316 0        DSQ      DMP
 0821                         22,2552   00005 1                 4
 0822                         22,2553   52415 0        DAD      SL3
 0823                         22,2554   00003 1                 2
 0824                         22,2555   77604 0        BOVB
 0825  REF   4  LAST  359     22,2556   21712 0                 SIGNMPAC
 0826  REF   2  LAST  360     22,2557   16241 1        STODL    KEL +8D           UY UY(1-COS(A)) +COS(A)          $1
 0827  REF  29  LAST  360     22,2560   03275 1                 COF +4
 0828                         22,2561   41316 0        DSQ      DMP
 0829                         22,2562   00005 1                 4
 0830                         22,2563   52415 0        DAD      SL3
 0831                         22,2564   00003 1                 2
 0832                         22,2565   77604 0        BOVB
 0833  REF   5  LAST  360     22,2566   21712 0                 SIGNMPAC
 0834  REF   3  LAST  360     22,2567   02251 0        STORE    KEL +16D          UZ UZ(1-COS(A)) +COS(A)          $1

P0835  COMPUTE THE OFF DIAGONAL TERMS OF DEL

 0836                         22,2570   41345 0        DLOAD    DMP
 0837  REF  30  LAST  360     22,2571   03271 0                 COF
 0838  REF  31  LAST  360     22,2572   03273 1                 COF +2
 0839                         22,2573   72405 0        DMP      SL1
 0840                         22,2574   00005 1                 4
 0841                         22,2575   41325 0        PDDL     DMP               D6  UX UY (1-COS A)            $ 4
 0842  REF  32  LAST  360     22,2576   03275 1                 COF +4
 0843                         22,2577   00001 0                 0
 0844                         22,2600   43206 1        PUSH     DAD               D8  UZ SIN A                   $ 4
 0845                         22,2601   00007 0                 6
 0846                         22,2602   41112 0        SL2      BOVB
 0847  REF   6  LAST  360     22,2603   21712 0                 SIGNMPAC
 0848  REF   4  LAST  360     22,2604   16237 0        STODL    KEL +6
 0849                         22,2605   52421 1        BDSU     SL2
 0850                         22,2606   77604 0        BOVB
 0851  REF   7  LAST  360     22,2607   21712 0                 SIGNMPAC
 0852  REF   5  LAST  360     22,2610   16233 1        STODL    KEL +2
 0853  REF  33  LAST  360     22,2611   03271 0                 COF
 0854                         22,2612   41205 0        DMP      DMP
 0855  REF  34  LAST  360     22,2613   03275 1                 COF +4
 0856                         22,2614   00005 1                 4
 0857                         22,2615   65352 0        SL1      PDDL              D6  UX UZ (1-COS A )           $ 4
 0858  REF  35  LAST  360     22,2616   03273 1                 COF +2
 0859                         22,2617   41405 0        DMP      PUSH              D8  UY SIN(A)
 0860                         22,2620   00001 0                 0
 0861                         22,2621   62415 0        DAD      SL2
 0862                         22,2622   00007 0                 6
 0863                         22,2623   77604 0        BOVB
 0864  REF   8  LAST  360     22,2624   21712 0                 SIGNMPAC
 0865  REF   6  LAST  360     22,2625   16235 1        STODL    KEL +4            UX UZ (1-COS(A))+UY SIN(A)
 0866                          22,2626   62421 1           BDSU    SL2
 0867                          22,2627   77604 0           BOVB
 0868   REF   9  LAST  360     22,2630   21712 0                   SIGNMPAC
 0869   REF   7  LAST  360     22,2631   16245 0           STODL   KEL +12D        UX UZ (1-COS(A))-UY SIN(A)
 0870   REF  36  LAST  360     22,2632   03273 1                   COF +2
 0871                          22,2633   41205 0           DMP     DMP
 0872   REF  37  LAST  361     22,2634   03275 1                   COF +4
 0873                          22,2635   00005 1                   4
 0874                          22,2636   05352 0           SL1     PDDL            D6  UY UZ (1-COS(A))            $ 4
 0875   REF  38  LAST  361     22,2637   03271 0                   COF
 0876                          22,2640   41405 0           DMP     PUSH            D8  UX SIN(A)
 0877                          22,2641   00001 0                   0
 0878                          22,2642   62415 0           DAD     SL2
 0879                          22,2643   00007 0                   6
 0880                          22,2644   77604 0           BOVB
 0881   REF  10  LAST  361     22,2645   21712 0                   SIGNMPAC
 0882   REF   8  LAST  361     22,2646   16247 1           STODL   KEL +14D        UY UZ(1-COS(A)) +UX SIN(A)
 0883                          22,2647   62421 1           BDSU    SL2
 0884                          22,2650   77604 0           BOVB
 0885   REF  11  LAST  361     22,2651   21712 0                   SIGNMPAC
 0886   REF   9  LAST  361     22,2652   02243 0           STORE   KEL +10D        UY UZ (1-COS(A)) -UX SIN(A)
 0887                          22,2653   77616 0           RVQ


R0888   DIRECTION COSINE MATRIX TO CDU ANGLE ROUTINE
R0889   X1 CONTAINS THE COMPLEMENT OF THE STARTING ADDRESS FOR MATRIX (SCALED 2)
R0890   LEAVES CDU ANGLES SCALED 2PI IN V(MPAC)
R0891   COS(MGA) WILL BE LEFT IN S1 (SCALED 1)

R0892   THE DIRECTION COSINE MATRIX RELATING S/C AXES TO STABLE MEMBER AXES CAN BE WRITTEN AS***

R0894             C =COS(THETA)COS(PSI)
R0895              0
R0896             C =-COS(THETA)SIN(PSI)COS(PHI)+SIN(THETA)SIN(PHI)
R0897              1
R0898             C =COS(THETA)SIN(PSI)SIN(PHI) + SIN(THETA)COS(PHI)
R0899              2
R0900             C =SIN(PSI)
R0901              3
R0902             C =COS(PSI)COS(PHI)
R0903              4
R0904             C =-COS(PSI)SIN(PHI)
R0905              5
R0906             C =-SIN(THETA)COS(PSI)
R0907              6
R0908             C =SIN(THETA)SIN(PSI)COS(PHI)+COS(THETA)SIN(PHI)
R0909              7
R0910             C =-SIN(THETA)SIN(PSI)SIN(PHI)+COS(THETA)COS(PHI)
R0911              8
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R0912                WHERE PHI = OGA
R0913                      THETA = IGA
R0914                      PSI = MGA

 0915                             22,2654   67543 1  DCMTOCDU DLOAD* ARCSIN
 0916                             22,2655   00007 0                  6,1
 0917                             22,2656   71406 0           PUSH   COS          PD +0   PSI
 0918                             22,2657   41152 1           SL1    BOVB
 0919   REF  12  LAST  361        22,2660   21712 0                  SIGNMPAC
 0920   REF   2  LAST  357        22,2661   00051 0           STODL  S1
 0921                             22,2662   57543 1           DLOAD* DCOMP
 0922                             22,2663   00015 0                  12D,1
 0923                             22,2664   67471 1           DDV    ARCSIN
 0924   REF   3  LAST  362        22,2665   00051 0                  S1
 0925                             22,2666   51123 0           PDDL*  BPL          PD +2  THETA
 0926                             22,2667   00001 0                  0,1          MUST CHECK THE SIGN OF COS(THETA)
 0927   REF   1                   22,2670   44702 1                  OKTHETA      TO DETERMINE THE PROPER QUADRANT
 0928                             22,2671   57545 1           DLOAD  DCOMP
 0929                             22,2672   43244 1           BPL    DAD
 0930   REF   1                   22,2673   44677 1                  SUHALFA
 0931   REF   3  LAST  359        22,2674   06520 0                  DPHALF
 0932                             22,2675   77650 1           GOTO
 0933   REF   1                   22,2676   44701 1                  CALCPHI
 0934                             22,2677   77625 0  SUHALFA  DSU
 0935   REF   4  LAST  362        22,2700   06520 0                  DPHALF
 0936                             22,2701   77606 1  CALCPHI  PUSH
 0937                             22,2702   57543 1  OKTHETA  DLOAD* DCOMP
 0938                             22,2703   00013 0                  10D,1
 0939                             22,2704   67471 1           DDV    ARCSIN
 0940   REF   4  LAST  362        22,2705   00051 0                  S1
 0941                             22,2706   51123 0           PDDL*  BPL          PUSH DOWN PHI
 0942                             22,2707   00011 1                  8D,1
 0943   REF   1                   22,2710   44722 0                  OKPHI
 0944                             22,2711   57545 1           DLOAD  DCOMP        PUSH UP PHI
 0945                             22,2712   43244 1           BPL    DAD
 0946   REF   1                   22,2713   44717 0                  SUHALFAP
 0947   REF   5  LAST  362        22,2714   06520 0                  DPHALF
 0948                             22,2715   77650 1           GOTO
 0949   REF   1                   22,2716   44723 1                  VECOFANG
 0950                             22,2717   52025 1  SUHALFAP DSU    GOTO
 0951   REF   6  LAST  362        22,2720   06520 0                  DPHALF
 0952   REF   2  LAST  362        22,2721   44723 1                  VECOFANG
 0953                             22,2722   77745 1  OKPHI    DLOAD               PUSH UP PHI
 0954                             22,2723   43466 1  VECOFANG VDEF   RVQ
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P0955   ROUTINES FOR TERMINATING THE AUTOMATIC MANEUVER AND RETURNING TO USER

 0956                          22,2724   77776 1  TOOBADF  EXIT
 0957   REF  19  LAST  270     22,2725  0 5567 0           TC      ALARM
 0958                          22,2726   00401 1           OCT     00401

 0959   REF   1                22,2727  1 2732 1           TCF     NOGO                DO NOT ZERO ATTITUDE ERRORS

 0960   REF  63  LAST  340     22,2730  0 4616 1           TC      BANKCALL
 0961   REF   2  LAST  285     22,2731   40153 1           CADR    ZATTEROR            ZERO ATTITUDE ERRORS

 0962   REF  64  LAST  363     22,2732  0 4616 1  NOGO     TC      BANKCALL
 0963   REF   2  LAST  288     22,2733   40165 1           CADR    STOPRATE            STOP RATES

 0964   REF  13  LAST  332     22,2734  3 4752 0           CAF     TWO
 0965                          22,2735  0 0004 0           INHINT                      ALL RETURNS ARE NOW MADE VIA GOODEND
 0966   REF  12  LAST  295     22,2736  0 5203 0           TC      WAITLIST
 0967   REF   9  LAST  357     E6,1676                     EBANK=  BCDU
 0968   REF   1                22,2737   03234 1           2CADR   GOODMANU
 0968   REF   1                22,2740   44066 1
 0969   REF  30  LAST  336     22,2741  1 5155 1           TCF     ENDOFJOB

 0970                          22,2742   77776 1  TOOBADI  EXIT
 0971   REF   2  LAST  363     22,2743  1 2732 1           TCF     NOGO
 0001                           15,2050                      BANK    15

 0002    REF    3  LAST  357    22,2000                      SETLOC KALCMON1
 0003                           22,2744                      BANK

R0004
R0005    DETECTING GIMBAL LOCK
 0006    REF    1               22,2744             LOCSKIRT EQUALS NOGIMLOC

 0007                           22,2744   77614 1   NOGIMLOC SET
 0008    REF    1               22,2745   01074 0                   CALCMAN3
 0009                           22,2746   70740 0   WCALC    LXC,1  DLOAD*
 0010    REF    3  LAST  293    22,2747   01325 1                   RATEINDX        CHOOSE THE DESIRED MANEUVER RATE
 0011    REF    1               22,2750   04772 1                   ARATE,1         FROM A LIST OF FOUR
 0012                           22,2751   45002 1            SR4    CALL            COMPUTE THE INCREMENTAL ROTATION MATRIX
 0013    REF    1               22,2752   44527 1                   DELCOMP         DEL CORRESPONDING TO A 1 SEC ROTATION
A0014                                                                               ABOUT COF
 0015                           22,2753   74343 0            DLOAD* VXSC
 0016    REF    2  LAST  364    22,2754   04772 1                   ARATE,1
 0017    REF   39  LAST  361    22,2755   03271 0                   COF
 0018    REF    1               22,2756   17326 0            STODL  BRATE           COMPONENT MANEUVER RATES 45 DEG/SEC
 0019    REF    3  LAST  352    22,2757   03336 1                   AM
 0020                           22,2760   55605 1            DMP    DDV*
 0021    REF    1               22,2761   05002 0                   ANGLTIME
 0022    REF    3  LAST  364    22,2762   04772 1                   ARATE,1
 0023                           22,2763   77661 0            SR
 0024                           22,2764   20606 0                   5
 0025    REF    1               22,2765   03334 0            STORE  TM              MANEUVER EXECUTION TIME SCALED AS T2
 0026                           22,2766   77614 1            SETGO
 0027    REF    1               22,2767   01035 0                   CALCMAN2        0(OFF) = CONTINUE MANEUVER
 0028    REF    1               22,2770   45010 1                   NEWANGL +1      1(ON) = START MANEUVER
R0029                THE FOUR SELECTABLE FREE FALL MANEUVER RATES SELECTED BY
R0030                LOADING RATEINDX WITH 0,2,4,6, RESPECTIVELY


 0031                           22,2771   00221 0   ARATE    2DEC   .0088888888     = 0.2 DEG/SEC        $ 22.5 DEG/SEC
 0031                           22,2772   24255 0
 0032                           22,2773   00554 0            2DEC   .0222222222     = 0.5 DEG/SEC        $ 22.5 DEG/SEC
 0032                           22,2774   02660 0
 0033                           22,2775   02660 0            2DEC   .0888888888     = 2.0 DEG/SEC        $ 22.5 DEG/SEC
 0033                           22,2776   13301 1
 0034                           22,2777   16161 0            2DEC   .4444444444     = 10.0 DEG/SEC       $ 22.5 DEG/SEC
 0034                           22,3000   30707 1
 0035                           22,3001   00003 1   ANGLTIME 2DEC   .0001907349     = 100B-19     FUDGE FACTOR TO CONVERT
 0035                           22,3002   04000 0
A0036                                                                               MANEUVER ANGLE TO MANEUVER TIME
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R0001   GENERATION OF STEERING COMMANDS FOR DIGITAL AUTOPILOT FREE FALL MANEUVERS

R0003   NEW COMMANDS WILL BE GENERATED EVERY ONE SECOND DURING THE MANEUVER

 0004   REF   1               E6,1707                     EBANK=  TTEMP

 0005   REF  65  LAST  363    22,3003   0 4016 1 NEWDELHI TC      BANKCALL      CHECK FOR AUTO STABILIZATION
 0006   REF   1               22,3004    54262 0          CADR    ISITAUTO      ONLY
 0007   REF  97  LAST  332    22,3005  10 000 0           CCS     A
 0008   REF   3  LAST  363    22,3006   1 2730 0          TCF     NOGO -2
 0009   REF  16  LAST  357    22,3007   0 6037 0 NEWANGL  TC      INTPRET
 0010                         22,3010    75160 1          AXC,1   AXC,2
 0011   REF   5  LAST  351    22,3011    03246 1                  MIS           COMPUTE THE NEW MATRIX FROM S/C TO
 0012   REF  10  LAST  361    22,3012    02230 1                  KEL           STABLE MEMBER AXES
 0013                         22,3013    77624 1          CALL
 0014   REF   2  LAST  351    22,3014    44312 1                  MXM3
 0015                         22,3015    45575 1          VLOAD   STADR
 0016   REF   6  LAST  365    22,3016    50514 1          STOVL   MIS +12D      CALCULATE NEW DESIRED CDU ANGLES
 0017                         22,3017    77626 0          STADR
 0018   REF   7  LAST  365    22,3020    50522 1          STOVL   MIS +6D
 0019                         22,3021    77626 0          STADR
 0020   REF   8  LAST  365    22,3022    74530 1          STORE   MIS
 0021                         22,3023    45160 1          AXC,1   CALL
 0022   REF   9  LAST  365    22,3024    03246 1                  MIS
 0023   REF   1               22,3025    44654 0                  DCMTOCDU      PICK UP THE NEW CDU ANGLES FROM MATRIX
 0024                         22,3026    77634 0          RTB
 0025   REF   1               22,3027    21620 0                  V1STO2S
 0026   REF   1               22,3030    03304 0          STORE   NCDU          NEW CDU ANGLES
 0027                         22,3031    77414 0          BONCLR  EXIT
 0028   REF   2  LAST  364    22,3032    01215 0                  CALCMAN2
 0029   REF   1               22,3033    45122 1                  MANUSTAT      TO START MANEUVER
 0030   REF  14  LAST  363    22,3034   3 4752 0          CAF     TWO                   +0 OTHERWISE
 0031   REF   1               22,3035  55'272 0 INCRDCDU TS      SPNDX
 0032   REF   2  LAST  365    22,3036  51'272 1          INDEX   SPNDX
 0033   REF   9  LAST  363    22,3037   3 1676 1          CA      BCDU          INITIAL CDU ANGLES
 0034                         22,3040   0 0006 1          EXTEND                OR PREVIOUS DESIRED CDU ANGLES
 0035   REF   3  LAST  365    22,3041   5 1272 1          INDEX   SPNDX
 0036   REF   2  LAST  365    22,3042  21'703 0          MSU     NCDU
 0037                         22,3043   0 0006 1          EXTEND
 0038   REF   4  LAST  364    22,2000                     SETLOC  KALCMON1
 0039                         22,3044                     BANK

 0040   REF   1               22,3044   7 3121 1          MP      DT/TAU
 0041   REF  98  LAST  365    22,3045  10 000 0           CCS     A             CONVERT TO 2S COMPLEMENT
 0042   REF  17  LAST  339    22,3046   6 4753 1          AD      ONE
 0043                         22,3047   1 3051 1          TCF     +2
 0044                         22,3050   4 0000 0          COM
 0045   REF   4  LAST  365    22,3051  51'272 1          INDEX   SPNDX
 0046   REF   1               22,3052  55'640 0          TS      DELDCDU       ANGLE INCREMENTS TO BE ADDED TO
 0047   REF   5  LAST  365    22,3053  51'272 1          INDEX   SPNDX         CDUXD, CDUYD, CDUZD EVERY TENTH SECOND
 0048    REF   3  LAST  365   22,3054  3 1703 1             CA       NCDU         BY LEM DAP
 0049    REF   6  LAST  365   22,3055  51'272 1             INDEX    SPNDX
 0050    REF  10  LAST  365   22,3056  57'676 1             XCH      BCDU
 0051    REF   7  LAST  366   22,3057  51'272 1             INDEX    SPNDX
 0052    REF   7  LAST  352   22,3060  55'635 1             TS       CDUXD
 0053    REF   8  LAST  366   22,3061  11'272 0             CCS      SPNDX
 0054    REF   1              22,3062  1 3035 0             TCF      INCRDCDU     LOOP FOR THREE AXES

 0055                         22,3063  0 0003 1             RELINT

R0056    COMPARE PRESENT TIME WITH TIME TO TERMINATE MANEUVER

 0057    REF   1              22,3064  0 3075 0  TMANUCHK   TC       TIMECHK
 0058    REF   1              22,3065  1 3170 0             TCF      CONTMANU
 0059    REF  18  LAST  365   22,3066  3 4753 1             CAF      ONE
 0060                         22,3067  0 0004 0  MANUSTAL   INHINT                END MAJOR PART OF MANEUVER WITHIN 1 SEC
 0061    REF  13  LAST  363   22,3070  0 5203 0             TC       WAITLIST     UNDER WAITLIST CALL TO MANUSTOP
 0062    REF   2  LAST  365   E6,1707                       EBANK=   TTEMP
 0063    REF   1              22,3071   03213 1             2CADR    MANUSTOP
 0063    REF   1              22,3072   44066 1
 0064                         22,3073  0 0003 1             RELINT
 0065    REF  31  LAST  363   22,3074  1 5155 1             TCF      ENDOFJOB


 0066                         22,3075  0 0006 1  TIMECHK    EXTEND
 0067    REF  11  LAST  306   22,3076  4 0025 1             DCS      TIME2
 0068    REF   3  LAST  366   22,3077  53'710 1             DXCH     TTEMP
 0069                         22,3100  0 0006 1             EXTEND
 0070    REF   2  LAST  364   22,3101  3 1734 0             DCA      TM
 0071    REF   4  LAST  366   22,3102  21'710 1             DAS      TTEMP
 0072    REF   5  LAST  366   22,3103  11'707 1             CCS      TTEMP
 0073    REF  36  LAST  336   22,3104  0 0002 0             TC       Q
 0074                         22,3105  1 3107 0             TCF      +2
 0075    REF   1              22,3106  1 3117 1             TCF      2NDRETRN
 0076    REF   6  LAST  366   22,3107  11'710 1             CCS      TTEMP +1
 0077    REF  37  LAST  366   22,3110  0 0002 0             TC       Q
 0078    REF   1              22,3111  1 3113 0             TCF      MANUOFF
 0079                         22,3112  4 0000 0             COM
 0080    REF   1              22,3113  6 3166 0  MANUOFF    AD       ONESEK +1
 0081                         22,3114  0 0006 1             EXTEND
 0082    REF   2  LAST  366   22,3115  6 3117 0             BZMF     2NDRETRN
 0083    REF  38  LAST  366   22,3116  24 0002 0            INCR     Q
 0084    REF  39  LAST  366   22,3117  24 0002 0 2NDRETRN   INCR     Q
 0085    REF  40  LAST  366   22,3120  0 0002 0             TC       Q

 0086                         22,3121   03146 1  DT/TAU     DEC      .1

 0087                         22,3122   77776 1  MANUSTAT   EXIT                  INITIALIZATION ROUTINE
 0088                         22,3123  0 0006 1             EXTEND                FOR AUTOMATIC MANEUVERS
 0089    REF  12  LAST  366   22,3124  3 0025 0             DCA      TIME2
 0090   REF    3  LAST  366    22,3125  21'734 1              DAS     TM             TM+TO     MANEUVER COMPLETION TIME
 0091                          22,3126  0 0006 1              EXTEND
 0092   REF    2  LAST  366    22,3127  4 3166 1              DCS     ONESEK
 0093   REF    4  LAST  367    22,3130  21'734 1              DAS     TM             (TM+TO)-1
 0094                          22,3131  0 0004 0              INHINT
 0095   REF   15  LAST  365    22,3132  3 4752 0              CAF     TWO
 0096   REF    2  LAST  135    22,3133  55'701 1    RATEBIAS  TS      KSPNDX
 0097                          22,3134  6 0000 1              DOUBLE
 0098   REF    2  LAST  135    22,3135  55'702 1              TS      KDPNDX
 0099   REF   99  LAST  365    22,3136  50 000 1              INDEX   A
 0100   REF    2  LAST  364    22,3137  3 1725 0              CA      BRATE
 0101   REF    3  LAST  367    22,3140  51'701 0              INDEX   KSPNDX         STORE MANEUVER RATE IN
 0102   REF    4  LAST  195    22,3141  55'643 0              TS      OMEGAPD        OMEGAPD, OMEGAQD, OMEGARD
 0103                          22,3142  0 0006 1              EXTEND
 0104                          22,3143  6 3145 1              BZMF    +2             COMPUTE ATTITUDE ERROR
 0105                          22,3144  4 0000 0              COM                    OFFSET = (WX)ABS(WX)/2AJX
 0106                          22,3145  0 0006 1              EXTEND                 WHERE AJX= 2-JET ACCELERATION
 0107   REF    1               22,3146  7 3167 0              MP      BIASCALE       = -1/16
 0108                          22,3147  0 0006 1              EXTEND
 0109   REF    3  LAST  367    22,3150  5 1702 0              INDEX   KDPNDX
 0110   REF    3  LAST  367    22,3151  7 1725 1              MP      BRATE
 0111                          22,3152  0 0006 1              EXTEND
 0112   REF    4  LAST  367    22,3153  5 1701 0              INDEX   KSPNDX
 0113   REF    5  LAST  133    22,3154  11'530 1              DV      1JACC          =AJX   $ 90 DEG/SEC-SEC
 0114   REF    5  LAST  367    22,3155  51'701 0              INDEX   KSPNDX
 0115   REF    1               22,3156  55'277 0              TS      DELPEROR           $ 180 DEG
 0116   REF    6  LAST  367    22,3157  11'701 1              CCS     KSPNDX
 0117   REF    1               22,3160  1 3133 1              TCF     RATEBIAS

 0120   REF    3  LAST  334    22,3161  3 0025 0              CA      TIME1
 0121   REF    3  LAST  367    22,3162  6 3166 0              AD      ONESEK +1
 0122   REF    1               22,3163  57'706 1              XCH     NEXTIME
 0123   REF    2  LAST  366    22,3164  1 3034 1              TCF     INCRDCDU -1

 0124                          22,3165   00000 1    ONESEK    DEC     0
 0125                          22,3166   00144 0              DEC     100

 0126                          22,3167   75777 1    BIASCALE  OCT     75777          = -1/16

 0127   REF    4  LAST  367    22,3170  4 0025 1    CONTMANU  CS      TIME1          RESET FOR NEXT DCDU UPDATE
 0128   REF    2  LAST  367    22,3171  6 1706 1              AD      NEXTIME
 0129   REF  100  LAST  367    22,3172  10 000 0              CCS     A
 0130   REF   19  LAST  366    22,3173  6 4753 1              AD      ONE
 0131   REF    1               22,3174  1 3177 1              TCF     MANUCALL
 0132   REF    1               22,3175  6 4735 1              AD      NEGMAX
 0133                          22,3176  4 0000 0              COM
 0134                          22,3177  0 0004 0    MANUCALL  INHINT                 CALL FOR NEXT UPDATE VIA WAITLIST
 0135   REF   14  LAST  366    22,3200  0 5203 0              TC      WAITLIST
 0136   REF    7  LAST  366    E6,1707                        EBANK=  TTEMP
 0137   REF    1               22,3201   03206 0              2CADR   UPDTCALL
 0137   REF    1               22,3202   44066 1
```

```
L        KALCMANU STEERING                                                              USER'S PAGE NO.   4      E6 S3

 0138    REF    4  LAST  367    22,3203   3 3166 0             CAF      ONESEK +1       INCREMENT TIME FOR NEXT UPDATE
 0139    REF    3  LAST  367    22,3204  27'706 0              ADS      NEXTIME
 0140    REF   32  LAST  366    22,3205   1 5155 1             TCF      ENDOFJOB


 0141    REF    1               22,3206   3 7714 1  UPDTCALL  CAF      PRIO26          SATELLITE PROGRAM TO CALL FOR UPDATE
 0142    REF   13  LAST  299    22,3207   0 5105 0             TC       FINDVAC         OF STEERING COMMANDS
 0143    REF    8  LAST  367    E6,1707                        EBANK=   TTEMP
 0144    REF    1               22,3210    03003 1             2CADR    NEWDELHI
 0144    REF    1               22,3211    44066 1
 0145    REF    5  LAST  282    22,3212   0 5261 1             TC       TASKOVER
```

```
P0146   ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

 0147   REF  40  LAST  336   22,3213  3 4755 1  MANUSTOP CAF     ZERO          ZERO MANEUVER RATES
 0148   REF   1              22,3214  55'642 1           TS      DELDCDU2
 0149   REF   1              22,3215  55'645 0           TS      OMEGARD
 0150   REF   1              22,3216  55'301 0           TS      DELREROR
 0151   REF   1              22,3217  55'641 1           TS      DELDCDU1
 0152   REF   1              22,3220  55'644 1           TS      OMEGAQD
 0153   REF   1              22,3221  55'300 1           TS      DELQEROR
 0154   REF   2  LAST  351   22,3222  3 0323 0           CA      CPSI          SET DESIRED GIMBAL ANGLES TO
 0155   REF   1              22,3223  55'637 0           TS      CDUZD         DESIRED FINAL GIMBAL ANGLES
 0156   REF   1              22,3224  3 0322 1           CA      CTHETA
 0157   REF   1              22,3225  55'636 1           TS      CDUYD
 0158   REF   4  LAST  352   22,3226  3 0321 1  ENDROLL  CA      CPHI          NO FINAL YAW
 0159   REF   8  LAST  366   22,3227  55'635 1           TS      CDUXD
 0160   REF  41  LAST  369   22,3230  3 4755 1           CAF     ZERO
 0161   REF   5  LAST  367   22,3231  55'643 0           TS      OMEGAPD       I.E. MANEUVER DID NOT GO THRU
 0162   REF   2  LAST  365   22,3232  55'640 0           TS      DELDCDU       GIMBAL LOCK ORIGINALLY
 0163   REF   2  LAST  367   22,3233  55'277 0           TS      DELPEROR
 0164   REF   1              22,3234  3 1311 0  GOODMANU CA      ATTPRIO       RESTORE USERS PRIO
 0165   REF   2  LAST  232   22,3235  54 063 0           TS      NEWPRIO

 0166   REF  42  LAST  369   22,3236  3 4755 1           CA      ZERO          ZERO ATTCADR
 0167   REF   3  LAST  222   22,3237  53'310 0           DXCH    ATTCADR

 0168   REF   2  LAST  232   22,3240  0 5115 1           TC      SPVAC         RETURN TO USER

 0169   REF   6  LAST  368   22,3241  0 5261 1           TC      TASKOVER
```

```
L          SYSTEM TEST STANDARD LEAD INS                                                          USER'S PAGE NO.   1       EO S3

 0001     REF    4  LAST  320    E5,1642                       EBANK= XSM

 0002                            33,2045                       BANK    33
 0003     REF    1               04,2000                       SETLOC  E/PROG
 0004                            04,2576                       BANK

 0005     REF    1                                             COUNT*  $$/P07

R0006                SPECIAL PROGRAMS TO EASE THE PANGS OF ERASABLE MEMORY PROGRAMS.

R0007     E/BKCALL    FOR DOING BANKCALLS FROM AND RETURNING TO ERASABLE.

R0008                THIS ROUTINE IS CALLABLE FROM ERASABLE OR FIXED.  LIKE BANKCALL, HOWEVER, SWITCHING BETWEEN S3 AND S4
R0010     IS NOT POSSIBLE.

R0011                THE CALLING SEQUENCE IS:

A0012                                                          TC      BANKCALL
A0013                                                          CADR    E/BKCALL
A0014                                                          CADR    ROUTINE           WHERE YOU WANT TO GO IN FIXED.
A0015                                                          RETURN HERE FROM DISPLAY TERMINATE, BAD STALL OR TC Q.
A0016                                                          RETURN HERE FROM DISPLAY PROCEED OR GOOD RETURN FROM STALL.
A0017                                                          RETURN HERE FROM DISPLAY ENTER OR RECYCLE.

R0018                THIS ROUTINE REQUIRES TWO ERASABLES (EBUF2, +1) IN UNSWITCHED WHICH ARE UNSHARED BY INTERRUPTS AND
R0020     OTHER EMEMORY PROGRAMS.

R0021                A + L ARE PRESERVED THROUGH BANKCALL AND E/BKCALL.

 0022     REF    3  LAST  245    04,2576  52 134 0  E/BKCALL DXCH    BUF2              SAVE A,L AND GET DP RETURN.
 0023     REF    1               04,2577  53'170 1           DXCH    EBUF2             SAVE DP RETURN.
 0024     REF    2  LAST  370    04,2600  25'167 0           INCR    EBUF2             RETURN +1 BECAUSE DOUBLE CADR.
 0025     REF   10  LAST  154    04,2601  3 0006 1           CA      BBANK
 0026     REF    3  LAST  304    04,2602  7 5012 0           MASK    LOW10             GET CURRENT EBANK.  (SBANK SOMEDAY)
 0027     REF    3  LAST  370    04,2603  27'170 1           ADS     EBUF2 +1          FORM BBCON.  (WAS FBANK)
 0028     REF    4  LAST  370    04,2604  51'167 0           NDX     EBUF2
 0029                            04,2605  2'7777 0           CA      0 -1              GET CADR OF ROUTINE.
 0030     REF    2  LAST  217    04,2606  0 4622 0           TC      SWCALL            GO TO ROUTINE, SETTING Q TO SWRETURN
A0031                                                                                  AND RESTORING A + L.
 0032                            04,2607  0 2613 1           TC      +4                TX Q, V34, OR BAD STALL RETURN.
 0033                            04,2610  0 2612 0           TC      +2                PROCEED OR GOOD STALL RETURN.
 0034     REF    5  LAST  370    04,2611  25'167 0           INCR    EBUF2             ENTER OR RECYCLE RETURN.
 0035     REF    6  LAST  370    04,2612  25'167 0           INCR    EBUF2
 0036     REF    7  LAST  370    04,2613  53'170 1  E/SWITCH DXCH    EBUF2
 0037                            04,2614  52 006 0           DTCB
```

```
P0038    E/CALL          FOR CALLING A FIXED MEMORY INTERPRETIVE SUBROUTINE FROM ERASABLE AND RETURNING TO ERASABLE.

R0040              THE CALLING SEQUENCE IS...
A0041                                                         RTB
A0042                                                                  E/CALL
A0043                                                         CADR     ROUTINE             THE INTERPRETIVE SUBROUTINE YOU WANT.
A0044                                                                                      RETURNS HERE IN INTERPRETIVE.

 0045    REF   1                04,2615  22 164 1  E/CALL     LXCH     LOC                 ADRES -1 OF CADR.
 0046    REF  33  LAST  336     04,2616  50 001 0             INDEX    L
 0047    REF  34  LAST  371     04,2617  3 0001 0             CA       L                   CADR IN A.
 0048    REF  35  LAST  371     04,2620  24 001 0             INCR     L
 0049    REF  36  LAST  371     04,2621  24 001 0             INCR     L                   RETURN ADRES IN L.
 0050    REF   8  LAST  370     04,2622  53'170 1             DXCH     EBUF2               STORE CADR AND RETURN.
 0051    REF  17  LAST  365     04,2623  0 6037 0             TC       INTPRET
 0052                           04,2624   77624 1             CALL
 0053    REF   9  LAST  371     04,2625   01167 0                      EBUF2               INDIRECTLY EXECUTE ROUTINE.  IT MUST
 0054                           04,2626   77776 1             EXIT                         LEAVE VIA RVQ OR EQUIVALENT.
 0055    REF  10  LAST  371     04,2627  23'170 0             LXCH     EBUF2 +1            PICK UP RETURN.
 0056    REF  18  LAST  371     04,2630  1 6041 0             TCF      INTPRET +2          SET LOC AND RETURN TO CALLER.
```

```
P0057   E/JOBWAK         FOR WAKING UP ERASABLE MEMORY JOBS.

R0058             THIS ROUTINE MUST BE CALLED IN INTERRUPT OR WITH INTERRUPTS INHIBITED.

R0060             THE CALLING SEQUENCE IS:

A0061                                                             INHINT
A0062                                                               .
A0063                                                               .
A0064                                                             CA       WAKEADR          ADDRESS OF SLEEPING JOB
A0065                                                             TC       IBNKCALL
A0066                                                             CADR     E/JOBWAK
A0067                                                               .                       RETURNS HERE
A0068                                                               .
A0069                                                               .
A0070                                                             RELINT                    IF YOU DID AN INHINT.

 0071                            33,2045                          BANK     33
 0072    REF    2  LAST  370     04,2000                          SETLOC E/PROG
 0073                            04,2631                          BANK

 0074    REF    2 LAST  370 TO  372:     27      27*              COUNT* $$/P07

 0075    REF    1                04,2631  0 5137 1  E/JOBWAK TC       JOBWAKE          ARRIVE IWTH ADRES IN A.
 0076    REF   17  LAST  255     04,2632  4 4741 0           CS       BIT11
 0077    REF    1                04,2633  50 064 0           NDX      LOCCTR
 0078    REF    2  LAST  371     04,2634  26 164 0           ADS      LOC              KNOCK FIXED MEMORY BIT OUT OF ADRES.
 0079    REF    1                04,2635  0 0072 1           TC       RUPTREG3         RETURN
```

```
R0001    NAME- IMU PERFORMANCE TESTS 2

R0002    DATE- MARCH 20,1967

R0003    BY- SYSTEM TEST GROUP 864-6900 EXT. 1274

R0004    MODNO.- ZERO

R0005    FUNCTIONAL DESCRIPTION

R0006    POSITIONING ROUTINES FOR THE IMU PERFORMANCE TESTS AS WELL AS SOME OF
R0007    THE TESTS THEMSELVES. FOR A DESCRIPTION OF THESE SUBROUTINES AND THE
R0008    OPERATING PROCEDURES (TYPICALLY) SEE STG MEMO 685.THEORETICAL REF.E-1973

 0009                         33,2045                               BANK     33
 0010    REF   2  LAST   44   37,2000                               SETLOC   IMU2
 0011                         37,2002                               BANK
 0012    REF   2  LAST  127   E5,1416                               EBANK=   POSITON
 00121   REF   2 LAST   44 TO   44:       2       2*                COUNT*   $$/P07

 00122   REF   1              37,2002  0 5311 1  REDO      TC       NEWMODEX
 00124                        37,2003   00007 0            MM       07

 0021    REF   1              37,2004  0 2325 1  GEOIMUTT  TC       IMUZEPR
 0022    REF  43  LAST  369   37,2005  3 4755 1  IMUBACK   CA       ZERO
 0023    REF   2  LAST  127   37,2006  55'414 0            TS       NDXCTR
 0024    REF   1              37,2007  55'440 1            TS       TORQNDX
 0025    REF   2  LAST  373   37,2010  55'441 0            TS       TORQNDX +1
 00251   REF   1              37,2011  55'576 0            TS       OVFLOWCK
 0026    REF   1              37,2012  3 4361 1  NBPOSPL   CA       DEC17
 0027    REF   1              37,2013  55'571 1            TS       ZERONDX
 0028    REF   1              37,2014  3 2476 0            CA       XNBADR
 0029    REF   1              37,2015  0 2367 1            TC       ZEROING
 0030    REF   3  LAST  334   37,2016  3 4736 1            CA       HALF
 0031    REF   1              37,2017  55'664 0            TS       XNB
 0032    REF  19  LAST  371   37,2020  0 6037 0  GUESS     TC       INTPRET
 0033                         37,2021   62545 1  LATAZCHK  DLOAD    SL2
 0034    REF   2  LAST  127   37,2022   02403 1                     LATITUDE
 0035    REF  13  LAST  317   37,2023   15047 0            STODL    DSPTEM1 +1
 0036    REF   2  LAST  127   37,2024   02401 0                     AZIMUTH
 0037                         37,2025   77434 1            RTB      EXIT
 0038    REF   1              37,2026   21614 1                     1STO2S
 0039    REF  68  LAST  357   37,2027  56 154 1            XCH      MPAC
 0040    REF  14  LAST  373   37,2030  55'045 0            TS       DSPTEM1
 0041    REF   1              37,2031  3 2473 0            CAF      VN0641
 0042    REF  66  LAST  365   37,2032  0 4616 1            TC       BANKCALL
 0043    REF   4  LAST  340   37,2033   20476 0            CADR     GOFLASH
 0044    REF   1              37,2034  0 2270 0            TC       ENDTEST1
 0045                         37,2035  0 2037 1            TC       +2
 0046                         37,2036  0 2031 1            TC       -5
 0047    REF  20  LAST  373   37,2037  0 6037 0                 TC       INTPRET
 0048                         37,2040   47135 0                 SLOAD    RTB
 0049    REF  15  LAST  373   37,2041   01046 1                          DSPTEM1
 0050    REF  10  LAST  357   37,2042   21576 0                          CDULOGIC
 0051    REF   3  LAST  373   37,2043   02401 0                 STORE    AZIMUTH
 0052                         37,2044   30535 1                 SLOAD    SR2
 0053    REF  16  LAST  374   37,2045   01047 0                          DSPTEM1 +1
 0054    REF   3  LAST  373   37,2046   02403 1                 STORE    LATITUDE
 0055                         37,2047   57546 1                 COS      DCOMP
 0056                         37,2050   77752 1                 SL1
 0057    REF   1              37,2051   16437 0                 STODL    WANGI
 0058    REF   4  LAST  374   37,2052   02403 1                          LATITUDE
 0059                         37,2053   72556 1                 SIN      SL1
 0060    REF   1              37,2054   16435 1                 STODL    WANGO
 0061    REF   4  LAST  374   37,2055   02401 0                          AZIMUTH
 0062                         37,2056   73406 1                 PUSH     SIN
 0063    REF   1              37,2057   02675 1                 STORE    YNB +2
 0064    REF   1              37,2060   16705 1                 STODL    ZNB +4
 0065                         37,2061   77746 1                 COS
 0066    REF   2  LAST  374   37,2062   02677 0                 STORE    YNB +4
 0067                         37,2063   77676 0                 DCOMP
 0068    REF   2  LAST  374   37,2064   36703 0    POSGMBL      STCALL   ZNB +2
 0069    REF   1              37,2065   47353 1                          CALCGA
 0070                         37,2066   77776 1                 EXIT
 0071    REF  67  LAST  373   37,2067  0 4616 1                 TC       BANKCALL
 0072    REF   2  LAST  268   37,2070   17000 1                 CADR     IMUCOARS
 0073    REF  35  LAST  293   37,2071  3 4736 1                 CAF      BIT14              IF BIT14 SET, GIMBAL LOCK
 0074    REF   9  LAST  280   37,2072  7 0077 0                 MASK     FLAGWRD3
 0075                         37,2073  0 0006 1                 EXTEND
 0076                         37,2074  1 2076 0                 BZF      +2
 0077    REF   3  LAST  373   37,2075  25'414 1                 INCR     NDXCTR             +1 IF IN GIMBAL LOCK,OTHERWISE 0
 0078    REF  26  LAST  340   37,2076  0 5516 0                 TC       DOWNFLAG
 0079    REF   1              37,2077   00056 1                 ADRES    GLOKFAIL           RESET GIMBAL LOCK FLAG
 0080    REF   1              37,2100  0 2315 1                 TC       IMUSLLLG
 0081    REF   4  LAST  374   37,2101  11'414 0                 CCS      NDXCTR             IF ONE GO AND DO A PIPA TEST ONLY
 0082    REF   1              37,2102  0 2126 0                 TC       PIPACHK            ALIGN AND MEASURE VERTICAL PIPA RATE
 0084    REF   1              37,2103  0 2320 1                 TC       FINIMUDD
 0085                         37,2104  0 0006 1                 EXTEND
 00851   REF   1              37,2105  3 1575 1                 DCA      PERFDLAY
 00852   REF   1              37,2106  0 5277 0                 TC       LONGCALL           DELAY WHILE SUSPENSION STABILIZES
 008525  REF   3  LAST  373   E5,1416                           EBANK=   POSITON
 00853   REF   1              37,2107   02113 0                 2CADR    GOESTIMS
 00853   REF   1              37,2110   76065 0
 00854   REF   1              37,2111  3 2116 0                 CA       ESTICADR
 00855   REF   1              37,2112  0 5133 0                 TC       JOBSLEEP
 00856   REF   2  LAST  374   37,2113  3 2116 0    GOESTIMS     CA       ESTICADR
 00857   REF   2  LAST  372   37,2114  0 5137 1                 TC       JOBWAKE
 00858   REF   7  LAST  369   37,2115  0 5261 1                 TC       TASKOVER
 00859   REF   1              37,2116   76500 0    ESTICADR     CADR     ESTIMS
 0086    REF  44  LAST  373   37,2117  3 4755 1    TORQUE       CA       ZERO
 0087    REF    7  LAST  317    37,2120  55'050 1             TS       DSPTEM2
 0088    REF    1               37,2121  3 1504 1             CA       DRIFTI
 0089    REF    8  LAST  375    37,2122  55'051 0             TS       DSPTEM2  +1
 0090    REF    4  LAST  374    37,2123  51'416 0             INDEX    POSITON
 0091    REF    2  LAST  127    37,2124  55'420 1             TS       SOUTHDR  -1
 0092    REF    1               37,2125  0 2457 0             TC       SHOW

 0093    REF    5  LAST  374    37,2126  51'414 1  PIPACHK    INDEX    NDXCTR                  PIPA TEST
 0094                           37,2127  0 2130 1             TC       +1
 0095    REF    1               37,2130  0 2447 1             TC       EARTHR*
 0096    REF    2  LAST  373    37,2131  3 4361 1             CA       DEC17                   ALLOW PIP COUNTER TO OVERFLOW 17 TIMES
 0097    REF    1               37,2132  55'476 1             TS       DATAPL  +4              IN THE ALLOTED TIME INTERVAL
 0098    REF    1               37,2133  3 2474 1             CA       DEC58
 0099    REF    2  LAST  127    37,2134  55'412 0             TS       LENGTHOT
 0100    REF   20  LAST  367    37,2135  3 4753 1             CA       ONE
 0101    REF    1               37,2136  55'537 0             TS       RESULTCT
 0102    REF   45  LAST  374    37,2137  3 4755 1             CA       ZERO
 0103    REF    2  LAST  127    37,2140  51'415 0             INDEX    PIPINDEX
 0104    REF    2  LAST  305    37,2141  54 037 1             TS       PIPAX
 0105    REF    2  LAST  375    37,2142  55'472 0             TS       DATAPL
 0106    REF    1               37,2143  0 2332 1             TC       CHECKG
 0107                           37,2144  0 0004 0             INHINT
 0108    REF   16  LAST  367    37,2145  3 4752 0             CAF      TWO
 0109    REF    1               37,2146  0 5173 1             TC       TWIDDLE
 0110    REF    5  LAST  370    E5,1642                       EBANK=   XSM
 0111    REF    1               37,2147   02151 0             ADRES    PIPATASK
 0112    REF   33  LAST  368    37,2150  0 5155 0             TC       ENDOFJOB


 0113                           37,2151  0 0006 1  PIPATASK   EXTEND
 0114    REF    3  LAST  375    37,2152  27'412 0             DIM      LENGTHOT
 0115    REF    4  LAST  375    37,2153  3 1412 1             CA       LENGTHOT
 0116                           37,2154  0 0006 1             EXTEND
 0117    REF    1               37,2155  6 2161 0             BZMF     STARTPIP
 0118    REF   19  LAST  334    37,2156  3 4742 1             CAF      BIT10
 0119    REF    2  LAST  375    37,2157  0 5173 1             TC       TWIDDLE
 0120    REF    6  LAST  375    E5,1642                       EBANK=   XSM
 0121    REF    2  LAST  375    37,2160   02151 0             ADRES    PIPATASK
 0122    REF    2  LAST  269    37,2161  3 4736 1  STARTPIP   CAF      PRIO20
 0123    REF   14  LAST  368    37,2162  0 5105 0             TC       FINDVAC
 0124    REF    7  LAST  375    E5,1642                       EBANK=   XSM
 0125    REF    1               37,2163   02166 1             2CADR    PIPJOBB
 0125    REF    1               37,2164   76065 0
 0126    REF    8  LAST  374    37,2165  0 5261 1             TC       TASKOVER

 0127    REF    6  LAST  375    37,2166  51'414 1  PIPJOBB    INDEX    NDXCTR
 0128                           37,2167  0 2170 0             TC       +1
 0129    REF    2  LAST  375    37,2170  0 2447 1             TC       EARTHR*
 0130    REF    5  LAST  375    37,2171  3 1412 1             CA       LENGTHOT
```

```
0131                        37,2172   0 0006 1                 EXTEND
0132                        37,2173   6 2175 0                 BZMF      +2
0133    REF  34  LAST  375  37,2174   0 5155 0                 TC        ENDOFJOB

0134    REF   7  LAST  261  37,2175   3 4756 1                 CA        FIVE
0135    REF   2  LAST  375  37,2176   55'537 0                 TS        RESULTCT
0136    REF   2  LAST  375  37,2177   0 2332 1                 TC        CHECKG
0137    REF   3  LAST  375  37,2200   11'473 1                 CCS       DATAPL +1
0138                        37,2201   0 2205 1                 TC        +4
0139    REF   1             37,2202   0 5705 0                 TC        CCSHOLE
0140    REF   4  LAST  376  37,2203   4 1476 1                 CS        DATAPL +4
0141    REF   5  LAST  376  37,2204   55'476 1                 TS        DATAPL +4
0142                        37,2205   0 0006 1                 EXTEND
0143    REF   6  LAST  376  37,2206   4 1473 1                 DCS       DATAPL
0144    REF   7  LAST  376  37,2207   21'477 0                 DAS       DATAPL +2

0145    REF  21  LAST  374  37,2210   0 6037 0                 TC        INTPRET
0146                        37,2211    45345 1                 DLOAD     DSU
0147    REF   8  LAST  376  37,2212    02501 1                            DATAPL +6
0148    REF   9  LAST  376  37,2213    02475 0                           DATAPL +2
0149                        37,2214    45044 0                 BPL       CALL
0150    REF   1             37,2215    76217 1                           AINGOTN
0151    REF   1             37,2216    76275 0                           OVERFFIX
0152                        37,2217    56325 0    AINGOTN      PDDL      DDV
0153    REF  10  LAST  376  37,2220    02477 1                           DATAPL +4
0154                        37,2221    47075 0                 DMPR      RTB
0155    REF   1             37,2222    37056 0                           DEC585          DEC585 HAS BEEN REDEFINED FOR LEM
0156    REF   1             37,2223    21612 1                           SGNAGREE
0157    REF   9  LAST  375  37,2224    01051 1                 STORE     DSPTEM2
0158                        37,2225    77776 1                 EXIT
0159    REF   7  LAST  375  37,2226   11'414 0                 CCS       NDXCTR
0160    REF   1             37,2227   0 2301 1                 TC        COAALIGN          TAKE PLATFORM OUT OF GIMBAL LOCK
0161    REF   2  LAST  375  37,2230   0 2457 0                 TC        SHOW
0162    REF   1             37,2231   3 2471 1    VERTDRFT     CA        3990DEC           ABOUT 1 HOUR VERTICAL DRIFT TEST
0163    REF   6  LAST  375  37,2232   55'412 0                 TS        LENGTHOT
0164    REF   5  LAST  375  37,2233   51'416 0                 INDEX     POSITON
0165    REF   3  LAST  375  37,2234   4 1417 0                 CS        SOUTHDR -2
0166    REF   1             37,2235   55'442 0                 TS        DRIFTT
01661   REF   3  LAST  375  37,2236   11'415 1                 CCS       PIPINDEX          OFFSET PLATFORM TO MISS PIP DEAD-ZONES
01662   REF   1             37,2237   1 2245 1                 TCF       PON4              Z UP IN POS 4
01663   REF  17  LAST  300  37,2240   4 4747 0    PON2         CS        BIT5              X UP
01664   REF   1             37,2241   27'565 1                 ADS       ERCOMP +2
01665   REF  18  LAST  376  37,2242   3 4747 1                 CA        BIT5
01666   REF   2  LAST  376  37,2243   27'567 0                 ADS       ERCOMP +4
01667   REF   1             37,2244   1 2251 1                 TCF       PON
01668   REF  19  LAST  376  37,2245   4 4747 0    PON4         CS        BIT5
01669   REF   3  LAST  376  37,2246   27'565 1                 ADS       ERCOMP +2
016691  REF  20  LAST  376  37,2247   3 4747 1                 CA        BIT5
016692  REF   4  LAST  376  37,2250   27'563 1                 ADS       ERCOMP
0167    REF   3  LAST  375  37,2251   0 2447 1    PON          TC        EARTHR*
```

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 0168    REF  46  LAST  375    37,2252  3 4755 1               CA      ZERO             ALLOW ONLY SOUTH GYRO EARTH RATE COMPENS
 0169    REF   2  LAST  127    37,2253  55'404 1               TS      ERVECTOR
 0170    REF   3  LAST  377    37,2254  55'405 0               TS      ERVECTOR +1
 0171    REF   4  LAST  219    37,2255  3 4733 1  GUESS1       CAF     POSMAX
 0172    REF   3  LAST  373    37,2256  55'440 1               TS      TORQNDX
 0173    REF   4  LAST  377    37,2257  55'441 0               TS      TORQNDX +1
 0174    REF   8  LAST  357    37,2260  3 0032 0               CA      CDUX
 0175    REF   2  LAST  127    37,2261  55'413 1               TS      LOSVEC
 0176    REF   2  LAST  374    37,2262  0 2500 0               TC      ESTIMS
 0177    REF   1               37,2263  3 1502 1  VALMIS       CA      DRIFTO
 0178    REF  10  LAST  376    37,2264  55'051 0               TS      DSPTEM2 +1
 0179    REF  47  LAST  377    37,2265  3 4755 1               CA      ZERO
 0180    REF  11  LAST  377    37,2266  55'050 1               TS      DSPTEM2
 0181    REF   3  LAST  376    37,2267  0 2457 0               TC      SHOW

 0182    REF  27  LAST  374    37,2270  0 5516 0  ENDTEST1     TC      DOWNFLAG
 0183    REF   3  LAST  287    37,2271   00007 0               ADRES   IMUSE
 0184    REF  48  LAST  377    37,2272  4 4755 0               CS      ZERO
 0185    REF   2  LAST  232    37,2273  0 5314 1               TC      NEWMODEA
 0186    REF  29  LAST  340    37,2274  0 5472 0               TC      ENDEXT
 0187                            37,2275   43215 0  OVERFFIX DAD      DAD
 0188     REF    3  LAST  300    37,2276   06530 1                    DPPOSMAX
 0189     REF    1               37,2277   37064 1                    ONEDPP
 0190                            37,2300   77616 0           RVQ


 0191                            37,2301  0 0006 1  COAALIGN EXTEND                                COARSE ALIGN SUBROUTINE
 0192     REF    2  LAST  373    37,2302  23'571 0           QXCH     ZERONDX
 0193     REF   49  LAST  377    37,2303  3 4755 1           CA       ZERO
 0194     REF    7  LAST  305    37,2304  54 321 0           TS       THETAD
 0195     REF    8  LAST  378    37,2305  54 322 0           TS       THETAD +1
 0196     REF    9  LAST  378    37,2306  54 323 1           TS       THETAD +2
 0197     REF   68  LAST  374    37,2307  0 4616 1           TC       BANKCALL
 0198     REF    3  LAST  374    37,2310   17000 1           CADR     IMUCOARS
 0199     REF   69  LAST  378    37,2311  0 4616 1  ALIGNCOA TC       BANKCALL
 0200     REF    7  LAST  333    37,2312   17716 1           CADR     IMUSTALL
 0201     REF    1               37,2313  0 3047 1           TC       SCMERR2
 0202     REF    3  LAST  378    37,2314  0 1571 0           TC       ZERONDX


 0203                            37,2315  0 0006 1  IMUSLLLG EXTEND
 0204     REF    4  LAST  378    37,2316  23'571 0           QXCH     ZERONDX
 0205     REF    1               37,2317  0 2311 0           TC       ALIGNCOA

 0206                            37,2320  0 0006 1  FINIMUDD EXTEND
 0207     REF    5  LAST  378    37,2321  23'571 0           QXCH     ZERONDX
 0208     REF   70  LAST  378    37,2322  0 4616 1           TC       BANKCALL
 0209     REF    2  LAST  273    37,2323   17210 1           CADR     IMUFINE
 0210     REF    2  LAST  378    37,2324  0 2311 0           TC       ALIGNCOA

 0211                            37,2325  0 0006 1  IMUZERR  EXTEND
 0212     REF    6  LAST  378    37,2326  23'571 0           QXCH     ZERONDX
 0213     REF   71  LAST  378    37,2327  0 4616 1           TC       BANKCALL
 0214     REF    3  LAST  265    37,2330   16714 1           CADR     IMUZERO
 0215     REF    3  LAST  378    37,2331  0 2311 0           TC       ALIGNCOA


 0216                            37,2332  0 0006 1  CHECKG   EXTEND                                PIP PULSE CATCHING ROUTINE
 0217     REF    4  LAST  290    37,2333  23'417 1           QXCH     QPLACE
 0218                            37,2334  0 2342 0           TC       +6
 0219                            37,2335  0 0003 1  CHECKG1  RELINT
 0220     REF    2  LAST  221    37,2336  3 0067 0           CA       NEWJOB
 0221                            37,2337  0 0006 1           EXTEND
 0222                            37,2340  6 2346 1           BZMF     +6
 0223     REF    1               37,2341  0 5122 0           TC       CHANG1
 0224                            37,2342  0 0004 0           INHINT
 0225     REF    4  LAST  376    37,2343  51'415 0           INDEX    PIPINDEX
 0226     REF    3  LAST  375    37,2344  4 0037 1           CS       PIPAX
 0227     REF    7  LAST  378    37,2345  55'571 1           TS       ZERONDX
 0228                            37,2346  0 0004 0           INHINT
 0229   REF   5  LAST  378   37,2347  51'415 0              INDEX   PIPINDEX
 0230   REF   4  LAST  378   37,2350  3 0037 0              CA      PIPAX
 0231   REF   8  LAST  378   37,2351  6 1571 0              AD      ZERONDX
 0232                        37,2352  0 0006 1              EXTEND
 0233   REF   1              37,2353  1 2335 1              BZF     CHECKG1
 0234   REF   6  LAST  379   37,2354  51'415 0              INDEX   PIPINDEX
 0235   REF   5  LAST  379   37,2355  3 0037 0              CA      PIPAX
 0236   REF   3  LAST  376   37,2356  51'537 1              INDEX   RESULTCT
 0237   REF  11  LAST  376   37,2357  55'472 0              TS      DATAPL
 0238   REF   1              37,2360  0 4102 0              TC      FINETIME
 0239   REF   4  LAST  379   37,2361  51'537 1              INDEX   RESULTCT
 0240   REF  12  LAST  379   37,2362  55'473 1              TS      DATAPL +1
 0241   REF   5  LAST  379   37,2363  51'537 1              INDEX   RESULTCT
 0242   REF  13  LAST  379   37,2364  23'474 1              LXCH    DATAPL +2
 0243                        37,2365  0 0003 1              RELINT
 0244   REF   5  LAST  378   37,2366  0 1417 1   ENDCHKG    TC      QPLACE


 0245   REF  37  LAST  371   37,2367  54 001 1   ZEROING    TS      L
 0246                        37,2370  1 2372 1              TCF     +2
 0247   REF   9  LAST  379   37,2371  55'571 1   ZEROING1   TS      ZERONDX
 0248   REF  50  LAST  378   37,2372  3 4755 1              CAF     ZERO
 0249   REF  38  LAST  379   37,2373  50 001 0              INDEX   L
 0250                        37,2374  54 000 0              TS      0
 0251   REF  39  LAST  379   37,2375  24 001 0              INCR    L
 0252   REF  10  LAST  379   37,2376  11'571 1              CCS     ZERONDX
 0253   REF   1              37,2377  1 2371 1              TCF     ZEROING1
 0254   REF  41  LAST  366   37,2400  0 0002 0              TC      Q
 0258                           37,2401   65345 0  ERTHRVSE DLOAD  PDDL
 0259   REF   1                 37,2402   37057 1                  SCHZEROS          PD24 = (SIN          -COS      0)(OMEG/MS)
 0260   REF   5  LAST   374     37,2403   02403 1                  LATITUDE
 0261                           37,2404   57546 1           COS    DCOMP
 0262                           37,2405   73525 1           PDDL   SIN
 0263   REF   6  LAST   380     37,2406   02403 1                  LATITUDE
 0264                           37,2407   74266 0           VDEF   VXSC
 0265   REF   1                 37,2410   36001 0                  OMEG/MS
 0266   REF   4  LAST   377     37,2411   02405 1           STORE  ERVECTOR
 0267                           37,2412   77634 0           RTB
 0268   REF   3  LAST   339     37,2413   21573 0                  LOADTIME
 0269   REF   2  LAST   127     37,2414   26433 1           STOVL  TMARK
 0270   REF   2  LAST   380     37,2415   37057 1                  SCHZEROS
 0271   REF   5  LAST   376     37,2416   02564 1           STORE  ERCOMP
 0272                           37,2417   77616 0           RVQ

 0276                           37,2420   47020 0  EARTHR   ITA    RTB
 0277   REF   3  LAST   323     37,2421   00051 0                  S2
 0278   REF   4  LAST   380     37,2422   21573 0                  LOADTIME
 0279   REF   2  LAST   127     37,2423   02431 0           STORE  TEMPTIME
 0280                           37,2424   51025 1           DSU    BPL
 0281   REF   3  LAST   380     37,2425   02433 1                  TMARK
 0282   REF   1                 37,2426   76431 0                  ERTHR
 0283                           37,2427   77624 1           CALL
 0284   REF   2  LAST   376     37,2430   76275 0                  OVERFFIX
 0285                           37,2431   74261 1  ERTHR    SL     VXSC
 0286                           37,2432   20212 1                  9D
 0287   REF   5  LAST   380     37,2433   02405 1                  ERVECTOR
 0288                           37,2434   53321 1           MXV    VAD
 0289   REF   8  LAST   375     37,2435   02643 1                  XSM
 0290   REF   6  LAST   380     37,2436   02564 1                  ERCOMP
 0291   REF   7  LAST   380     37,2437   16564 1           STODL  ERCOMP
 0292   REF   3  LAST   380     37,2440   02431 0                  TEMPTIME
 0293   REF   4  LAST   380     37,2441   02433 1           STORE  TMARK
 0294                           37,2442   47170 1           AXT,1  RTB
 0295   REF   8  LAST   380     37,2443   02563 0           ECADR  ERCOMP
 0296   REF   1                 37,2444   21705 0                  PULSEIMU
 0297                           37,2445   77650 1           GOTO
 0298   REF   6  LAST   380     37,2446   00051 0                  S2

 02991                          37,2447  0 0006 1  EARTHR*  EXTEND
 02992  REF   2  LAST   127     37,2450  23'420 0           QXCH   QPLACES
 02993  REF  22  LAST   376     37,2451  0 6037 0           TC     INTPRET
 02994                          37,2452   77624 1           CALL
 02995  REF   1                 37,2453   76420 0                  EARTHR
 02996                          37,2454   77776 1           EXIT
 02997  REF   2  LAST   374     37,2455  0 2315 1           TC     IMUSLLLG
 02998  REF   3  LAST   380     37,2456  0 1420 0           TC     QPLACES

 0300                           37,2457  0 0006 1  SHOW     EXTEND
 0301   REF    6  LAST  379   37,2460  23'417 1            OXCH    QPLACE
 0302   REF    6  LAST  376   37,2461  3 1416 0  SHOW1     CA      POSITON
 0303   REF   12  LAST  377   37,2462  55'052 0            TS      DSPTEM2 +2
 0304   REF    1              37,2463  3 2472 1            CA      VB06N98
 0305   REF   72  LAST  378   37,2464  0 4616 1            TC      BANKCALL
 0306   REF    5  LAST  373   37,2465   20476 0            CADR    GOFLASH
 0307   REF    2  LAST  373   37,2466  0 2270 0            TC      ENDTEST1            V 34
 0308   REF    7  LAST  381   37,2467  0 1417 1            TC      QPLACE               V33
 0309   REF    1              37,2470  1 2461 1            TCF     SHOW1


 0311                         37,2471   07626 1  3990DEC   DEC     3990
 0312                         37,2472   01542 0  VB06N98   VN      0698
 0313                         37,2473   01451 0  VN0641    VN      0641
 0315   REF    1                 4301            DEC17     =       ND1
 0316                         37,2474   00072 1  DEC58     DEC     58
 0317   REF    9  LAST  317   37,2475   02737 0  OGCPL     ECADR   OGC
 0318   REF    3  LAST  300      4777            1SECX     =       1SEC
 0319   REF    2  LAST  373   37,2476   01664 1  XNBADR    GENADR  XNB
 0320   REF    9  LAST  380   37,2477   01642 0  XSMADR    GENADR  XSM
 0322                            4102                      BLOCK   2
 0323   REF    1                                           COUNT*  $$/P07
 0324                            4102  0 0004 0  FINETIME  INHINT                      RETURNS WITH INTERRUPT INHIBITED
 0325                            4103  0 0006 1            EXTEND
 0326   REF    1                 4104  00 004 0            READ    LOSCALAR
 0327   REF   40  LAST  379      4105  54 001 1            TS      L
 0328                            4106  0 0006 1            EXTEND
 0329   REF    2  LAST  381      4107  06 004 0            RXOR    LOSCALAR
 0330                            4110  0 0006 1            EXTEND
 0331                            4111  1 4115 1            BZF     +4
 0332                            4112  0 0006 1            EXTEND
 0333   REF    3  LAST  331      4113  00 004 0            READ    LOSCALAR
 0334   REF   41  LAST  381      4114  54 001 1            TS      L
 0335   REF    5  LAST  377      4115  4 4733 0  +4        CS      POSMAX
 0336   REF   42  LAST  381      4116  0 0001 0            AD      L
 0337                            4117  0 0006 1            EXTEND
 0338   REF    2  LAST  379      4120  1 4103 0            BZF     FINETIME +1
 0339                            4121  0 0006 1            EXTEND
 0340   REF    1                 4122  00 003 1            READ    HISCALAR
 0341   REF   42  LAST  379      4123  0 0002 0            TC      Q
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L        IMU PERFORMANCE TESTS 4                                                USER'S PAGE NO.   1       EO S3

R0001    PROGRAM-IMU PERFORMANCE TESTS 4
R0002    DATE-NOV 15,1966
R0003    BY- GEORGE SCHMIDT IL7-146 EXT 1126
R0004    MOD NO-ZERO


R0005    FUNCTIONAL DESCRIPTION

R0006    THIS SECTION CONSISTS OF THE FILTER FOR THE GYRO DRIFT TESTS. NO COMPASS
R0007    IS DONE IN LEM. FOR A DESCRIPTION OF THE FILTER SEE E-1973. THIS
R0008    SECTION IS ENTERED FROM IMU 2. IT RETURNS THERE AT END OF TEST.

R0009    EARTHR,OGC ZERO,ERTHRVSE

R0010    NORMAL EXIT

R0011    LENGTHOT GOES TO ZERO-RETURN TO IMU PERF TESTS 2 CONTROL

R0012    ALARMS

R0013    1600 OVERFLOW IN DRIFT TEST
R0014    1601     BAD IMU MODING IN ANY ROUTINE THAT USES IMUSTALL
R0015    OUTPUT

R0016    FLASHING DISPLAY OF RESULTS-CONTROLLED IN IMU PERF TESTS 2

R0017    DEBRIS

R0018    ALL CENTRALS-ALL OF EBANK XSM
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0019                          33,2045                       BANK    33
0020    REF    1              37,2000                       SETLOC  IMU4
0021                          37,2500                       BANK
0022    REF    3 LAST  373 TO  381:    318    320*          COUNT*  $$/P07

0023    REF   10  LAST  381   E5,1642                       EBANK=  XSM


0024                          37,2500  0 0004 0  ESTIMS     INHINT
0025    REF    1              37,2501  31'572 0             CAE     1SECXT
0026    REF    3  LAST  375   37,2502  0 5173 1             TC      TWIDDLE
0027    REF   11  LAST  383   E5,1642                       EBANK=  XSM
0028    REF    1              37,2503   02536 0             ADRES   ALLOOP
0029    REF   51  LAST  379   37,2504  3 4755 1             CAF     ZERO              ZERO THE PIPAS
0030    REF    6  LAST  379   37,2505  54 037 1             TS      PIPAX
0031    REF    1              37,2506  54 040 1             TS      PIPAY
0032    REF    1              37,2507  54 041 0             TS      PIPAZ
0033                          37,2510  0 0003 1             RELINT
0034    REF    1              37,2511  3 3075 0             CA      77DECML
0035    REF   11  LAST  379   37,2512  55'571 1             TS      ZERONDX
0036    REF    1              37,2513  3 3076 0             CA      ALXXXZ
0037    REF    2  LAST  373   37,2514  0 2367 1             TC      ZEROING
0038    REF   23  LAST  380   37,2515  0 6037 0             TC      INTPRET
0039                          37,2516   77735 0             SLOAD
0040    REF    3  LAST  380   37,2517   37057 1                     SCHZEROS
0041    REF   10  LAST  336   37,2520   25477 1             STOVL   GCOMPSV -1
0042    REF    1              37,2521   37070 1                     INTVAL +2
0043    REF    1              37,2522   26445 0             STOVL   ALX1S
0044    REF    4  LAST  383   37,2523   37057 1                     SCHZEROS
0045    REF    6  LAST  329   37,2524   00325 0             STORE   DELVX
0046    REF   23  LAST  337   37,2525   01472 1             STORE   GCOMP
00461                         37,2526   77735 0             SLOAD
00462   REF    5  LAST  377   37,2527   02441 1                     TORQNDX
00463                         37,2530   50076 0             DCOMP   BMN
00464   REF    1              37,2531   76534 1                     VERTSKIP
0047                          37,2532   77624 1             CALL
00471   REF    1              37,2533   76401 0                     ERTHRVSE
00472                         37,2534   77776 1  VERTSKIP   EXIT
0048    REF    1              37,2535  0 3035 1             TC      SLEEPIE +1
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 00481  REF   2  LAST  373   37,2536   3 1576 1  ALLOOP   CA      OVFLOWCK
 004815                      37,2537   0 0006 1           EXTEND
 00482                       37,2540   1 2542 1           BZF     +2
 00483  REF   9  LAST  375   37,2541   0 5261 1           TC      TASKOVER
 0049   REF   1              37,2542  11'530 1            CCS     ALTIM
 0050   REF 101  LAST  367   37,2543   3 0000 1           CA      A                  SHOULD NEVER HIT THIS LOCATION
 0051   REF   1              37,2544  55'531 0            TS      ALTIMS
 0052   REF 102  LAST  384   37,2545   4 0000 0           CS      A
 0053   REF   2  LAST  384   37,2546  55'530 1            TS      ALTIM
 00531  REF  21  LAST  375   37,2547   4 4753 0           CS      ONE
 00532  REF   1              37,2550   5 1562 1           AD      GEOCOMPS
 00533                       37,2551   0 0006 1           EXTEND
 00534                       37,2552   1 2556 1           BZF     +4
 0054   REF   7  LAST  376   37,2553   3 1412 1           CA      LENGTHOT
 0055                        37,2554   0 0006 1           EXTEND
 0056                        37,2555   6 2562 1           BZMF    +5
 0057   REF   2  LAST  383   37,2556  31'572 0            CAE     1SECXT
 0058   REF   4  LAST  383   37,2557   0 5173 1           TC      TWIDDLE
 0059   REF  12  LAST  383   E5,1642                      EBANK=  XSM
 0060   REF   2  LAST  383   37,2560    02536 0           ADRES   ALLOOP
 0061   REF  52  LAST  383   37,2561   3 4755 1           CAF     ZERO
 0062   REF   7  LAST  383   37,2562  56 037 0            XCH     PIPAX
 0063   REF   7  LAST  383   37,2563  54 324 0            TS      DELVX
 0064   REF  53  LAST  384   37,2564   3 4755 1           CAF     ZERO
 0065   REF   2  LAST  383   37,2565  56 040 0            XCH     PIPAY
 0066   REF   4  LAST  329   37,2566  54 326 1            TS      DELVY
 0067   REF  54  LAST  384   37,2567   3 4755 1           CAF     ZERO
 0068   REF   2  LAST  383   37,2570  56 041 1            XCH     PIPAZ
 0069   REF   3  LAST  330   37,2571  54 330 0            TS      DELVZ
 0070   REF   3  LAST  375   37,2572   3 4736 1  SPECSTS  CAF     PRIO20
 0071   REF  15  LAST  375   37,2573   0 5105 0           TC      FINDVAC
 0072   REF  13  LAST  384   E5,1642                      EBANK=  XSM
 0073   REF   1              37,2574    02577 0           2CADR   ALFLT              START THE JOB
 0073   REF   1              37,2575    76065 0
 0074   REF  10  LAST  384   37,2576   0 5261 1           TC      TASKOVER
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0075    REF   2  LAST  384   37,2577  11562 0  ALFLT     CCS     GEOCOMPS
0076                         37,2600  0 2602 1            TC      +2
00761   REF   1              37,2601  0 2604 1            TC      NORMLOP
0077    REF  73  LAST  381   37,2602  0 4616 1            TC      BANKCALL
0078    REF   1              37,2603   15263 1            CADR    1/PIPA
0079    REF  24  LAST  383   37,2604  0 6037 0  NORMLOP   TC      INTPRET
0080                         37,2605   77745 1            DLOAD
0081    REF   2  LAST  383   37,2606   37066 0                    INTVAL
0082    REF   5  LAST  362   37,2607   24051 0            STOVL   S1
00821   REF   8  LAST  384   37,2610   00325 0                    DELVX
00822                        37,2611   76505 0            VXM     VSL1
008231  REF  14  LAST  384   37,2612   02643 1                    XSM
008232                       37,2613   57545 1            DLOAD   DCOMP
008233  REF  69  LAST  373   37,2614   00160 0                    MPAC +3
008234  REF   1              37,2615   16523 1            STODL   DPIPAY
008235  REF  70  LAST  385   37,2616   00162 1                    MPAC +5
008236  REF   1              37,2617   02527 0            STORE   DPIPAZ

008237                       37,2620   76001 1            SETPD   AXT,1
00824                        37,2621   00001 0                    0
00825                        37,2622   00010 0                    8D
00826                        37,2623   57535 0            SLOAD   DCOMP
00827   REF   3  LAST  385   37,2624   02563 0                    GEOCOMPS
00828                        37,2625   77640 0            BMN
00829   REF   1              37,2626   76772 1                    PERFERAS
0083                         37,2627   50135 0  ALCGKK    SLOAD   BMN
0084    REF   2  LAST  384   37,2630   02532 1                    ALTIMS
0085    REF   1              37,2631   76644 0                    ALFLT3
0086                         37,2632   72174 0  ALKCG     AXT,2   LXA,1          LOADS SLOPES AND TIME CONSTANTS AT RQST
0087                         37,2633   00014 1                    12D
0088    REF   2  LAST  383   37,2634   02444 1                    ALX1S
0089                         37,2635   62143 0  ALKCG2    DLOAD*  INCR,1
0090    REF   1              37,2636   02243 0                    ALFDK +144D,1
0091                         37,2637   77775 1            DEC     -2
0092    REF   1              37,2640   12545 0            STORE   ALDK +10D,2
0093                         37,2641   66104 1            TIX,2   SXA,1
0094    REF   1              37,2642   76635 0                    ALKCG2
0095    REF   3  LAST  385   37,2643   02444 1                    ALX1S

01074                        37,2644   77770 1  ALFLT3    AXT,1
01075                        37,2645   00010 0                    8D
0108                         37,2646   41343 0  DELMLP    DLOAD*  DMP
0109    REF   2  LAST  385   37,2647   02533 0                    DPIPAY +8D,1
0110    REF   1              37,2650   37100 1                    PIPASC
0111                         37,2651   43661 1            SLR     BDSU*
0112                         37,2652   21212 0                    9D
0113    REF   1              37,2653   02501 1                    INTY +8D,1
0114    REF   2  LAST  385   37,2654   06501 0            STORE   INTY +8D,1
0115                         37,2655   40725 0            PDDL    DMP*
0116    REF   1              37,2656   37102 0                    VELSC
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 0117   REF   1                37,2657   02521 0                      VLAUN +8D,1
 0118                          37,2660   77732 1              SL2P
 0119                          37,2661   45425 0              DSU     STADR
 0120   REF   1                37,2662   71216 1              STORE   DELM +8D,1
 0121   REF   2  LAST   386    37,2663   06563 1              STORE   DELM +10D,1
 0122                          37,2664   77100 0              TIX,1   AXT,2
 0123   REF   1                37,2665   76646 1                      DELMLP
 0124                          37,2666   00004 0                      4
 0125                          37,2667   56743 1   ALILP      DLOAD*  DMPR*
 0126   REF   2  LAST   128    37,2670   75324 0                      ALK +4,2
 0127   REF   2  LAST   385    37,2671   75240 0                      ALDK +4,2
 0128   REF   3  LAST   386    37,2672   12453 0              STORE   ALK +4,2
 0129                          37,2673   77104 1              TIX,2   AXT,2
 0130   REF   1                37,2674   76667 1                      ALILP
 0131                          37,2675   00010 0                      8D
 0132                          37,2676   66140 1   ALKLP      LXC,1   SXA,1
 0133   REF   1                37,2677   02445 0                      CMPX1
 0134   REF   2  LAST   386    37,2700   02445 0                      CMPX1
 0135                          37,2701   56743 1              DLOAD*  DMPR*
 0136   REF   4  LAST   386    37,2702   02450 1                      ALK +1,1
 0137   REF   3  LAST   386    37,2703   75216 0                      DELM +8D,2
 0138                          37,2704   77613 0              DAD*
 0139   REF   3  LAST   385    37,2705   75276 0                      INTY +8D,2
 0140   REF   4  LAST   386    37,2706   12501 0              STORE   INTY +8D,2
 0141                          37,2707   42743 1              DLOAD*  DAD*
 0142   REF   5  LAST   386    37,2710   75314 0                      ALK +12D,2
 0143   REF   3  LAST   386    37,2711   75230 1                      ALDK +12D,2
 0144   REF   6  LAST   386    37,2712   12463 0              STORE   ALK  +12D,2
 0145                          37,2713   42673 0              DMPR*   DAD*
 0146   REF   4  LAST   386    37,2714   75216 0                      DELM +8D,2
 0147   REF   5  LAST   386    37,2715   75266 1                      INTY +16D,2
 0148   REF   6  LAST   386    37,2716   12511 1              STORE   INTY +16D,2
 0149                          37,2717   40743 0              DLOAD*  DMP*
 0150   REF   1                37,2720   37105 1                      ALSK +1,1
 0151   REF   5  LAST   386    37,2721   75216 0                      DELM +8D,2
 0152                          37,2722   42772 0              SL1R    DAD*
 0153   REF   2  LAST   386    37,2723   75256 1                      VLAUN +8D,2
 0154   REF   3  LAST   386    37,2724   12521 1              STORE   VLAUN +8D,2
 0155                          37,2725   76104 0              TIX,2   AXT,1
 0156   REF   1                37,2726   76676 1                      ALKLP
 0157                          37,2727   00010 0                      8D

 0158                          37,2730   64743 0   LOOSE      DLOAD*  PDDL*
 0159   REF   1                37,2731   02523 1                      ACCWD +8D,1
 0160   REF   4  LAST   386    37,2732   02521 0                      VLAUN +8D,1
 0161                          37,2733   55523 0              PDDL*   VDEF
 0162   REF   1                37,2734   02531 1                      POSNV +8D,1
 0163                          37,2735   76521 0              MXV     VSL1
 0164   REF   2  LAST   117    37,2736   02001 1                      TRANSM1
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L         IMU PERFORMANCE TESTS                                                        USER'S PAGE NO.   6        E5 S3

 0165                             37,2737   77745 1             DLOAD
 0166    REF  71  LAST  385       37,2740   00155 0                     MPAC
 0167    REF   2  LAST  386       37,2741   06531 0             STORE   POSNV +8D,1
 0168                             37,2742   77745 1             DLOAD
 0169    REF  72  LAST  387       37,2743   00160 0                     MPAC +3
 0170    REF   5  LAST  386       37,2744   06521 1             STORE   VLAUN +8D,1
 0171                             37,2745   77745 1             DLOAD
 0172    REF  73  LAST  387       37,2746   00162 1                     MPAC +5
 0173    REF   2  LAST  386       37,2747   06523 0             STORE   ACCWD +8D,1
 0174                             37,2750   77700 0             TIX,1
 0175    REF   1                  37,2751   76730 1                     LOOSE


 0176                             37,2752   76174 1             AXT,2   AXT,1              EVALUATE SINES AND COSINES
 0177                             37,2753   00006 1                     6
 0178                             37,2754   00002 0                     2
 0179                             37,2755   57343 1   BOOP      DLOAD*  DMPR
 0180    REF   1                  37,2756   02503 0                     ANGX +2,1
 0181    REF   1                  37,2757   37110 0                     GEORGEJ
 0182                             37,2760   77722 0             SR2R
 0183                             37,2761   73406 1             PUSH    SIN
 0184                             37,2762   56072 1             SL3R    XAD,1
 0185    REF   2  LAST  252       37,2763   00046 0                     X1
 0186                             37,2764   10021 0             STORE   16D,2
 0187                             37,2765   77745 1             DLOAD
 0188                             37,2766   77746 1             COS
 0189                             37,2767   10027 0             STORE   22D,2              COSINES
 0190                             37,2770   77704 1             TIX,2
 0191    REF   1                  37,2771   76755 1                     BOOP


 0192                             37,2772   77776 1   PERFERAS  EXIT
 0193    REF   1                  37,2773  3 5016 0             CA      EBANK7
 0194    REF  11  LAST  336       37,2774  54 003 0             TS      EBANK
 0195    REF   1                  E7,1400                       EBANK=  ATIGINC
 0196    REF   2  LAST  387       37,2775  0 1400 1             TC      ATIGINC            GOTO ERASABLE TO CALCULATE ONLY TO RETN

R0197               CAUTION

R0198     THE ERASABLE PROGRAM THAT DOES THE CALCULATIONS MUST BE LOADED
R0199     BEFORE ANY ATTEMPT IS MADE TO RUN THE IMU PERFORMANCE TEST

 01995   REF   5  LAST  374       E5,1400                       EBANK=  AZIMUTH
 0290    REF   8  LAST  384       37,2776  11'412 0             CCS     LENGTHOT
 0291    REF   2  LAST  383       37,2777  0 3034 0             TC      SLEEPIE
 0292    REF   6  LAST  383       37,3000  11'440 1             CCS     TORQNDX
 0293                             37,3001  1 3003 0             TCF     +2
 0294    REF   1                  37,3002  0 3005 1             TC      SETUPER1
 0295    REF   9  LAST  377       37,3003  3 0032 0             CA      CDUX
 0296    REF   3  LAST  377       37,3004  55'414 0             TS      LOSVEC +1          FOR TROUBLESHOOTING VD POSNS 2$4
 0297   REF  25  LAST  385   37,3005   0 6037 0  SETUPER1 TC      INTPRET
 0298                        37,3006    65345 0           DLOAD   PDDL              ANGLES FROM DRIFT TEST ONLY
 0299   REF   1              37,3007    02473 0                   ANGZ
 0300   REF   1              37,3010    02477 1                   ANGY
 0301                        37,3011    55525 0           PDDL    VDEF
 0302   REF   2  LAST  387   37,3012    02501 1                   ANGX
 0303                        37,3013    74276 1           VCOMP   VXSC
 0304   REF   2  LAST  387   37,3014    37110 0                   GEORGEJ
 0305                        37,3015    74521 1           MXV     VSR1
 0306   REF  15  LAST  385   37,3016    02643 1                   XSM
 0307   REF  10  LAST  381   37,3017    02740 0           STORE   OGC
 0308                        37,3020    77776 1           EXIT


 0309   REF   1              37,3021   3 2475 0           CA      OGCPL
 0310   REF  74  LAST  385   37,3022   0 4616 1           TC      BANKCALL
 0311   REF   3  LAST  333   37,3023    17323 0           CADR    IMUPULSE
 0312   REF   3  LAST  380   37,3024   0 2315 1           TC      IMUSLLLG
 0313   REF   7  LAST  387   37,3025   11'440 1  GEOSTRT4 CCS     TORQNDX            ONLY POSITIVE IF IN VERTICAL DRIFT TEST
 0314   REF   1              37,3026   0 2263 1           TC      VALMIS
 0315   REF  26  LAST  388   37,3027   0 6037 0           TC      INTPRET
 03151                       37,3030    77624 1           CALL
 03152  REF   2  LAST  383   37,3031    76401 0                   ERTHRVSE
 03153                       37,3032    77776 1           EXIT
 0316   REF   1              37,3033   0 2117 1           TC      TORQUE


 0317   REF   9  LAST  387   37,3034   55'412 0  SLEEPIE  TS      LENGTHOT          TEST NOT OVER-DECREMENT LENGTHOT
 0318   REF   8  LAST  388   37,3035   11'440 1           CCS     TORQNDX           ARE WE DOING VERTDRIFT
 0319   REF   4  LAST  376   37,3036   0 2447 1           TC      EARTHR*
 0320   REF  35  LAST  376   37,3037   0 5155 0           TC      ENDOFJOB


 0321   REF   1              37,3040   3 5014 1  SOMEERRR CA      EBANK5
 03211  REF  12  LAST  387   37,3041   54 003 0           TS      EBANK
 03212  REF  22  LAST  384   37,3042   3 4753 1           CA      ONE
 03213  REF   3  LAST  384   37,3043   55'576 0           TS      OVFLOWCK          STOP ALLOOP FROM CALLING ITSELF
 03214  REF  20  LAST  363   37,3044   0 5567 0           TC      ALARM
 0322                        37,3045    01600 0           OCT     1600
 0323   REF   3  LAST  381   37,3046   0 2270 0           TC      ENDTEST1
 0324   REF   1              37,3047   3 3054 0  SOMERR2  CAF     OCT1601
 0325   REF   2  LAST  180   37,3050   0 5744 0           TC      VARALARM
 0330   REF  28  LAST  377   37,3051   0 5516 0           TC      DOWNFLAG
 0331   REF   4  LAST  377   37,3052    00007 0           ADRES   IMUSE
 0332   REF  36  LAST  388   37,3053   0 5155 0           TC      ENDOFJOB


 0333                        37,3054    01601 1  OCT1601  OCT     01601
 0334                        37,3055    06200 0  DEC585   OCT     06200             3200 B+14  ORDER IS IMPORTANT
 0335                        37,3056    00000 1  SCHZEROS 2DEC    .00000000
 0335                        37,3057    00000 1
 0336                          37,3060   00000 1            2DEC     .00000000
 0336                          37,3061   00000 1
 0337                          37,3062   00000 1            OCT      00000
 0338                          37,3063   00000 1  ONEDPP    OCT      00000                ORDER IS IMPORTANT
 0339                          37,3064   00001 0            OCT      00001


 0340                          37,3065   00004 0  INTVAL    OCT      4
 0341                          37,3066   00002 0            OCT      2
 0342                          37,3067   00220 1            DEC      144
 0343                          37,3070   77776 1            DEC      -1
 0344                          37,3071   35730 0  SOUPLY    2DEC     .93505870            INITIAL GAINS FOR PIP OUTPUTS
 0344                          37,3072   00035 1
 0345                          37,3073   10317 0            2DEC     .26266423            INITIAL GAINS/4 FOR ERECTION ANGLES
 0345                          37,3074   17550 1


 0346                          37,3075   00115 1  77DECML   DEC      77
 0347    REF   4  LAST   385   37,3076   01443 0  ALXXXZ    GENADR   ALX1S -1
 0348                          37,3077   04133 1  PIPASC    2DEC     .13055869
 0348                          37,3100   02265 1
 0349                          37,3101   57223 0  VELSC     2DEC     -.52223476           512/980.402
 0349                          37,3102   66451 1
 0350                          37,3103   05427 0  ALSK      2DEC     .17329931           SSWAY VEL GAIN X 980.402/4096
 0350                          37,3104   12577 1
 0351                          37,3105   77567 0            2DEC     -.00835370          SSWAY ACCEL GAIN X 980.402/4096
 0351                          37,3106   44202 1


 0352                          37,3107   24276 1  GEORGEJ   2DEC     .63661977
 0352                          37,3110   14066 1
 0353                          37,3111   23073 1  GEORGEK   2DEC     .59737013
 0353                          37,3112   11773 1
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R0001    PROGRAM NAME - KEYBOARD AND DISPLAY PROGRAM
R0002    MOD NO - 4        DATE - 27 APRIL 1967        ASSEMBLY - PINDANCE REV 18
R0003    MOD BY - FILENE
R0004    LOG SECTION - PINBALL GAME  BUTTONS AND LIGHTS

R0019    FUNCTIONAL DESCRIPTION-

R0010       THE KEYBOARD AND DISPLAY SYSTEM PROGRAM OPERATES UNDER EXECUTIVE
R0011    CONTROL AND PROCESSES INFORMATION EXCHANGED BETWEEN THE AGC AND THE
R0012    COMPUTER OPERATOR.  THE INPUTS TO THE PROGRAM ARE FROM THE KEYBOARD,
R0013    FROM INTERNAL PROGRAMS, AND FROM THE UPLINK.
R0014       THE LANGUAGE OF COMMUNICATION WITH THE PROGRAM IS A PAIR OF WORDS
R0015    KNOWN AS VERB AND NOUN.  EACH OF THESE IS REPRESENTED BY A 2 CHARACTER
R0016    DECIMAL NUMBER.  THE VERB CODE INDICATES WHAT ACTION IS TO BE TAKEN, THE
R0017    NOUN CODE INDICATES TO WHAT THIS ACTION IS APPLIED.  NOUNS USUALLY
R0018    REFER TO A GROUP OF ERASABLE REGISTERS.

R0020    VERBS ARE GROUPED INTO DISPLAYS, LOADS, MONITORS (DISPLAYS THAT ARE
R0021    UPDATED ONCE PER SECOND), SPECIAL FUNCTIONS, AND EXTENDED VERBS(THESE
R0022    ARE OUTSIDE OF THE DOMAIN OF PINBALL AND CAN BE FOUND UNDER LOG SECTION
R0023    :EXTENDED VERBS:).
R0024    A LIST OF VERBS AND NOUNS IS GIVEN IN LOG SECTION :ASSEMBLY AND
R0025    OPERATION INFORMATION:.


R0026    CALLING SEQUENCES-

R0027    KEYBOARD:
R0028       EACH DEPRESSION OF A KEYBOARD BUTTON ACTIVATES INTERRUPT KEYRUPT1
R0029    AND PLACES THE 5 BIT KEY CODE INTO CHANNEL 15.  KEYRUPT1 PLACES THE KEY
R0030    CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE KEYBOARD AND DISPLAY
R0031    PROGRAM (AT :CHARIN:), AND EXECUTES A RESUME.

R0032    UPLINK:
R0033       EACH WORD RECEIVED BY THE UPLINK ACTIVATES INTERRUPT UPRUPT WHICH
R0034    PLACES THE 5 BIT KEY CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE
R0035    KEYBOARD AND DISPLAY PROGRAM (AT:CHARIN:) AND EXECUTES A RESUME.

R0036    INTERNAL PROGRAMS:
R0037       INTERNAL PROGRAMS CALL PINBALL AT :NVSUB: WITH THE DESIRED VERB/NOUN
R0038    CODE IN A (LOW 7 BITS FOR NOUN, NEXT 7 BITS FOR VERB).  DETAILS
R0039    DESCRIBED ON REMARKS CARDS JUST BEFORE :NVSUB: AND :NVSBWAIT: (SEE
R0040    SYMBOL TABLE FOR PAGE NUMBERS).


R0045    NORMAL EXIT MODES-

R0046       IF PINBALL WAS CALLED BY EXTERNAL ACTION, THERE ARE FOUR EXITS:
R004605           1) ALL BUT (2), (3), AND (4) EXIT DIRECTLY TO ENDOFJOB.
R00461            2) EXTENDED VERBS GO TO THE EXTENDED VERB FAN AS PART OF THE
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R004615              PINBALL EXECUTIVE JOB WITH PRIORITY 30000.  IT IS THE
R00462               RESPONSIBILITY OF THE EXTENDED VERB CALLED TO EVENTUALLY
R00463               CHANGE PRIORITY (IF NECESSARY) AND DO AN ENDOFJOB.
R004635              ALSO PINBALL IS A NOVAC JOB. EBANK SET FOR COMMON.
R00464            3) VERB 37. CHANGE OF PROGRAM (MAJOR MODE) CALLS :V37: IN THE
R00465               SERVICE ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO
R00466               30000.  THE NEW PROGRAM CODE (MAJOR MODE) IS LEFT IN A.
R00467            4) KEY RELEASE BUTTON CALLS :PINBRNCH: IN THE DISPLAY INTERFACE
R00468               ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO 30000 IF
R00469               THE KEY RELEASE LIGHT IS OFF AND :CADRSTOR: IS NOT +0.

R0047        IF PINBALL WAS CALLED BY INTERNAL PROGRAMS, EXIT FROM PINBALL IS BACK
R0048    TO CALLING ROUTINE.  DETAILS DESCRIBED IN REMARKS CARDS JUST BEFORE
R0049    :NVSUB: AND :NVSBWAIT: (SEE SYMBOL TABLE FOR PAGE NUMBERS).


R0050    ALARM OR ABORT EXIT MODES-

R0051    EXTERNAL INITIATION:
R0052       IF SOME IMPROPER SEQUENCE OF KEY CODES IS DETECTED, THE OPERATOR
R0053    ERROR LIGHT IS TURNED ON AND EXIT IS TO :ENDOFJOB:.

R0054    INTERNAL PROGRAM INITIATION:
R0055       IF AN ILLEGAL V/N COMBINATION IS ATTEMPTED, AN ABORT IS CAUSED
R0056    (WITH OCTAL 01501).
R00561      IF A SECOND ATTEMPT IS MADE TO GO TO SLEEP IN PINBALL, AN ABORT IS
R00562   CAUSED (WITH OCTAL 01206). THERE ARE TWO WAYS TO GO TO SLEEP IN PINBALL:
R00563            1) ENDIDLE OR DATAWAIT.
R00564            2) NVSBWAIT, PRENVBSY, OR NVSUBUSY.

R0057    CONDITIONS LEADING TO THE ABOVE ARE DESCRIBED IN FORTHCOMING MIT/IL
R0058    E-REPORT DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.


R0059    OUTPUT-

R0060       INFORMATION TO BE SENT TO THE DISPLAY PANEL IS LEFT IN THE :DSPTAB:
R0061    BUFFER REGISTERS (UNDER EXEC CONTROL).  :DSPOUT: (A PART OF T4RUPT)
R0062    HANDLES THE PLACING OF THE :DSPTAB: INFORMATION INTO OUTPUT CHANNEL 10
R0063    IN INTERRUPT.


R0064    ERASABLE INITIALIZATION-

R0065       FRESH START AND RESTART INITIALIZE THE NECESSARY E REGISTERS FOR
R0066    PINBALL IN :STARTSUB:.   REGISTERS ARE:  DSPTAB BUFFER, CADRSTOR,
R0067    REQRET, CLPASS, DSPLOCK, MONSAVE, MONSAVE1, VERBREG, NOUNREG, DSPLIST,
R0068    DSPCOUNT, NOUT.

R0069    A COMPLETE LIST OF ALL THE ERASABLES (BOTH RESERVED AND TEMPORARIES) FOR
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R0070    PINBALL IS GIVEN BELOW.

R0071    THE FOLLOWING ARE OF GENERAL INTEREST-

R0072       REMARKS CARDS PRECEDE THE REFERENCED SYMBOL DEFINITION.  SEE SYMBOL
R0073    TABLE TO FIND APPROPRIATE PAGE NUMBERS.

R0074       NVSUB     CALLING POINT FOR INTERNAL USE OF PINBALL.
R0075                    OF RELATED INTEREST    NVSBWAIT
R0076                                           NVSUBUSY
R0077                                           PRENVBSY

R0083       ENDIDLE   ROUTINE FOR INTERNAL PROGRAMS WISHING TO GO TO SLEEP WHILE
R0084                 AWAITING OPERATORS RESPONSE.

R00851      DSPMM     ROUTINE BY WHICH AN INTERNAL PROGRAM MAY DISPLAY A DECIMAL
R00852                PROGRAM CODE (MAJOR MODE) IN THE PROGRAM (MAJOR MODE) LIGHTS.
R008525               (DSPMM DOES NOT DISPLAY DIRECTLY BUT ENTERS EXEC REQUEST
R008527               FOR DSPMMJB WITH PRIO 30000 AND RETURNS TO CALLER.)

R00853      BLANKSUB    ROUTINE BY WHICH AN INTERNAL PROGRAM MAY BLANK ANY
R00854                  COMBINATION OF THE DISPLAY REGISTERS R1, R2, R3.

R00855      JAMTERM   ROUTINES BY WHICH AN INTERNAL PROGRAM MAY PERFORM THE
R00856      JAMPROC   TERMINATE (V 34) OR PROCEED (V 33) FUNCTION.

R0086       MONITOR   VERBS FOR PERIODIC ( 1 PER SEC) DISPLAY.

R00861      PLEASE PERFORM, PLEASE MARK SITUATIONS
R00862                   REMARKS DESCRIBING HOW AN INTERNAL ROUTINE SHOULD HANDLE
R00863                   THESE SITUATIONS CAN BE FOUND JUST BEFORE :NVSUB: (SEE
R00864                   SYMBOL TABLE FOR PAGE NUMBER).

R0087       THE NOUN TABLE FORMAT IS DESCRIBED ON A PAGE OF REMARKS CARDS JUST
R0088       BEFORE :DSPABC: (SEE SYMBOL TABLE FOR PAGE NUMBER).

R0089       THE NOUN TABLES THEMSELVES ARE FOUND IN LOG SECTION :PINBALL NOUN
R00891      TABLES:.

R0090    FOR FURTHER DETAILS ABOUT OPERATION OF THE KEYBOARD AND DISPLAY SYSTEM
R0091    PROGRAM, SEE THE MISSION PLAN AND/OR MIT/IL E-2129
R0092    DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.

R0150    THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COURTESY OF THE AUTHORS.

R0151          ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0152    USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
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R0153   CHRISTIAN EAR CAN ENDURE TO HEAR.::

R0154                     HENRY 6, ACT 2, SCENE 4

R0155   THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE

R0156   RESERVED FOR PINBALL EXECUTIVE ACTION

R0157   DSPCOUNT ERASE                         DISPLAY POSITION INDICATOR
R0158   DECBRNCH ERASE                         +DEC, - DEC, OCT INDICATOR
R0159   VERBREG  ERASE                         VERB CODE
R0160   NOUNREG  ERASE                         NOUN CODE
R0161   XREG     ERASE                         R1 INPUT BUFFER
R0162   YREG     ERASE                         R2 INPUT BUFFER
R0163   ZREG     ERASE                         R3 INPUT BUFFER
R0164   XREGLP   ERASE                         LO PART OF XREG (FOR DEC CONV ONLY)
R0165   YREGLP   ERASE                         LO PART OF YREG (FOR DEC CONV ONLY)
R0166   HITEMOUT =        YREGLP               TEMP FOR DISPLAY OF HRS, MIN, SEC
R0167                                                   MUST = LOTEMOUT-1.
R0168   ZREGLP   ERASE                         LO PART OF ZREG (FOR DEC CONV ONLY)
R0169   LOTEMOUT =        ZREGLP               TEMP FOR DISPLAY OF HRS, MIN, SEC
R0170                                                   MUST = HITEMOUT+1.
R0171   MODREG   ERASE                         MODE CODE
R0172   DSPLOCK  ERASE                         KEYBOARD/SUBROUTINE CALL INTERLOCK
R0173   REQRET   ERASE                         RETURN REGISTER FOR LOAD
R0174   LOADSTAT ERASE                         STATUS INDICATOR FOR LOADTST
R0175   CLPASS   ERASE                         PASS INDICATOR CLEAR
R0176   NOUT     ERASE                         ACTIVITY COUNTER FOR DSPTAB
R0177   NOUNCADR ERASE                         MACHINE CADR FOR NOUN
R0178   MONSAVE  ERASE                         N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0179   MONSAVE1 ERASE                         NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R01795  MONSAVE2 ERASE                         NVMONOPT OPTIONS
R0180   DSPTAB   ERASE             +13D        0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0181   CADRSTOR ERASE                         ENDIDLE STORAGE
R0182   NVQTEM   ERASE                         NVSUB STORAGE FOR CALLING ADDRESS
R0183                                          MUST = NVBNKTEM-1
R0184   NVBNKTEM ERASE                         NVSUB STORAGE FOR CALLING BANK
R0185                                          MUST = NVQTEM+1
R0186   VERBSAVE ERASE                         NEEDED FOR RECYCLE
R0187   DSPLIST  ERASE                         WAITING REG FOR DSP SYST INTERNAL USE
R0188   EXTVBACT REASE                         EXTENDED VERB ACTIVITY INTERLOCK
R0189   DSPTEM1  ERASE             +2          BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0190   DSPTEM2  ERASE             +2          BUFFER STORAGE AREA 2 (MOSTLY FOR DEC)
R0191   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION

R0192   TEMPORARIES FOR PINBALL EXECUTIVE ACTION
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R0193   DSEXIT    =       INTB15+              RETURN FOR DSPIN
R0194   EXITEM    =       INTB15+              RETURN FOR SCALE FACTOR ROUTINE SELECT
R0195   BLANKRET  =       INTB15+              RETURN FOR 2BLANK

R0196   WRDRET    =       INTBIT15             RETURN FOR 5BLANK
R0197   WDRET     =       INTBIT15             RETURN FOR DSPWD
R0198   DECRET    =       INTBIT15             RETURN FOR PUTCOM(DEC LOAD)
R0199   21/22REG  =       INTBIT15             TEMP FOR CHARIN

R0200   UPDATRET  =       POLISH               RETURN FOR UPDATNN, UPDATVB
R0201   CHAR      =       POLISH               TEMP FOR CHARIN
R0202   ERCNT     =       POLISH               COUNTER FOR ERROR LIGHT RESET
R0203   DECOUNT   =       POLISH               COUNTER FOR SCALING AND DISPLAY (DEC)

R0204   SGNON     =       VBUF                 TEMP FOR +,- ON
R0205   NOUNTEM   =       VBUF                 COUNTER FOR MIXNOUN FETCH
R0206   DISTEM    =       VBUF                 COUNTER FOR OCTAL DISPLAY VERBS
R0207   DECTEM    =       VBUF                 COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0208   SGNOFF    =       VBUF     +1          TEMP FOR +,- ON
R0209   NVTEMP    =       VBUF     +1          TEMP FOR NVSUB
R0210   SFTEMP1   =       VBUF     +1          STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
R0211   HITEMIN   =       VBUF     +1          TEMP FOR LOAD OF HRS, MIN, SEC
R0212                                                    MUST = LOTEMIN-1.
R0213   CODE      =       VBUF     +2          FOR DSPIN
R0214   SFTEMP2   =       VBUF     +2          STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
R0215   LOTEMIN   =       VBUF     +2          TEMP FOR LOAD OF HRS, MIN, SEC
R0216                                                    MUST = HITEMIN+1.
R0217   MIXTEMP   =       VBUF     +3          FOR MIXNOUN DATA
R0218   SIGNRET   =       VBUF     +3          RETURN FOR +,- ON

R0219   ALSO MIXTEMP+1  = VBUF+4, MIXTEMP+2 = VBUF+5.

R0220   ENTRET    =       DOTINC               EXIT FROM ENTER

R0221   WDCNT     =       DOTRET               CHAR COUNTER FOR DSPWD
R0222   INREL     =       DOTRET               INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0223   DSPMMTEM  =       MATINC               DSPCOUNT SAVE FOR DSPMM
R0224   MIXBR     =       MATINC               INDICATOR FOR MIXED OR NORMAL NOUN

R0225   TEM1      ERASE                        EXEC TEMP
R0226   DSREL     =       TEM1                 REL ADDRESS FOR DSPIN

R0227   TEM2      ERASE                        EXEC TEMP
R0228   DSMAG     =       TEM2                 MAGNITUDE STORE FOR DSPIN
R0229   IDADDTEM  =       TEM2                 MIXNOUN INDIRECT ADDRESS STORAGE

R0230   TEM3      ERASE                        EXEC TEMP
R0231   COUNT     =       TEM3                 FOR DSPIN
```

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R0232   TEM4      ERASE                         EXEC TEMP
R0233   LSTPTR    =         TEM4                LIST POINTER FOR GRABUSY
R0234   RELRET    =         TEM4                RETURN FOR RELDSP
R0235   FREERET   =         TEM4                RETURN FOR FREEDSP
R0236   DSPWDRET  =         TEM4                RETURN FOR DSPSIGN
R0237   SEPSCRET  =         TEM4                RETURN FOR SEPSEC
R0238   SEPMNRET  =         TEM4                RETURN FOR SEPMIN

R0239   TEM5      ERASE                         EXEC TEMP
R0240   NOUNADD   =         TEM5                TEMP STORAGE FOR NOUN ADDRESS

R0241   NNADTEM   ERASE                         TEMP FOR NOUN ADDRESS TABLE ENTRY
R0242   NNTYPTEM  ERASE                         TEMP FOR NOUN TYPE TABLE ENTRY
R0243   IDAD1TEM  ERASE                         TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0244                                           MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0245   IDAD2TEM  ERASE                         TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0246                                           MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0247   IDAD3TEM  ERASE                         TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0248                                           MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0249   RUTMXTEM  ERASE                         TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0250   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION


R02501  ADDITIONAL TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R02502  MPAC, THRU MPAC +6
R02503  BUF, +1, +2
R02504  BUF2, +1, +2
R02506  MPTEMP
R02507  ADDRWD
R02509    END OF ADDITIONAL TEMPS FOR PINBALL EXEC ACTION


R0251   RESERVED FOR PINBALL INTERRUPT ACTION

R0252   DSPCNT    ERASE                         COUNTER FOR DSPOUT
R0253   UPLOCK    ERASE                         BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0254                                                                                    RECEPTION OF A BAD MESSAGE IN UPLINK)
R0255   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0256   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0257   KEYTEMP1  =         WAITEXIT            TEMP FOR KEYRUPT, UPRUPT
R0258   DSRUPTEM  =         WAITEXIT            TEMP FOR DSPOUT
R0259   KEYTEMP2  =         RUPTAGN             TEMP FOR KEYRUPT, UPRUPT
R0260   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
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R0261   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE,
R0262   0          10000
R0263   1          00001
R0264   9          01001
R0265   VERB       10001
R0266   ERROR RES10010
R0267   KEY RLSE 11001
R0268   +          11010
R0269   -          11011
R0270   ENTER      11100
R0271   CLEAR      11110
R0272   NOUN       11111


R0273   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUT0 TO  AAAABCCCCCDDDDD.
R0274   A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0275   ENERGIZED.
R0276   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0277   C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0278   D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0279   THE PANEL APPEARS AS FOLLOWS,
R0280   MD1     MD2                                 (MAJOR MODE)
R0281   VD1     VD2 (VERB)     ND1      ND2         (NOUN)
R0282   R1D1    R1D2    R1D3   R1D4     R1D5        (R1)
R0283   R2D1    R2D2    R2D3   R2D4     R2D5        (R2)
R0284   R3D1    R3D2    R3D3   R3D4     R3D5        (R3)

R0285   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0286   MD1     25      R2D1    11            ALL ARE OCTAL
R0287   MD2     24      R2D2    10
R0288   VD1     23      R2D3     7
R0289   VD2     22      R2D4     6
R0290   ND1     21      R2D5     5
R0291   ND2     20      R3D1     4
R0292   R1D1    16      R3D2     3
R0293   R1D2    15      R3D3     2
R0294   R1D3    14      R3D4     1
R0295   R1D4    13      R3D5     0
R0296   R1D5    12


R0297   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0298   DSPTAB RELAYWD          BIT11      BITS 10-6       BITS 5-1
R0299   RELADD
R0300   10       1011                      MD1   (25)      MD2   (24)
R0301   9        1010                      VD1   (23)      VD2   (22)
R0302   8        1001                      ND1   (21)      ND2   (20)
R0303   7        1000                                      R1D1  (16)
```

```
R0304   6        0111            +R1       R1D2 (15)     R1D3 (14)
R0305   5        0110            -R1       R1D4 (13)     R1D5 (12)
R0306   4        0101            +R2       R2D1 (11)     R2D2 (10)
R0307   3        0100            -R2       R2D3 (7)      R2D4 (6)
R0308   2        0011                      R2D5 (5)      R3D1 (4)
R0309   1        0010            +R3       R3D2 (3)      R3D3 (2)
R0310   0        0001            -R3       R3D4 (1)      R3D5 (0)
R0311            0000   NO RELAYWORD

R0312   THE 5 BIT OUTPUT RELAY CODES ARE:
R0313   BLANK        00000
R0314   0            10101
R0315   1            00011
R0316   2            11001
R0317   3            11011
R0318   4            01111
R0319   5            11110
R0320   6            11100
R0321   7            10011
R0322   8            11101
R0323   9            11111

R03231  OUTPUT BITS USED BY PINBALL:

R03232                KEY RELEASE LIGHT    - BIT 5 OF CHANNEL 11
R03233                VERB/NOUN FLASH      - BIT 6 OF CHANNEL 11
R03234                OPERATOR ERROR LIGHT - BIT 7 OF CHANNEL 11
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L        PINBALL GAME  BUTTONS AND LIGHTS                                              USER'S PAGE NO.   9      EO S3

P0324    START OF EXECUTIVE SECTION OF PINBALL


 0325                          40,2077                          BANK    40
 032501 REF    2  LAST  299    40,2000                          SETLOC  PINBALL1
 032502                        40,2077                          BANK

 03258  REF    1                                                COUNT*  $$/PIN
 0330   REF   23  LAST  388    40,2077  3 4753 1  CHARIN       CAF     ONE                BLOCK DISPLAY SYST
 0331   REF    2  LAST  222    40,2100  57'012 0               XCH     DSPLOCK            MAKE DSP SYST BUSY, BUT SAVE OLD
 0332   REF    1               40,2101  54 115 0               TS      21/22REG           C(DSPLOCK) FOR ERROR LIGHT RESET.
 03321  REF    2  LAST  222    40,2102  11'042 1               CCS     CADRSTOR           ALL KEYS EXCEPT ER TURN ON KR LITE IF
 03322                         40,2103  0 2105 1               TC      +2                 CADRSTOR IS FULL.  THIS REMINDS OPERATOR
 03323  REF    1               40,2104  0 2112 1               TC      CHARIN2            TO RE-ESTABLISH A FLASHING DISPLAY
 03324  REF    1               40,2105  4 2156 0               CS      ELRCODE1           WHICH HE HAS OBSCURED WITH DISPLAYS OF
 03325  REF   74  LAST  387    40,2106  6 0154 1               AD      MPAC               HIS OWN (SEE REMARKS PRECEDING ROUTINE
 03326                         40,2107  0 0006 1               EXTEND                     VBRELDSP).
 03327  REF    2  LAST  398    40,2110  1 2112 0               BZF     CHARIN2
 03328  REF    1               40,2111  0 4374 0               TC      RELDSPON
 0333   REF   75  LAST  398    40,2112  56 154 1  CHARIN2      XCH     MPAC
 0334   REF    1               40,2113  54 117 1               TS      CHAR
 0335   REF  103  LAST  384    40,2114  50 000 1               INDEX   A
 0336                          40,2115  0 2116 0               TC      +1                 INPUT CODE     FUNCTION
 0337   REF    1               40,2116  0 3434 1               TC      CHARALRM           0
 0338   REF    1               40,2117  0 2175 0               TC      NUM                1
 0339   REF    2  LAST  398    40,2120  0 2175 0               TC      NUM                2
 0340   REF    3  LAST  398    40,2121  0 2175 0               TC      NUM                3
 0341   REF    4  LAST  398    40,2122  0 2175 0               TC      NUM                4
 0342   REF    5  LAST  398    40,2123  0 2175 0               TC      NUM                5
 0343   REF    6  LAST  398    40,2124  0 2175 0               TC      NUM                6
 0344   REF    7  LAST  398    40,2125  0 2175 0               TC      NUM                7
 0345   REF    1               40,2126  0 2161 0               TC      89TEST             10             8
 0346   REF    2  LAST  398    40,2127  0 2161 0               TC      89TEST             11             9
 0347   REF    2  LAST  398    40,2130  0 3434 1               TC      CHARALRM           12
 0348   REF    3  LAST  398    40,2131  0 3434 1               TC      CHARALRM           13
 0349   REF    4  LAST  398    40,2132  0 3434 1               TC      CHARALRM           14
 0350   REF    5  LAST  398    40,2133  0 3434 1               TC      CHARALRM           15
 0351   REF    6  LAST  398    40,2134  0 3434 1               TC      CHARALRM           16
 0352   REF    7  LAST  398    40,2135  0 3434 1               TC      CHARALRM           17
 0353   REF    8  LAST  398    40,2136  0 2173 0               TC      NUM        -2      20             0
 0354   REF    1               40,2137  0 2354 1               TC      VERB               21             VERB
 0355   REF    1               40,2140  0 3603 1               TC      ERROR              22             ERROR LIGHT RESET
 0356   REF    8  LAST  398    40,2141  0 3434 1               TC      CHARALRM           23
 0357   REF    9  LAST  398    40,2142  0 3434 1               TC      CHARALRM           24
 0358   REF   10  LAST  398    40,2143  0 3434 1               TC      CHARALRM           25
 0359   REF   11  LAST  398    40,2144  0 3434 1               TC      CHARALRM           26
 0360   REF   12  LAST  398    40,2145  0 3434 1               TC      CHARALRM           27
 0361   REF   13  LAST  398    40,2146  0 3434 1               TC      CHARALRM           30
 0362   REF    1               40,2147  0 3461 1               TC      VBRELDSP           31             KEY RELEASE
 0363   REF    1               40,2150  0 2407 0               TC      POSGN              32             +
 0364   REF    1              40,2151   0 2374 0               TC      NEGSGN             33                 -
 0365   REF    1              40,2152   0 2157 0               TC      ENTERJMP           34                 ENTER
 0366   REF   14  LAST   398  40,2153   0 3434 1               TC      CHARALRM           35
 0367   REF    1              40,2154   0 2467 0               TC      CLEAR              36                 CLEAR
 0368   REF    1              40,2155   0 2370 1               TC      NOUN               37                 NOUN


 03685                        40,2156    00022 1  ELRCODE1 OCT     22
 0369   REF   17  LAST   299  40,2157   0 4635 0  ENTERJMP TC      POSTJUMP
 0370   REF    1              40,2160    62002 1           CADR    ENTER

 0371   REF    3  LAST   222  40,2161  10 777 1   89TEST   CCS     DSPCOUNT
 0372                         40,2162   0 2166 1           TC      +4                 +
 0373                         40,2163   0 2166 1           TC      +3                 +0
 0374   REF   37  LAST   388  40,2164   0 5155 0           TC      ENDOFJOB           - BLOCK DATA IN IF DSPCOUNT IS - OR -0
 0375   REF   38  LAST   399  40,2165   0 5155 0           TC      ENDOFJOB           -0
 0376   REF    4  LAST   339  40,2166   3 6245 1           CAF     THREE
 0377   REF    1              40,2167   7 1000 1           MASK    DECBRNCH
 0378   REF  104  LAST   398  40,2170  10 000 0            CCS     A
 0379   REF    9  LAST   398  40,2171   0 2175 0           TC      NUM                IF DECBRNCH IS +, 8 OR 9 OK
 0380   REF   15  LAST   399  40,2172   0 3434 1           TC      CHARALRM           IF DECBRNCH IS +0, REJECT 8 OR 9


R0381   NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0382   WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0383   OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0384   YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0385   DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0386   IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

 0387   REF   55  LAST   384  40,2173   3 4755 1           CAF     ZERO
 0388   REF    2  LAST   398  40,2174  54 117 1            TS      CHAR
 0389   REF    4  LAST   399  40,2175  10 777 1   NUM      CCS     DSPCOUNT
 0390                         40,2176   0 2202 0           TC      +4                 +
 0391                         40,2177   0 2202 0           TC      +3                 +0
 0392                         40,2200   0 2201 0           TC      +1                 -BLOCK DATA IN IF DSPCOUNT IS -
 0393   REF   39  LAST   399  40,2201   0 5155 0           TC      ENDOFJOB           -0
 0394   REF    1              40,2202   0 2324 0           TC      GETINREL
 0395   REF    2  LAST   222  40,2203  11'015 0            CCS     CLPASS             IF CLPASS IS + OR +0, MAKE IT +0.
 0396   REF   56  LAST   399  40,2204   3 4755 1           CAF     ZERO
 0397   REF    3  LAST   399  40,2205  55'015 0            TS      CLPASS
 0398                         40,2206   0 2207 0           TC      +1
 0399   REF    3  LAST   399  40,2207  50 117 0            INDEX   CHAR
 0400   REF    2  LAST   157  40,2210   3 4066 0           CAF     RELTAB
 0401   REF    1              40,2211   7 4346 0           MASK    LOW5
 0402   REF    1              40,2212  54 124 1            TS      CODE
 0403   REF    5  LAST   399  40,2213   3 0777 0           CA      DSPCOUNT
 0404   REF    1              40,2214  54 143 0            TS      COUNT
 0405   REF    1              40,2215   0 3322 1           TC      DSPIN
 0406   REF    5  LAST   399  40,2216   3 6245 1           CAF     THREE
 0407   REF   2  LAST  399    40,2217  7 1000 1            MASK    DECBRNCH
 0408   REF 105  LAST  399    40,2220  10 000 0            CCS     A                  +0, OCTAL.  +1, + DEC.  +2, - DEC.
 0409   REF   1               40,2221  0 2232 0            TC      DECTOBIN           +
 0410   REF   1               40,2222  50 137 1            INDEX   INREL              +0 OCTAL
 0411   REF   2  LAST  222    40,2223  57'001 1            XCH     VERBREG
 0412   REF   1               40,2224  54 022 0            TS      CYL
 0413   REF   2  LAST  400    40,2225  4 0022 0            CS      CYL
 0414   REF   3  LAST  400    40,2226  4 0022 0            CS      CYL
 0415   REF   4  LAST  400    40,2227  56 022 1            XCH     CYL
 0416   REF   4  LAST  399    40,2230  6 0117 0            AD      CHAR
 0417   REF   1               40,2231  0 2247 1            TC      ENDNMTST
 0418   REF   2  LAST  400    40,2232  50 137 1  DECTOBIN  INDEX   INREL
 0419   REF   3  LAST  400    40,2233  57'001 1            XCH     VERBREG
 0420   REF  76  LAST  398    40,2234  54 154 0            TS      MPAC               SUM X 2EXP-14 IN MPAC
 0421   REF  57  LAST  399    40,2235  3 4755 1            CAF     ZERO
 0422   REF  77  LAST  400    40,2236  54 155 1            TS      MPAC     +1
 0423   REF   4  LAST  221    40,2237  3 4363 0            CAF     TEN                10 X 2EXP-14
 0424   REF   1               40,2240  0 7307 1            TC      SHORTMP            10SUM X 2EXP-28 IN MPAC, MPAC+1
 0425   REF  78  LAST  400    40,2241  56 155 0            XCH     MPAC     +1
 0426   REF   5  LAST  400    40,2242  6 0117 0            AD      CHAR
 0427   REF  79  LAST  400    40,2243  54 155 1            TS      MPAC     +1
 0428   REF   2  LAST  400    40,2244  0 2247 1            TC      ENDNMTST           NO OF
 0429   REF  80  LAST  400    40,2245  26 154 0            ADS     MPAC               OF MUST BE 5TH CHAR
 0430   REF   1               40,2246  0 2265 1            TC      DECEND
 0431   REF   3  LAST  400    40,2247  50 137 1  ENDNMTST  INDEX   INREL
 0432   REF   4  LAST  400    40,2250  55'001 0            TS      VERBREG
 0433   REF   6  LAST  399    40,2251  4 0777 1            CS      DSPCOUNT
 0434   REF   4  LAST  400    40,2252  50 137 1            INDEX   INREL
 0435   REF   1               40,2253  6 2315 1            AD      CRITCON
 0436                         40,2254  0 0006 1            EXTEND
 0437   REF   1               40,2255  1 2257 1            BZF     ENDNUM             -0, DSPCOUNT = CRITCON
 0438   REF   1               40,2256  0 2312 0            TC      MORNUM             - , DSPCOUNT G/ CRITCON
 0439   REF   6  LAST  399    40,2257  3 6245 1  ENDNUM    CAF     THREE
 0440   REF   3  LAST  400    40,2260  7 1000 1            MASK    DECBRNCH
 0441   REF 106  LAST  400    40,2261  10 000 0            CCS     A
 0442   REF   2  LAST  400    40,2262  0 2265 1            TC      DECEND
 0443   REF   7  LAST  400    40,2263  4 0777 1  ENDALL    CS      DSPCOUNT           BLOCK NUMIN BY PLACING DSPCOUNT
 0444   REF   2  LAST  400    40,2264  0 2313 1            TC      MORNUM   +1        NEGATIVELY
 0445   REF  24  LAST  398    40,2265  4 4753 0  DECEND    CS      ONE
 0446   REF   5  LAST  400    40,2266  6 0137 1            AD      INREL
 0447                         40,2267  0 0006 1            EXTEND
 0448   REF   1               40,2270  6 2263 1            BZMF    ENDALL             IF INREL=0,1(VBREG,NNREG), LEAVE WHOLE
 0449   REF   1               40,2271  0 7103 1            TC      DMP                IF INREL=2,3,4(R1,R2,R3),CONVERT TO FRAC
A0450                                                                                 MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
 0451   REF   1               40,2272   02322 0            ADRES   DECON              2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
 0452   REF   7  LAST  400    40,2273  3 6245 1            CAF     THREE              IN MPAC, +1, +2.
 0453   REF   4  LAST  400    40,2274  7 1000 1            MASK    DECBRNCH
 0454   REF 107  LAST  400    40,2275  50 000 1            INDEX   A
 0455                         40,2276  0 2276 0            TC      +0
 0456   REF   1               40,2277  0 2303 0            TC      +DECSGN
 0457                           40,2300  0 0006 1            EXTEND                     - CASE
 0458  REF  81  LAST  400       40,2301  4 0156 1            DCS      MPAC      +1
 0459  REF  82  LAST  401       40,2302  52 156 1            DXCH     MPAC      +1
 0460  REF  83  LAST  401       40,2303  56 156 0  +DECSGN   XCH      MPAC      +2
 0461  REF   6  LAST  400       40,2304  50 137 1            INDEX    INREL
 0462  REF   1                  40,2305  55*004 0            TS       XREGLP    -2
 0463  REF  84  LAST  401       40,2306  56 155 0            XCH      MPAC      +1
 0464  REF   7  LAST  401       40,2307  50 137 1            INDEX    INREL
 0465  REF   5  LAST  400       40,2310  55*001 0            TS       VERBREG
 0466  REF   2  LAST  400       40,2311  0 2263 1            TC       ENDALL
 0467  REF   8  LAST  400       40,2312  10 777 1  MORNUM    CCS      DSPCOUNT              DECREMENT DSPCOUNT
 0468  REF   9  LAST  401       40,2313  54 777 1            TS       DSPCOUNT
 0469  REF  40  LAST  399       40,2314  0 5155 0            TC       ENDOFJOB

 0470                           40,2315   00022 1  CRITCON   OCT      22                    (DEC 18)
 0471                           40,2316   00020 0            OCT      20                    (DEC 16)
 0472                           40,2317   00012 1            OCT      12                    (DEC 10)
 0473                           40,2320   00005 1            OCT      5
 0474                           40,2321   00000 1            OCT      0

 0475                           40,2322   05174 0  DECON     2DEC     E-5 B14               2EXP14/10EXP5 = .16384 DEC
 0475                           40,2323   13261 0


R0476       GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0477       PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

 0478  REF  10  LAST  401       40,2324  50 777 0  GETINREL  INDEX    DSPCOUNT
 0479  REF   1                  40,2325  3 2330 0            CAF      INRELTAB
 0480  REF   8  LAST  401       40,2326  54 137 0            TS       INREL                 (A TEMP, REG)
 0481  REF  43  LAST  381       40,2327  0 0002 0            TC       Q

 0482                           40,2330   00004 0  INRELTAB  OCT      4                     R3D5 (DSPCOUNT = 0)
 0483                           40,2331   00004 0            OCT      4                     R3D4            =(1)
 0484                           40,2332   00004 0            OCT      4                     R3D3            =(2)
 0485                           40,2333   00004 0            OCT      4                     R3D2            =(3)
 0486                           40,2334   00004 0            OCT      4                     R3D1            =(4)
 0487                           40,2335   00003 1            OCT      3                     R2D5            =(5)
 0488                           40,2336   00003 1            OCT      3                     R2D4            =(6)
 0489                           40,2337   00003 1            OCT      3                     R2D3            =(7)
 0490                           40,2340   00003 1            OCT      3                     R2D2            =(8D)
 0491                           40,2341   00003 1            OCT      3                     R2D1            =(9D)
 0492                           40,2342   00002 0            OCT      2                     R1D5            =(10D)
 0493                           40,2343   00002 0            OCT      2                     R1D4            =(11D)
 0494                           40,2344   00002 0            OCT      2                     R1D3            =(12D)
 0495                           40,2345   00002 0            OCT      2                     R1D2            =(13D)
 0496                           40,2346   00002 0            OCT      2                     R1D1            =(14D)
 0497  REF   2  LAST  376       40,2347  0 5705 0            TC       CCSHOLE               NO DSPCOUNT NUMBER = 15D
 0498                           40,2350   00001 0            OCT      1                     ND2             =(16D)
 0499                           40,2351   00001 0            OCT      1                     ND1             =(17D)
 0500                         40,2352   00000 1            OCT     0               VD2            =(18D)
 0501                         40,2353   00000 1            OCT     0               VD1            =(19D)


 0502   REF  58  LAST  400    40,2354   3 4755 1  VERB     CAF     ZERO
 0503   REF   6  LAST  401    40,2355   55'001 0           TS      VERBREG
 0504   REF   2  LAST  222    40,2356   3 4360 0           CAF     VD1
 0505   REF  11  LAST  401    40,2357   54 777 1  NVCOM    TS      DSPCOUNT
 0506   REF   1               40,2360   0 2601 1           TC      2BLANK
 0507   REF  25  LAST  400    40,2361   3 4753 1           CAF     ONE
 0508   REF   5  LAST  400    40,2362   55'000 1           TS      DECBRNCH        SET FOR DEC V/N CODE
 0509   REF  59  LAST  402    40,2363   3 4755 1           CAF     ZERO
 0510   REF   2  LAST  222    40,2364   55'013 0           TS      REQRET          SET FOR ENTPASO
 0511   REF   1               40,2365   3 4217 1           CAF     ENDINST         IF DSPALARM OCCURS BEFORE FIRST ENTPASO
 0512   REF   1               40,2366   54 136 1           TS      ENTRET          OR NVSUB, ENTRET MUST ALREADY BE SET
A0513                                                                              TO TC ENDOFJOB
 0514   REF  41  LAST  401    40,2367   0 5155 0           TC      ENDOFJOB
 0515   REF  60  LAST  402    40,2370   3 4755 1  NOUN     CAF     ZERO
 0516   REF   7  LAST  304    40,2371   55'002 0           TS      NOUNREG
 0517   REF   2  LAST  381    40,2372   3 4361 1           CAF     ND1             ND1, OCT 21 (DEC 17)
 0518   REF   1               40,2373   0 2357 1           TC      NVCOM


 0519   REF   1               40,2374   0 2446 0  NEGSGN   TC      SIGNTEST
 0520   REF   1               40,2375   0 2433 1           TC      -ON
 0521   REF  17  LAST  375    40,2376   3 4752 0           CAF     TWO
 0522   REF   9  LAST  401    40,2377   50 137 1  BOTHSGN  INDEX   INREL           SET DEC COMP BIT TO 1 (IN DECBRNCH)
 0523   REF  18  LAST  191    40,2400   6 4745 0           AD      BIT7            BIT 5 FOR R1,  BIT 4 FOR R2,
 0524   REF   6  LAST  402    40,2401   27'000 1           ADS     DECBRNCH        BIT 3 FOR R3.
 0525   REF   4  LAST  399    40,2402   11'015 0  FIXCLPAS CCS     CLPASS          IF CLPASS IS + OR +0, MAKE IT +0.
 0526   REF  61  LAST  402    40,2403   3 4755 1           CAF     ZERO
 0527   REF   5  LAST  402    40,2404   55'015 0           TS      CLPASS
 0528                         40,2405   0 2406 1           TC      +1
 0529   REF  42  LAST  402    40,2406   0 5155 0           TC      ENDOFJOB

 0530   REF   2  LAST  402    40,2407   0 2446 0  POSGN    TC      SIGNTEST
 0531   REF   1               40,2410   0 2413 0           TC      +ON
 0532   REF  26  LAST  402    40,2411   3 4753 1           CAF     ONE
 0533   REF   1               40,2412   0 2377 0           TC      BOTHSGN

 0534   REF  44  LAST  401    40,2413   22 002 0  +ON      LXCH    Q
 0535   REF   2  LAST  399    40,2414   0 2324 0           TC      GETINREL
 0536   REF  10  LAST  402    40,2415   50 137 1           INDEX   INREL
 0537   REF   1               40,2416   3 2441 1           CAF     SGNTAB  -2
 0538   REF   1               40,2417   54 123 0           TS      SGNOFF
 0539   REF  27  LAST  402    40,2420   6 4753 1           AD      ONE
 0540   REF   1               40,2421   54 122 1           TS      SGNON
 0541   REF  62  LAST  402    40,2422   3 4755 1  SGNCOM   CAF     ZERO
 0542   REF   2  LAST  3      40,2423   54 124 1           TS      CODE
 0543   REF   2  LAST  402    40,2424   56 123 1           XCH     SGNOFF
 0544   REF    1                40,2425  0 3404 1               TC       11DSPIN
 0545   REF   13  LAST  372     40,2426  3 4741 1               CAF      BIT11
 0546   REF    3  LAST  402     40,2427  54 124 1               TS       CODE
 0547   REF    2  LAST  402     40,2430  56 122 0               XCH      SGNON
 0548   REF    2  LAST  403     40,2431  0 3404 1               TC       11DSPIN
 0549   REF   43  LAST  381     40,2432  0 0001 0               TC       L
 0550   REF   45  LAST  402     40,2433  22 002 0   -ON         LXCH     Q
 0551   REF    3  LAST  402     40,2434  0 2324 0               TC       GETINREL
 0552   REF   11  LAST  402     40,2435  50 137 1               INDEX    INREL
 0553   REF    2  LAST  402     40,2436  3 2441 1               CAF      SGNTAB   -2
 0554   REF    3  LAST  403     40,2437  54 122 1               TS       SGNON
 0555   REF   28  LAST  402     40,2440  6 4753 1               AD       ONE
 0556   REF    3  LAST  402     40,2441  54 123 0               TS       SGNOFF
 0557   REF    1                40,2442  0 2422 1               TC       SGNCOM

 0558                           40,2443   00005 1   SGNTAB      OCT      5                 -R1
 0559                           40,2444   00003 1               OCT      3                 -R2
 0560                           40,2445   00000 1               OCT      0                 -R3


 0561   REF   46  LAST  403     40,2446  22 002 0   SIGNTEST    LXCH     Q                 ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
 0562   REF    8  LAST  400     40,2447  3 6245 1               CAF      THREE             R2D1, OR R3D1. ALLOWS ONLY FIRST OF
 0563   REF    7  LAST  402     40,2450  7 1000 1               MASK     DECBRNCH          CONSECUTIVE +/- CHARACTERS.
 0564   REF  108  LAST  400     40,2451  10 000 0               CCS      A                 IF LOW2 BITS OF DECBRNCH NOT= 0, SIGN
 0565   REF   43  LAST  402     40,2452  0 5155 0               TC       ENDOFJOB          FOR THIS WORD ALREADY IN. REJECT.
 0566   REF    1                40,2453  4 4317 1               CS       R1D1
 0567   REF    1                40,2454  0 2462 0               TC       SGNTST1
 0568   REF    1                40,2455  4 4320 0               CS       R2D1
 0569   REF    2  LAST  403     40,2456  0 2462 0               TC       SGNTST1
 0570   REF    1                40,2457  4 4321 1               CS       R3D1
 0571   REF    3  LAST  403     40,2460  0 2462 0               TC       SGNTST1
 0572   REF   44  LAST  403     40,2461  0 5155 0               TC       ENDOFJOB          NO MATCH FOUND. SIGN ILLEGAL
 0573   REF   12  LAST  402     40,2462  6 0777 0   SGNTST1     AD       DSPCOUNT
 0574                           40,2463  0 0006 1               EXTEND
 0575                           40,2464  1 2466 0               BZF      +2                MATCH FOUND
 0576   REF   47  LAST  403     40,2465  0 0002 0               TC       Q
 0577   REF   44  LAST  403     40,2466  0 0001 0               TC       L                 SIGN LEGAL

R0578   CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0579   NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0580   L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0581   THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0582   APPROPRIATE TO BE CLEARED.

R0583   CLPASS    +0   PASS0, CAN BE BACKED UP
R0584             +NZ  HIPASS, CAN BE BACKED UP
R0585             -NZ  PASS0, CANNOT BE BACKED UP
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L         PINBALL GAME  BUTTONS AND LIGHTS                                                USER'S PAGE NO.  15        EO S4

 0586    REF  13   LAST  403    40,2467   10 777 1  CLEAR     CCS      DSPCOUNT
 0587    REF  29   LAST  403    40,2470   6 4753 1            AD       ONE
 0588                           40,2471   0 2473 0            TC       +2
 0589    REF  30   LAST  404    40,2472   6 4753 1            AD       ONE
 0590    REF 109   LAST  403    40,2473   50 000 1            INDEX    A                   DO NOT CHANGE DSPCOUNT BECAUSE MAY LATER
 0591    REF   2   LAST  401    40,2474   3 2330 0            CAF      INRELTAB            FAIL LEGALTST.
 0592    REF  12   LAST  403    40,2475   54 137 0            TS       INREL               MUST SET INREL, EVEN FOR HIPASS.
 0593    REF   6   LAST  402    40,2476   11'015 0            CCS      CLPASS
 0594    REF   1                40,2477   0 2505 0            TC       CLPASHI             +
 0595                           40,2500   0 2502 1            TC       +2                  +0    IF CLPASS IS +0 OR -, IT IS PASSO
 0596                           40,2501   0 2502 1            TC       +1                  -
 0597    REF  13   LAST  404    40,2502   3 0137 1            CA       INREL
 0598    REF   1                40,2503   0 2527 0            TC       LEGALTST
 0599    REF   1                40,2504   0 2522 0            TC       CLEAR1
 0600    REF  14   LAST  404    40,2505   10 137 0  CLPASHI   CCS      INREL
 0601    REF  15   LAST  404    40,2506   54 137 0            TS       INREL
 0602    REF   2   LAST  404    40,2507   0 2527 0            TC       LEGALTST
 0603    REF   1                40,2510   3 2577 0            CAF      DOUBLK +2           +3 TO - NUMBER. BACKS DATA REQUESTS.
 0604    REF   3   LAST  402    40,2511   27'013 0            ADS      REQRET
 0605    REF  16   LAST  404    40,2512   3 0137 1            CA       INREL
 0606    REF   1                40,2513   54 125 0            TS       MIXTEMP             TEMP STORAGE FOR INREL
 0607                           40,2514   0 0006 1            EXTEND
 0608    REF   7   LAST  402    40,2515   27'001 0            DIM      VERBREG             DECREMENT VERB AND RE-DISPLAY
 0609    REF  75   LAST  388    40,2516   0 4616 1            TC       BANKCALL
 0610    REF   1                40,2517    62340 1            CADR     UPDATVB
 0611    REF   2   LAST  404    40,2520   3 0125 1            CA       MIXTEMP
 0612    REF  17   LAST  404    40,2521   54 137 0            TS       INREL               RESTORE INREL
 0613    REF   1                40,2522   0 2525 1  CLEAR1    TC       CLR5
 0614    REF   7   LAST  404    40,2523   25'015 1            INCR     CLPASS              ONLY IF CLPASS IS + OR +0,
 0615    REF  45   LAST  403    40,2524   0 5155 0            TC       ENDOFJOB            SET FOR HIGHER PASS.
 0616    REF  48   LAST  403    40,2525   22 002 0  CLR5      LXCH     Q                   USES 5BLANK  BUT AVOIDS ITS TC GETINREL
 0617    REF   1                40,2526   0 2540 1            TC       5BLANK  +2
 0618    REF   2   LAST  230    40,2527   6 7746 0  LEGALTST  AD       NEG2
 0619    REF 110   LAST  404    40,2530   10 000 0            CCS      A
 0620    REF  49   LAST  404    40,2531   0 0002 0            TC       Q                   LEGAL  INREL G/ 2
 0621    REF   3   LAST  401    40,2532   0 5705 0            TC       CCSHOLE
 0622    REF  46   LAST  404    40,2533   0 5155 0            TC       ENDOFJOB            ILLEGAL    INREL= 0,1
 0623    REF  50   LAST  404    40,2534   0 0002 0            TC       Q                   LEGAL     INREL = 2

R0624    5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0625    YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0626    DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

 0627    REF  14   LAST  404    40,2535   54 777 1            TS       DSPCOUNT            NEEDED FOR BLANKSUB
 0628    REF  51   LAST  404    40,2536   22 002 0  5BLANK    LXCH     Q
 0629    REF   4   LAST  403    40,2537   0 2324 0            TC       GETINREL
 0630    REF  63   LAST  402    40,2540   3 4755 1            CAF      ZERO
 0631    REF  18   LAST  404    40,2541   50 137 1            INDEX    INREL
 0632    REF   8   LAST  404    40,2542   55'001 0            TS       VERBREG             ZERO X, Y, Z REG.
 0633   REF  19  LAST  404    40,2543  50 137 1                INDEX  INREL
 0634   REF   2  LAST  401    40,2544  55'004 0                TS     XREGLP   -2
 0635   REF   4  LAST  403    40,2545  54 124 1                TS     CODE
 0636   REF  20  LAST  405    40,2546  50 137 1                INDEX  INREL                ZERO PERTINENT DEC COMP BIT.
 0637   REF  19  LAST  402    40,2547  4 4745 1                CS     BIT7                 PROTECT OTHERS
 0638   REF   8  LAST  403    40,2550  7 1000 1                MASK   DECBRNCH
 0639   REF   1               40,2551  7 2600 1                MASK   BRNCHCON             ZERO LOW 2 BITS.
 0640   REF   9  LAST  405    40,2552  55'000 1                TS     DECBRNCH
 0641   REF  21  LAST  405    40,2553  50 137 1                INDEX  INREL
 0642   REF   1               40,2554  3 2570 1                CAF    SINBLANK -2          BLANK ISOLATED CHAR SEPARATELY
 0643   REF   2  LAST  399    40,2555  54 143 0                TS     COUNT
 0644   REF   2  LAST  399    40,2556  0 3322 1                TC     DSPIN
 0645   REF  22  LAST  405    40,2557  50 137 1  5BLANK1       INDEX  INREL
 0646   REF   2  LAST  404    40,2560  3 2573 1                CAF    DOUBLK   -2
 0647   REF  15  LAST  404    40,2561  54 777 1                TS     DSPCOUNT
 0648   REF   2  LAST  402    40,2562  0 2601 1                TC     2BLANK
 0649   REF   1  LAST  402    40,2563  4 4752 1                CS     TWO
 0650   REF  16  LAST  405    40,2564  26 777 1                ADS    DSPCOUNT
 0651   REF   3  LAST  405    40,2565  0 2601 1                TC     2BLANK
 0652   REF  23  LAST  405    40,2566  50 137 1                INDEX  INREL
 0653   REF   2  LAST  403    40,2567  3 4315 1                CAF    R1D1     -2
 0654   REF  17  LAST  405    40,2570  54 777 1                TS     DSPCOUNT             SET DSPCOUNT TO LEFT MOST DSP NUMBER
 0655   REF  45  LAST  403    40,2571  0 0001 0                TC     L                    OF REG. JUST BLANKED

 0656                         40,2572   00016 0  SINBLANK OCT    16                   DEC 14
 0657                         40,2573   00005 1           OCT    5
 0658                         40,2574   00004 0           OCT    4
 0659                         40,2575   00015 0  DOUBLK   OCT    15                   DEC 13
 0660                         40,2576   00011 1           OCT    11                   DEC 9
 0661                         40,2577   00003 1           OCT    3

 0662                         40,2600   77774 0  BRNCHCON OCT    77774

R0663   2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR  OF THE PAIR INTO
R0664   DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

 0665   REF  18  LAST  405    40,2601  3 0777 0  2BLANK   CA     DSPCOUNT
 0666   REF   1               40,2602  54 021 0           TS     SR
 0667   REF   1               40,2603  4 2614 1           CS     BLANKCON
 0668                         40,2604  0 0004 0           INHINT
 0669   REF   2  LAST  405    40,2605  50 021 1           INDEX  SR
 0670   REF  23  LAST  221    40,2606  57'023 1           XCH    DSPTAB
 0671                         40,2607  0 0006 1           EXTEND
 0672                         40,2610  6 2612 0           BZMF   +2                   IF OLD CONTENTS -, NOUT OK
 0673   REF   6  LAST  222    40,2611  25'016 1           INCR   NOUT                 IF OLD CONTENTS +, +1 TO NOUT
 0674                         40,2612  0 0003 1           RELINT                      IF -,NOUT OK
 0675   REF  52  LAST  404    40,2613  0 0002 0           TC     Q
 0676                         40,2614   04000 0  BLANKCON OCT    4000
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P0677   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0678   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0679   PASSES.


R0680   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0681   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0682   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).


 0683                          41,2000                         BANK     41
 068301 REF    1               41,2000                         SETLOC  PINBALL2
 068302                        41,2000                         BANK

 06835  REF    1                                               COUNT*  $$/PIN
 0684   REF    1               41,2000  0 3544 1  NVSUBB       TC      NVSUB1        STANDARD LEAD INS. DONT MOVE.
 0685   REF    1               41,2001  0 2775 0  LOADLV1      TC      LOADLV
A0686                                                                                END OF STANDARD LEAD INS.


 0687   REF   64  LAST  404    41,2002  3 4755 1  ENTER        CAF     ZERO
 0688   REF    8  LAST  404    41,2003  55'015 0               TS      CLPASS
 0689   REF    2  LAST  402    41,2004  3 4217 1               CAF     ENDINST
 0690   REF    2  LAST  402    41,2005  54 136 1               TS      ENTRET
 0691   REF    4  LAST  404    41,2006  11'013 0               CCS     REQRET
 0692   REF    1               41,2007  0 2035 0               TC      ENTPASO       IF +, PASS 0
 0693   REF    2  LAST  406    41,2010  0 2035 0               TC      ENTPASO       IF +, PASS 0
 0694                          41,2011  0 2012 0               TC      +1            IF -, NOT PASS 0
 0695   REF    1               41,2012  3 2033 0  ENTPASHI     CAF     MMADREF
 0696   REF    5  LAST  406    41,2013  6 1013 1               AD      REQRET        IF L/ 2 CHAR IN FOR MM CODE, ALARM
 0697                          41,2014  0 0006 1               EXTEND                AND RECYCLE(DECIDE AT MMCHANG+1).
 0698   REF    1               41,2015  1 2027 1               BZF     ACCEPTWD
 0699   REF    9  LAST  403    41,2016  3 6245 1               CAF     THREE         IF DEC, ALARM IF L/ 5 CHAR IN FOR DATA,
 0700   REF   10  LAST  405    41,2017  7 1000 1               MASK    DECBRNCH      BUT LEAVE REQRET - AND FLASH ON, SO
 0701   REF  111  LAST  404    41,2020  10 000 0               CCS     A             OPERATOR CAN SUPPLY MISSING NUMERICAL
 0702                          41,2021  0 2023 1               TC      +2            CHARACTERS AND CONTINUE.
 0703   REF    2  LAST  406    41,2022  0 2027 0               TC      ACCEPTWD      OCTAL. ANY NUMBER OF CHAR OK.
 0704   REF   19  LAST  405    41,2023  10 777 1               CCS     DSPCOUNT
 0705   REF    1               41,2024  0 2351 1               TC      GODSPALM      LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0706   REF    2  LAST  406    41,2025  0 2351 1               TC      GODSPALM      LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0707                          41,2026  0 2027 0               TC      +1            5 CHAR IN (DSPCOUNT IS -)
 0708   REF    6  LAST  406    41,2027  4 1013 0  ACCEPTWD     CS      REQRET        5 CHAR IN (DSPCOUNT IS -)
 0709   REF    7  LAST  406    41,2030  55'013 0               TS      REQRET        SET REQRET +.
 0710   REF    2  LAST  274    41,2031  0 4433 1               TC      FLASHOFF
 0711   REF    8  LAST  406    41,2032  0 1013 1               TC      REQRET

 0712   REF    3  LAST  406       0136            ENTEXIT      =       ENTRET

 0713   REF    1               41,2033   03431 1  MMADREF      ADRES   MMCHANG +1    ASSUMES TC REQMM AT MMCHANG.
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0714                          41,2034   00034 0  LOWVERB  DEC      28               LOWER VERB THAT AVOIDS NOUN TEST.

0715   REF  65  LAST  406     41,2035   3 4755 1  ENTPASO  CAF      ZERO              NOUN VERB SUB ENTERS HERE
0716   REF  11  LAST  406     41,2036   55'000 1           TS       DECBRNCH
0717   REF   3  LAST  402     41,2037   4 4360 1           CS       VD1             BLOCK FURTHER NUM CHAR, SO THAT STRAY
0718   REF  20  LAST  406     41,2040   54 777 1           TS       DSPCOUNT        CHAR DO NOT GET INTO VERB OR NOUN LTS.
0719   REF   9  LAST  404     41,2041   4 1001 0  TESTVB   CS       VERBREG         IF VERB IS G/E LOWVB, SKIP NOUN TEST.
0720   REF   1                41,2042   55'041 1           TS       VERBSAVE        SAVE VERB FOR POSSIBLE RECYCLE.
0721   REF   1                41,2043   6 2034 1           AD       LOWVERB         LOWVERB - VB
0722                          41,2044   0 0006 1           EXTEND
0723   REF   1                41,2045   6 2133 1           BZMF     VERBFAN         VERB G/E LOWVERB
0724                          41,2046   0 0006 1  TESTNN   EXTEND                   VERB L/ LOWVERB
0725   REF   1                41,2047   3 2114 1           DCA      LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
0726   REF   3  LAST  305     41,2050   52 006 0           DXCH     Z               ROUTINE.
0727   REF   3  LAST  304     41,2051   50 140 1           INDEX    MIXBR
0728                          41,2052   0 2052 1           TC       +0
0729                          41,2053   0 2055 0           TC       +2              NORMAL
0730   REF   1                41,2054   0 2221 1           TC       MIXNOUN         MIXED
0731   REF   3  LAST  304     41,2055   10 146 0           CCS      NNADTEM         NORMAL
0732   REF   2  LAST  407     41,2056   0 2131 0           TC       VERBFAN -2            NORMAL IF +
0733   REF   3  LAST  406     41,2057   0 2351 1           TC       GODSPALM        NOT IN USE   IF +0
0734   REF   1                41,2060   0 2064 1           TC       REQADD          SPECIFY MACHINE CADR IF -
0735   REF   1                41,2061   25'017 0           INCR     NOUNCADR        AUGMENT MACHINE CADR IF -0
0736   REF   1                41,2062   0 4311 0           TC       SETNADD         ECADR FROM NOUNCADR. SETS EB, NOUNADD.
0737   REF   1                41,2063   0 2120 0           TC       INTMCTBS +2
0738   REF  20  LAST  293     41,2064   3 4735 1  REQADD   CAF      BIT15           SET CLPASS FOR PASSO ONLY
0739   REF   9  LAST  406     41,2065   55'015 0           TS       CLPASS
0740   REF   3  LAST  406     41,2066   4 4217 0           CS       ENDINST         TEST IF REACHED HERE FROM INTERNAL OR
0741   REF   1                41,2067   6 0136 0           AD       ENTEXIT                   FROM EXTERNAL
0742                          41,2070   0 0006 1           EXTEND
0743                          41,2071   1 2073 0           BZF      +2              EXTERNAL MACH CADR TO BE SPECIFIED
0744   REF   2  LAST  407     41,2072   0 2116 0           TC       INTMCTBS
0745   REF   1                41,2073   0 2307 1           TC       REQDATZ         EXTERNAL MACH CADR TO BE SPECIFIED
0746   REF  12  LAST  407     41,2074   11'000 1           CCS      DECBRNCH        ALARM AND RECYCLE IF DECIMAL USED
0747   REF   1                41,2075   0 4145 0           TC       ALMCYCLE        FOR MCTBS.
0748   REF   4  LAST  407     41,2076   4 4360 1           CS       VD1             OCTAL USED  OK
0749   REF  21  LAST  407     41,2077   54 777 1           TS       DSPCOUNT        BLOCK NUM CHAR IN
0750   REF   3  LAST  398     41,2100   11'042 1           CCS      CADRSTOR
0751                          41,2101   0 2104 0           TC       +3              EXTERNAL MCTBS DISPLAY WILL LEAVE FLASH
0752   REF   1                41,2102   0 2105 1           TC       USEADD          ON IF ENDIDLE NOT = +0.
0753                          41,2103   0 2104 0           TC       +1
0754   REF   1                41,2104   0 4427 1           TC       FLASHON
0755   REF   1                41,2105   57'005 0  USEADD   XCH      ZREG
0756   REF   1                41,2106   0 4303 0           TC       SETNCADR        ECADR INTO NOUNCADR. SET EB, NOUNADD.
0757                          41,2107   0 0006 1           EXTEND
0758   REF   2  LAST  407     41,2110   3 2114 1           DCA      LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
0759   REF   4  LAST  407     41,2111   52 006 0           DXCH     Z               ROUTINE.
0760   REF   3  LAST  407     41,2112   0 2133 1           TC       VERBFAN

0761   REF  22  LAST  407       0777                       EBANK=   DSPCOUNT
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 0762   REF    1               41,2113   02103 1  LODNNLOC 2CADR    LODNNTAB
 0762   REF    1               41,2114   64101 0

 0763                          41,2115   77772 0  NEG5     OCT      77772

 0764   REF   85  LAST  401    41,2116  3 0156 0  INTMCTBS CA       MPAC     +2        INTERNAL MACH CADR TO BE SPECIFIED.
 0765   REF    2  LAST  407    41,2117  0 4303 0           TC       SETNCADR           ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0766   REF    8  LAST  376    41,2120  4 4756 0           CS       FIVE               NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
 0767   REF   10  LAST  407    41,2121  6 1001 1           AD       VERBREG            CADR TO BE SPECIFIED.
 0768                          41,2122  0 0006 1           EXTEND
 0769   REF    4  LAST  407    41,2123  1 2133 0           BZF      VERBFAN            DONT DISPLAY CADR IF VB = 05.
 0770   REF    2  LAST  403    41,2124  3 4321 0           CAF      R3D1               VB NOT = 05. DISPLAY CADR.
 0771   REF   23  LAST  407    41,2125  54 777 1           TS       DSPCOUNT
 0772   REF    2  LAST  407    41,2126  3 1017 0           CA       NOUNCADR
 0773   REF    1               41,2127  0 3363 1           TC       DSPOCTWD
 0774   REF    5  LAST  408    41,2130  0 2133 1           TC       VERBFAN

 0775   REF   31  LAST  404    41,2131  6 4753 1           AD       ONE
 0776   REF    3  LAST  408    41,2132  0 4303 0           TC       SETNCADR           ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0777   REF    1               41,2133  4 2145 1  VERBFAN  CS       LST2CON
 0778   REF   11  LAST  408    41,2134  6 1001 1           AD       VERBREG            VERB-LST2CON
 0779   REF  112  LAST  406    41,2135  10 000 0           CCS      A
 0780   REF   32  LAST  408    41,2136  6 4753 1           AD       ONE                VERB G/ LST2CON
 0781                          41,2137  0 2141 1           TC       +2
 0782   REF    1               41,2140  0 2146 0           TC       VBFANDIF           VERB L/ LST2CON
 0783   REF   86  LAST  408    41,2141  54 154 0           TS       MPAC
 0784   REF    4  LAST  232    41,2142  0 4457 0           TC       RELDSP             RELEASE DISPLAY SYST
 0785   REF   19  LAST  399    41,2143  0 4635 0           TC       POSTJUMP           GO TO GOEXTVB WITH VB-40 IN MPAC.
 0786   REF    1               41,2144   66000 1           CADR     GOEXTVB
 0788                          41,2145   00050 1  LST2CON  DEC      40                 FIRST LIST2 VERB (EXTENDED VERB)

 0790   REF   12  LAST  408    41,2146  51'001 1  VBFANDIF INDEX    VERBREG
 0791   REF    1               41,2147  3 2151 0           CAF      VERBTAB
 0792   REF    2  LAST  271    41,2150  0 4640 1           TC       BANKJUMP

 0793   REF    4  LAST  407    41,2151   62351 1  VERBTAB  CADR     GODSPALM           VB00 ILLEGAL
 0794   REF    1               41,2152   62365 0           CADR     DSPA               VB01 DISPLAY OCT COMP 1 (R1)
 0795   REF    1               41,2153   62373 1           CADR     DSPB               VB02 DISPLAY OCT COMP 2 (R1)
 0796   REF    1               41,2154   62400 1           CADR     DSPC               VB03 DISPLAY OCT COMP 3 (R1)
 0797   REF    1               41,2155   62360 0           CADR     DSPAB              VB04 DISPLAY OCT COMP 1,2 (R1,R2)
 0798   REF    1               41,2156   62353 0           CADR     DSPABC             VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
 0799   REF    1               41,2157   62523 1           CADR     DECDSP             VB06 DECIMAL DISPLAY
 0800   REF    1               41,2160   60771 0           CADR     DSPDPDEC           VB07 DP DECIMAL DISPLAY (R1,R2)
 0801   REF    5  LAST  408    41,2161   62351 1           CADR     GODSPALM           VB08 SPARE
 0802   REF    6  LAST  408    41,2162   62351 1           CADR     GODSPALM           VB09 SPARE
 0803   REF    1               41,2163   61420 0           CADR     DSPALARM           VB10 SPARE
 0804   REF    1               41,2164   63230 0           CADR     MONITOR            VB11 MONITOR OCT COMP 1 (R1)
 0805   REF    2  LAST  408    41,2165   63230 0           CADR     MONITOR            VB12 MONITOR OCT COMP 2 (R1)
 0806   REF    3  LAST  408    41,2166   63230 0           CADR     MONITOR            VB13 MONITOR OCT COMP 3 (R1)
 0807   REF    4  LAST  408    41,2167   63230 0           CADR     MONITOR            VB14 MONITOR OCT COMP 1,2 (R1,R2)
 0808   REF   5  LAST  408   41,2170   63230 0               CADR    MONITOR      VB15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
 0809   REF   6  LAST  409   41,2171   63230 0               CADR    MONITOR      VB16 MONITOR DECIMAL
 0810   REF   7  LAST  409   41,2172   63230 0               CADR    MONITOR      VB17 MONITOR DP DEC  (R1,R2)
 0811   REF   7  LAST  408   41,2173   62351 1               CADR    GODSPALM     VB18 SPARE
 0812   REF   8  LAST  409   41,2174   62351 1               CADR    GODSPALM     VB19 SPARE
 0813   REF   9  LAST  409   41,2175   62351 1               CADR    GODSPALM     VB20 SPARE
 0814   REF   1              41,2176   62732 0               CADR    ALOAD        VB21 LOAD COMP 1 (R1)
 0815   REF   1              41,2177   62743 0               CADR    BLOAD        VB22 LOAD COMP 2 (R2)
 0816   REF   1              41,2200   62760 1               CADR    CLOAD        VB23 LOAD COMP 3 (R3)
 0817   REF   1              41,2201   62703 1               CADR    ABLOAD       VB24 LOAD COMP 1,2 (R1,R2)
 0818   REF   1              41,2202   62616 1               CADR    ABCLOAD      VB25 LOAD COMP 1,2,3 (R1,R2,R3)
 0819   REF  10  LAST  409   41,2203   62351 1               CADR    GODSPALM     VB26 SPARE
 0820   REF   1              41,2204   63353 1               CADR    DSPFMEM      VB27 FIXED MEMORY DISPLAY
A0821                                                                             THE FOLLOWING VERBS MAKE NO NOUN TEST
 0822   REF  11  LAST  409   41,2205   62351 1               CADR    GODSPALM     VB28 SPARE
 0823   REF  12  LAST  409   41,2206   62351 1               CADR    GODSPALM     VB29 SPARE
 0824   REF   1              41,2207   63466 0  REQEXLOC     CADR    VBRQEXEC     VB30 REQUEST EXECUTIVE
 0825   REF   1              41,2210   63512 1               CADR    VBRQWAIT     VB31 REQUEST WAITLIST
 0826   REF   1              41,2211   61457 0               CADR    VBRESEQ      VB32 RESEQUENCE
 0827   REF   1              41,2212   61442 1               CADR    VBPROC       VB33 PROCEED WITHOUT DATA
 0828   REF   1              41,2213   61450 1               CADR    VBTERM       VB34 TERMINATE CURRENT TEST OR LOAD REQ
 0829   REF   1              41,2214   63613 0               CADR    VBTSTLTS     VB35 TEST LIGHTS
 0830   REF   1              41,2215   12447 0               CADR    SLAP1        VB36 FRESH START
 0831   REF   2  LAST  406   41,2216   63430 0               CADR    MMCHANG      VB37 CHANGE MAJOR MODE
 0832   REF  13  LAST  409   41,2217   62351 1               CADR    GODSPALM     VB38 SPARE
 0833   REF  14  LAST  409   41,2220   62351 1               CADR    GODSPALM     VB39 SPARE

R0834   THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
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R0835    NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
R0836    TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
R0837    MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
R0838     MIXTEMP.

 0839    REF   4  LAST  407     41,2221  10 146 0  MIXNOUN   CCS      NNADTEM
 0840                           41,2222   0 2226 0           TC       +4                 +  IN USE
 0841    REF  15  LAST  409     41,2223   0 2351 1           TC       GODSPALM           +0  NOT IN USE
 0842                           41,2224   0 2226 0           TC       +2                 -  IN USE
 0843                           41,2225   0 2226 0           TC       +1                 -0  IN USE
 0844    REF  10  LAST  279     41,2226   4 6242 1           CS       SIX
 0845    REF  13  LAST  408     41,2227   6 1001 1           AD       VERBREG
 0846                           41,2230   0 0006 1           EXTEND
 0847                           41,2231   6 2233 1           BZMF     +2                 VERB L/E 6
 0848    REF   6  LAST  408     41,2232   0 2133 1           TC       VERBFAN            AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 0849    REF  19  LAST  405     41,2233   3 4752 0           CAF      TWO
 0850    REF   1                41,2234  54 117 1  MIXNN1    TS       DECOUNT
 0851    REF   1                41,2235   6 2260 1           AD       MIXAD
 0852    REF   1                41,2236  54 145 0           TS       NOUNADD            SET NOUNADD TO MIXTEMP + K
 0853    REF   2  LAST  410     41,2237  50 117 0           INDEX    DECOUNT            GET IDADDTAB ENTRY FOR COMPONENT K
 0854    REF   2  LAST  304     41,2240   3 0150 0           CA       IDAD1TEM           OF NOUN.
 0855    REF   1                41,2241  54 122 1           TS       NOUNTEM
A0856                                                                                    TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
A0857                                                                                      MINOR PART ONLY.
 0858    REF   1                41,2242   0 3034 0           TC       SFRUTMIX           GET SF ROUT NUMBER IN A
 0859    REF   1                41,2243   0 2261 0           TC       DPTEST
 0860    REF   1                41,2244   0 2246 0           TC       MIXNN2             NO DP
 0861    REF   2  LAST  410     41,2245  24 122 0           INCR     NOUNTEM            DP  GET MINOR PART
 0862    REF   3  LAST  410     41,2246   3 0122 0  MIXNN2    CA       NOUNTEM
 0863    REF   3  LAST  157     41,2247   7 4356 1           MASK     LOW11              ESUBK (NO DP)  OR (ESUBK)+1     FOR DP
 0864    REF   1                41,2250   0 4313 1           TC       SETEBANK           SET EBANK, LEAVE EADRES IN A.
 0865    REF 113  LAST  408     41,2251  50 000 1           INDEX    A                  PICK UP C(ESUBK)  NOT DP
 0866                           41,2252   3 0000 1           CA       0                  OR C((ESUBK)+1)  FOR DP MINOR PART
 0867    REF   2  LAST  410     41,2253  50 145 1           INDEX    NOUNADD
 0868                           41,2254  56 000 1           XCH      0                  STORE IN MIXTEM + K
 0869    REF   3  LAST  410     41,2255  10 117 1           CCS      DECOUNT
 0870    REF   1                41,2256   0 2234 0           TC       MIXNN1
 0871    REF   7  LAST  410     41,2257   0 2133 1           TC       VERBFAN

 0872    REF   3  LAST  404     41,2260   0 0125 1  MIXAD     TC       MIXTEMP


R0873    DPTEST    ENTER WITH SF ROUT NUMBER IN A.
R0874              RETURNS TO L+1 IF NO DP.
R0875              RETURNS TO L+2 IF DP.

 0876    REF 114  LAST  410     41,2261  50 000 1  DPTEST    INDEX    A
 0877                           41,2262   1 2263 0           TCF      +1
 0878    REF  53  LAST  405     41,2263   0 0002 0           TC       Q                  OCTAL ONLY  NO DP
 0879    REF  54  LAST  410     41,2264   0 0002 0           TC       Q                  FRACT NO DP
 0880    REF   55  LAST  410    41,2265  0 0002 0              TC        Q                 DEG   NO DP
 0881    REF   56  LAST  411    41,2266  0 0002 0              TC        Q                 ARITH  NO DP
 0882    REF    1               41,2267  1 2301 0              TCF       DPTEST1           DP1OUT
 0883    REF    2  LAST  411    41,2270  1 2301 0              TCF       DPTEST1           DP2OUT
 0884    REF   57  LAST  411    41,2271  0 0002 0              TC        Q                 LRPOSOUT  NO DP (DATA IN CHANNEL 33)
 0885    REF    3  LAST  411    41,2272  1 2301 0              TCF       DPTEST1           DP3OUT
 0886    REF   58  LAST  411    41,2273  0 0002 0              TC        Q                 HMS    NO DP
 0887    REF   59  LAST  411    41,2274  0 0002 0              TC        Q                 M/S    NO DP
 0888    REF    4  LAST  411    41,2275  1 2301 0              TCF       DPTEST1           DP4OUT
 08881   REF   60  LAST  411    41,2276  0 0002 0              TC        Q                 ARITH1    NO DP
 08882   REF   61  LAST  411    41,2277  0 0002 0              TC        Q                 2INTOUT   NO DP TO GET HI PART IN MPAC
 08883   REF   62  LAST  411    41,2300  0 0002 0              TC        Q                 360-CDU    NO DP
 0889    REF   63  LAST  411    41,2301 50 0002 0  DPTEST1     INDEX     Q
 0890                           41,2302  0 0001 0              TC        1                 RETURN TO L+2


 0891    REF    3  LAST  405    41,2303  3 4317 0  REQDATX     CAF       R1D1
 0892    REF    1               41,2304  1 2310 0              TCF       REQCOM
 0893    REF    2  LAST  403    41,2305  3 4320 1  REQDATY     CAF       R2D1
 0894    REF    2  LAST  411    41,2306  1 2310 0              TCF       REQCOM
 0895    REF    3  LAST  408    41,2307  3 4321 0  REQDATZ     CAF       R3D1
 0896    REF   24  LAST  408    41,2310 54  777 1  REQCOM      TS        DSPCOUNT
 0897    REF   64  LAST  411    41,2311  4 0002 1              CS        Q
 0898    REF    9  LAST  406    41,2312 55'013 0               TS        REQRET
 0899    REF   76  LAST  404    41,2313  0 4616 1              TC        BANKCALL
 0900    REF    2  LAST  404    41,2314   60536 1              CADR      5BLANK
 0901    REF    2  LAST  407    41,2315  0 4427 1              TC        FLASHON
 0902    REF    2  LAST  407    41,2316  0 6136 0  ENDRQDAT    TC        ENTEXIT

 0903    REF    8  LAST  402    41,2317 55'002 0               TS        NOUNREG
 0904    REF   65  LAST  411    41,2320 56  002 0  UPDATNN     XCH       Q
 0905    REF    1               41,2321 54  117 1              TS        UPDATRET
 0906                           41,2322  0 0006 1              EXTEND
 0907    REF    3  LAST  407    41,2323  3 2114 1              DCA       LODNNLOC          SWITCH BANKS TO NOUN TABLE READING
 0908    REF    5  LAST  407    41,2324 52  006 0              DXCH      Z                 ROUTINE.
 0909    REF    5  LAST  410    41,2325 10  146 0              CCS       NNADTEM
 0910    REF   33  LAST  408    41,2326  6 4753 1              AD        ONE               NORMAL
 0911    REF    1               41,2327  1 2332 0              TCF       PUTADD
 0912    REF    2  LAST  411    41,2330  1 2333 1              TCF       PUTADD   +1       MCTBS   DONT CHANGE NOUNADD
 0913    REF    3  LAST  411    41,2331  1 2333 1              TCF       PUTADD   +1       MCTBI   DONT CHANGE NOUNADD
 0914    REF    4  LAST  408    41,2332  0 4303 0  PUTADD      TC        SETNCADR          ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0915    REF    3  LAST  402    41,2333  3 4361 1              CAF       ND1
 0916    REF   25  LAST  411    41,2334 54  777 1              TS        DSPCOUNT
 0917    REF    9  LAST  411    41,2335  3 1002 1              CA        NOUNREG
 0918    REF    1               41,2336  1 2345 0              TCF       UPDAT1

 0919    REF   14  LAST  410    41,2337 55'001 0               TS        VERBREG
 0920    REF   66  LAST  411    41,2340 56  002 0  UPDATVB     XCH       Q
 0921    REF    2  LAST  411    41,2341 54  117 1              TS        UPDATRET
 0922    REF    5  LAST  407    41,2342  3 4360 0              CAF       VD1
 0923   REF  26  LAST  411   41,2343  54 777 1            TS      DSPCOUNT
 0924   REF  15  LAST  411   41,2344  3 1001 1            CA      VERBREG
 0925   REF  19  LAST  408   41,2345  0 4635 0  UPDATVB   TC      POSTJUMP          CANT USE SWCALL TO GO TO DSPDECVN,SINCE
 0926   REF   1              41,2346   61317 0            CADR    GOVNUPDT          UPDATVB CAN ITSELF BE CALLED BY SWCALL.
 0927   REF   3  LAST  411   41,2347  0 0117 0            TC      UPDATRET

 0928   REF   2  LAST  407   41,2350  0 4145 0  GOALMCYC  TC      ALMCYCLE          NEEDED BECAUSE BANKJUMP CANT HANDLE F/F.

 0929   REF  20  LAST  412   41,2351  0 4635 0  GODSPALM  TC      POSTJUMP
 0930   REF   2  LAST  408   41,2352   61420 0            CADR    DSPALARM
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R0931              NOUN   TABLES
R0932   NOUN CODE L/40, NORMAL NOUN CASE.  NOUN CODE G/E 40, MIXED NOUN CASE.
R0933   FOR NORMAL CASE, NNADTAB CONTAINS ONE          ECADR      FOR EACH NOUN.
R0934   +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0935   BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R0936   OF LAST MACHINE CADR SUPPLIED.

R0937   FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0938   10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0939   NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0940   FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0941                         N-S ARE THE SF ROUTINE CODE NUMBER.
R0942                         P-S ARE THE SF CONSTANT CODE NUMBER.

R0943   MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER      3 COMPONENT CASE
R0944              N-S ARE THE SF CONSTANT2 CODE NUMBER
R0945              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0946              N-S ARE THE SF CONSTANT2 CODE NUMBER      2 COMPONENT CASE
R0947              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0948              P-S ARE THE SF CONSTANT1 CODE NUMBER       1 COMPONENT CASE

R0949   THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0950   EACH ENTRY CONTAINS ONE ECADR.    IDADDREL IS THE RELATIVE ADDRESS OF
R0951   THE FIRST OF THESE ENTRIES.
R0952   THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0953   THEY ARE LISTED IN ORDER OF ASCENDING K.

R0954   THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0955   CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0956          QQQQQRRRRRSSSSS
R0957   Q-S ARE THE SF ROUTINE 3 CODE NUMBER      3 COMPONENT CASE
R0958   R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0959   S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0960   R-S ARE THE SF ROUTINE 2 CODE NUMBER      2 COMPONENT CASE
R0961   S-S ARE THE SF ROUTINE 1 CODE NUMBER


R0962   IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0963   COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0964   (ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 3 COMPONENT.)


R0967   IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0968   COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.

R0969   IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0970   BEFORE EACH ENTER. IF NOT, ALARM.
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P0971                   DISPLAY  VERBS
 0972   REF  20  LAST  410    41,2353  4 4752 1  DSPABC     CS     TWO
 0973   REF   1               41,2354  0 2424 1             TC     COMPTEST
 0974   REF   3  LAST  410    41,2355  50 145 1             INDEX  NOUNADD
 0975                         41,2356  4 0002 1             CS     2
 0976   REF  41  LAST  336    41,2357  56 132 1             XCH    BUF         +2
 0977   REF  34  LAST  411    41,2360  4 4753 0  DSPAB      CS     ONE
 0978   REF   2  LAST  414    41,2361  0 2424 1             TC     COMPTEST
 0979   REF   4  LAST  414    41,2362  50 145 1             INDEX  NOUNADD
 0980                         41,2363  4 0001 1             CS     1
 0981   REF  42  LAST  414    41,2364  56 131 1             XCH    BUF         +1
 0982   REF   1               41,2365  0 2443 0  DSPA       TC     DECTEST
 0983   REF   1               41,2366  0 2466 1             TC     TSTFORDP
 0984   REF   5  LAST  414    41,2367  50 145 1             INDEX  NOUNADD
 0985                         41,2370  4 0000 0             CS     0
 0986   REF  43  LAST  414    41,2371  56 130 0  DSPCOM1    XCH    BUF
 0987   REF   1               41,2372  0 2405 1             TC     DSPCOM2
 0988   REF  35  LAST  414    41,2373  4 4753 0  DSPB       CS     ONE
 0989   REF   1               41,2374  0 2437 0             TC     DCOMPTST
 0990   REF   6  LAST  414    41,2375  50 145 1             INDEX  NOUNADD
 0991                         41,2376  4 0001 1             CS     1
 0992   REF   1               41,2377  0 2371 0             TC     DSPCOM1
 0993   REF  21  LAST  414    41,2400  4 4752 1  DSPC       CS     TWO
 0994   REF   2  LAST  414    41,2401  0 2437 0             TC     DCOMPTST
 0995   REF   7  LAST  414    41,2402  50 145 1             INDEX  NOUNADD
 0996                         41,2403  4 0002 1             CS     2
 0997   REF   2  LAST  414    41,2404  0 2371 0             TC     DSPCOM1
 0998   REF  22  LAST  414    41,2405  4 4752 1  DSPCOM2    CS     TWO               A   B   C   AB  ABC
 0999   REF  16  LAST  412    41,2406  6 1001 1             AD     VERBREG           -1  -0  +1  +2  +3    IN A
 1000   REF 115  LAST  410    41,2407  10 000 0             CCS    A                 +0  +0  +0  +1  +2     IN A AFTER CCS
 1001   REF   1               41,2410  0 2413 0             TC     DSPCOM3
 1002   REF   3  LAST  411    41,2411  0 0136 0             TC     ENTEXIT
 1003                         41,2412  0 2413 0             TC     +1
 1004   REF   1               41,2413  54 122 1  DSPCOM3    TS     DISTEM            +0,+1,+2 INTO DISTEM
 1005   REF 116  LAST  414    41,2414  50 000 1             INDEX  A
 1006   REF   4  LAST  411    41,2415  3 4317 0             CAF    FID1
 1007   REF  27  LAST  412    41,2416  54 777 1             TS     DSPCOUNT
 1008   REF   2  LAST  414    41,2417  50 122 0             INDEX  DISTEM
 1009   REF  44  LAST  414    41,2420  4 0130 1             CS     BUF
 1010   REF   2  LAST  408    41,2421  0 3363 1             TC     DSPOCTWD
 1011   REF   3  LAST  414    41,2422  56 122 0             XCH    DISTEM
 1012   REF   2  LAST  414    41,2423  0 2407 0             TC     DSPCOM2 +2

P1013   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
P1014   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
 1016   REF   4  LAST  305    41,2424  54 123 0  COMPTEST   TS     SFTEMP1           - VERB COMP
 1017   REF  67  LAST  411    41,2425  22 002 0             LXCH   Q
 1022   REF   1               41,2426  0 2515 1  COMPTST1   TC     GETCOMP
 1023   REF   1               41,2427  0 4331 1             TC     LEFT5
 1024   REF  10  LAST  406    41,2430  7 6245 0             MASK   THREE             NOUN COMP
 1025    REF   5  LAST  414    41,2431   6 0123 1            AD      SFTEMP1          NOUN COMP - VERB COMP
 1026    REF 117  LAST  414    41,2432  10 000 0             CCS     A
 1027    REF  46  LAST  405    41,2433   0 0001 0            TC      L                NOUN COMP G/ VERB COMP
 1028    REF   4  LAST  404    41,2434   0 5705 0            TC      CCSHOLE
 1029    REF  16  LAST  410    41,2435   0 2351 1            TC      GODSPALM         NOUN COMP L/ VERB COMP
 1030    REF  47  LAST  415    41,2436   0 0001 0  NDCMPTST TC      L                NOUN COMP = VERB COMP


R1031    DCOMPTST ALARMS IF DECIMAL ONLY BIT (BIT4 OF COMP CODE NUMBER) = 1.
R1032    IF NOT, IT PERFORMS REGULAR COMPTEST.
 1033    REF   6  LAST  415    41,2437  54 123 0  DCOMPTST TS      SFTEMP1          - VERB COMP
 1034    REF  68  LAST  414    41,2440  22 002 0           LXCH    Q
 1035    REF   2  LAST  414    41,2441   0 2443 0          TC      DECTEST
 1036    REF   1               41,2442   0 2426 0          TC      COMPTST1

 1037                          41,2443   0 0006 1  DECTEST  EXTEND                   ALARMS IF DEC ONLY BIT = 1 (BIT4 OF COMP
 1038    REF  87  LAST  408    41,2444  22 156 0           QXCH    MPAC      +2     CODE NUMBER). RETURNS IF NOT.
 1039    REF   2  LAST  414    41,2445   0 2515 1          TC      GETCOMP
 1040    REF  36  LAST  374    41,2446   7 4736 0          MASK    BIT14
 1041    REF 118  LAST  415    41,2447  10 000 0           CCS     A
 1042    REF  17  LAST  415    41,2450   0 2351 1          TC      GODSPALM
 1043    REF  88  LAST  415    41,2451   0 0156 0          TC      MPAC      +2


 1044    REF  69  LAST  415    41,2452  22 002 0  DCTSTCYC LXCH    Q                ALARMS AND RECYCLES IF DEC ONLY BIT = 1
 1045    REF   3  LAST  415    41,2453   0 2515 1          TC      GETCOMP          ( BIT4 OF COMP CODE NUMBER). RETURNS
 1046    REF  37  LAST  415    41,2454   7 4736 0          MASK    BIT14            IF NOT.  USED BY LOAD VERBS.
 1047    REF 119  LAST  415    41,2455  10 000 0           CCS     A
 1048    REF   3  LAST  412    41,2456   0 4145 0          TC      ALMCYCLE
 1049    REF  48  LAST  415    41,2457   0 0001 0          TC      L


R1050    NOUNTEST ALARMS IF NO-LOAD BIT (BIT5 OF COMP CODE NUMBER) = 1.
R1051    IF NOT, IT RETURNS.
 1052    REF  70  LAST  415    41,2460  22 002 0  NOUNTEST LXCH    Q
 1053    REF   4  LAST  415    41,2461   0 2515 1          TC      GETCOMP
 1054    REF 120  LAST  415    41,2462  10 000 0           CCS     A
 1055    REF  49  LAST  415    41,2463   0 0001 0          TC      L
 1056    REF  50  LAST  415    41,2464   0 0001 0          TC      L
 1057    REF  13  LAST  415    41,2465   0 2351 1          TC      GODSPALM


 1058    REF  71  LAST  415    41,2466  22 002 0  TSTFORDP LXCH    Q                TEST FOR DP. IF SO, GET MINOR PART ONLY.
 1059    REF   6  LAST  411    41,2467   3 0146 1          CA      NNADTEM
 1060    REF  36  LAST  414    41,2470   6 4753 1          AD      ONE              IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1061                          41,2471   0 0006 1          EXTEND
 1062    REF   1               41,2472   1 2504 0          BZF     CHANDSP
 1063    REF   4  LAST  407    41,2473  50 140 1           INDEX   MIXBR
 1064                          41,2474   0 2474 1          TC      +0
 1065                          41,2475   0 2477 1          TC      +2                NORMAL
 1066   REF   51  LAST  415   41,2476  0 0001 0           TC      L                  MIXED CASE ALREADY HANDLED IN MIXNOUN
 1067   REF    1              41,2477  0 3026 0           TC      SFRUTNOR
 1068   REF    2  LAST  410   41,2500  0 2261 0           TC      DPTEST
 1069   REF   52  LAST  416   41,2501  0 0001 0           TC      L                  NO DP
 1070   REF    8  LAST  414   41,2502  24 145 1           INCR    NOUNADD            DP   E+1 INTO NOUNADD FOR MINOR PART.
 1071   REF   53  LAST  416   41,2503  0 0001 0           TC      L


 1072   REF    3  LAST  408   41,2504  3 1017 0  CHANDSP  CA      NOUNCADR
 1073   REF    6  LAST  269   41,2505  7 5004 1           MASK    LOW9
 10731                        41,2506  0 0006 1           EXTEND
 10732  REF  121  LAST  415   41,2507  5 0000 1           INDEX   A
 1074                         41,2510  00 000 1           READ    0
 1075   REF  122  LAST  416   41,2511  4 0000 0           CS      A
 1076   REF    3  LAST  414   41,2512  1 2371 1           TCF     DSPCOM1


 1077   REF    2  LAST  304   41,2513   00147 0  COMPICK  ADRES   NNTYPTEM
 1078   REF    7  LAST  415   41,2514   00146 1           ADRES   NNADTEM

 1079   REF    5  LAST  415   41,2515  50 140 1  GETCOMP  INDEX   MIXBR              NORMAL                     MIXED
 1080   REF    1              41,2516  3 2512 0           CAF     COMPICK -1         ADRES NNTYPTEM             ADRES NNADTEM
 1081   REF  123  LAST  416   41,2517  50 000 1           INDEX   A
 1082                         41,2520  3 0000 1           CA      0                  C(NNTYPTEM)                C(NNADTEM)
 1083   REF    4  LAST  232   41,2521  7 4350 1           MASK    HI5                GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
 1084   REF   72  LAST  415   41,2522  0 0002 0           TC      Q


 1085   REF    5  LAST  415   41,2523  0 2515 1  DECDSP   TC      GETCOMP
 1086   REF    2  LAST  414   41,2524  0 4331 1           TC      LEFT5
 1087   REF   11  LAST  414   41,2525  7 6245 0           MASK    THREE
 1088   REF    4  LAST  410   41,2526  54 117 1           TS      DECOUNT            COMP NUMBER INTO DECOUNT
 1089   REF    1              41,2527  54 122 1  DSPDCGET TS      DECTEM             PICKS UP DATA
 1090   REF    9  LAST  416   41,2530  6 0145 1           AD      NOUNADD            DECTEM  1COMP +0, 2COMP +1, 3COMP +2
 1091   REF  124  LAST  416   41,2531  50 000 1           INDEX   A
 1092                         41,2532  4 0000 0           CS      0
 1093   REF    2  LAST  416   41,2533  50 122 0           INDEX   DECTEM
 1094   REF    2  LAST  305   41,2534  57'003 0           XCH     XREG               CANT USE BUF SINCE DMP USES IT.
 1095   REF    3  LAST  416   41,2535  10 122 1           CCS     DECTEM
 1096   REF    1              41,2536  0 2527 0           TC      DSPDCGET           MORE TO GET
 1097   REF   66  LAST  407   41,2537  3 4755 1  DSPDCPUT CAF     ZERO               DISPLAYS DATA
 1098   REF   89  LAST  415   41,2540  54 155 1           TS      MPAC      +1       DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
 1099   REF   90  LAST  416   41,2541  54 156 1           TS      MPAC      +2
 1100   REF    5  LAST  416   41,2542  50 117 0           INDEX   DECOUNT
 1101   REF    5  LAST  414   41,2543  3 4317 0           CAF     R1D1
 1102   REF   28  LAST  414   41,2544  54 777 1           TS      DSPCOUNT
 1103   REF    6  LAST  416   41,2545  50 117 0           INDEX   DECOUNT
 1104   REF    3  LAST  416   41,2546  4 1003 1           CS      XREG
 1105   REF   91  LAST  416   41,2547  54 154 0           TS      MPAC
 1106   REF    1              41,2550  0 3047 1           TC      SFCONUM            2X( SF CON NUMB ) IN A
 1107   REF   7  LAST  415   41,2551  54 123 0           TS       SFTEMP1
 1108                        41,2552   0 0006 1           EXTEND                    SWITCH BANKS TO SF CONSTANT TABLE
 1109   REF   1              41,2553   3 2565 0           DCA      GTSFOUTL            READING ROUTINE.
 1110   REF   6  LAST  411   41,2554  52 006 0           DXCH     Z                 LOADS SFTEMP1, SFTEMP2.
 1111   REF   6  LAST  416   41,2555  50 140 1           INDEX    MIXBR
 1112                        41,2556   0 2556 0           TC       +0
 1113   REF   1              41,2557   0 2562 1           TC       DSPSFNOR
 1114   REF   2  LAST  410   41,2560   0 3034 0           TC       SFRUTMIX
 1115   REF   1              41,2561   0 2575 1           TC       DECDSP3

 1116   REF   2  LAST  416   41,2562   0 3026 0  DSPSFNOR TC       SFRUTNOR
 1117   REF   2  LAST  417   41,2563   0 2575 1           TC       DECDSP3

 1118   REF  29  LAST  416      0777                      EBANK=   DSPCOUNT
 1119   REF   1              41,2564    02141 1  GTSFOUTL 2CADR    GTSFOUT
 1119   REF   1              41,2565    64101 0


 1120   REF  77  LAST  411   41,2566   0 4616 1  DSPDCEND TC       BANKCALL          ALL SFOUT ROUTINES END HERE
 1121   REF   1              41,2567    61226 0           CADR     DSPDECWD
 1122   REF   7  LAST  416   41,2570  10 117 1           CCS      DECOUNT
 1123                        41,2571   0 2573 1           TC       +2
 1124   REF   4  LAST  414   41,2572   0 0136 0           TC       ENTEXIT
 1125   REF   8  LAST  417   41,2573  54 117 1           TS       DECOUNT
 1126   REF   1              41,2574   0 2537 1           TC       DSPDCPUT          MORE TO DISPLAY


 1127   REF 125  LAST  416   41,2575  50 000 1  DECDSP3  INDEX    A
 1128   REF   1              41,2576   3 2600 0           CAF      SFOUTABR
 1129   REF   3  LAST  408   41,2577   0 4640 1           TC       BANKJUMP

 1130   REF   1              41,2600    61416 0  SFOUTABR CADR     PREDSPAL          ALARM IF DEC DISP WITH OCTAL ONLY NOUN
 1131   REF   1              41,2601    62566 0           CADR     DSPDCEND
 1132   REF   1              41,2602    60615 0           CADR     DEGOUTSF
 1133   REF   1              41,2603    60677 1           CADR     ARTOUTSF
 1134   REF   1              41,2604    60710 1           CADR     DP1OUTSF
 1135   REF   1              41,2605    60715 1           CADR     DP2OUTSF
 1136   REF   1              41,2606    60635 1           CADR     LRPOSOUT
 1137   REF   1              41,2607    60717 0           CADR     DP3OUTSF
 1138   REF   1              41,2610    65230 0           CADR     HMSOUT
 1139   REF   1              41,2611    65303 1           CADR     M/SOUT
 1140   REF   2  LAST  417   41,2612    60715 1           CADR     DP2OUTSF
 11401  REF   1              41,2613    60704 1           CADR     AROUT1SF
 11402  REF   1              41,2614    60732 1           CADR     2INTOUT
 11403  REF   1              41,2615    60623 0           CADR     360-CDUO
 1141                        41,2616             ENDRTOUT EQUALS

R1142           THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R1143   LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND
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 1144   REF   2  LAST  405   40,2615                         SETLOC BLANKCON +1

 11445  REF   2 LAST  398 TO  406:   334   334*              COUNT* $$/PIN
R1145      DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE , ADDING .18 FOR
R1146   NUMBERS IN THE NEGATIVE (AGC) RANGE.

 1147   REF  67  LAST  416   40,2615  3 4755 1  DEGOUTSF CAF     ZERO
 1148   REF  92  LAST  416   40,2616  54 156 1           TS      MPAC     +2        SET INDEX FOR FULL SCALE
 1149   REF   1              40,2617  0 2652 1           TC      FIXRANGE
 1150                        40,2620  0 2622 0           TC      +2                 NO AUGMENT NEEDED (SFTEMP1 AND 2 ARE 0)
 1151   REF   1              40,2621  0 2645 1           TC      SETAUG             SET AUGMENTER ACCORDING TO C(MPAC +2)
 11511  REF   1              40,2622  0 2663 0           TC      DEGCOM

R1152   360-CDUO COMPUTES 360 - CDU ANGLE IN MPAC, STORES RESULT IN MPAC AND
R11521  GOES TO DEGOUTSF.

 11522  REF   1              40,2623  0 2625 1  360-CDUO TC      360-CDU
 11523  REF   2  LAST  417   40,2624  0 2615 1           TC      DEGOUTSF

 11524  REF  93  LAST  418   40,2625  3 0154 1  360-CDU  CA      MPAC
 11525  REF   6  LAST  381   40,2626  7 4733 0           MASK    POSMAX             IF ANGLE IS 0 OR 180 DEGREES, DO NOTHING
 11526                       40,2627  0 0006 1           EXTEND
 11527  REF   1              40,2630  1 2634 0           BZF     360-CDUE
 11528  REF  94  LAST  418   40,2631  4 0154 0           CS      MPAC               COMPUTE 360 DEGREES MINUS ANGLE
 11529  REF  37  LAST  415   40,2632  6 4753 1           AD      ONE
 115291 REF  95  LAST  418   40,2633  54 154 0           TS      MPAC
 115292 REF  73  LAST  416   40,2634  0 0002 0  360-CDUE TC      Q

R1153   LRPOSOUT DISPLAYS +0,1,2,OR 3 (WHOLE) FOR CHANNEL 33,BITS 7-6 = 11,10,
R1154   01,00 RESPECTIVELY.

 1155                        40,2635  0 0006 1  LRPOSOUT EXTEND
 1156   REF   6  LAST  277   40,2636  00 033 1           READ    CHAN33
 1157                        40,2637  0 0006 1           EXTEND
 1158   REF  20  LAST  375   40,2640  7 4742 0           MP      BIT10              BITS 7-6 TO BITS 2-1
 1159                        40,2641  4 0000 0           COM
 1160   REF  12  LAST  416   40,2642  7 6245 0           MASK    THREE
 1161   REF  96  LAST  418   40,2643  54 154 0           TS      MPAC
 1162   REF   2  LAST  417   40,2644  0 2677 0           TC      ARTOUTSF           DISPLAY AS WHOLE

 1174                        40,2645  0 0006 1  SETAUG   EXTEND                     LOADS SFTEMP1 AND SFTEMP2 WITH THE
 1175   REF  97  LAST  418   40,2646  5 0156 0           INDEX   MPAC     +2        DP AUGMENTER CONSTANT
 1176   REF   1              40,2647  3 2674 0           DCA     DEGTAB
 1177   REF   8  LAST  417   40,2650  52 124 1           DXCH    SFTEMP1
 1178   REF  74  LAST  416   40,2651  0 0002 0           TC      Q

 1179   REF  98  LAST  418   40,2652  10 154 0  FIXRANGE CCS     MPAC               IF MPAC IS + RETURN TO L+1
 1180   REF  75  LAST  418   40,2653  0 0002 0           TC      Q                  IF MPAC IS - RETURN TO L+2 AFTER
 1181   REF  76  LAST  418   40,2654  0 0002 0           TC      Q                  MASKING OUT THE SIGN BIT
 1182                        40,2655  1 2656 1           TCF     +1
 1183   REF  21  LAST  407   40,2656  4 4735 0            CS       BITI5
 1184   REF  99  LAST  418   40,2657  7 0154 0            MASK     MPAC
 1185   REF 100  LAST  419   40,2660  54 154 0            TS       MPAC
 1186   REF  77  LAST  418   40,2661  50 002 0            INDEX    Q
 1187                        40,2662  0 0001 0            TC       1

 1188                        40,2663  0 0006 1  DEGCOM    EXTEND                   LOADS MULTIPLIER , DOES SHORTMP, AND
 1189   REF 101  LAST  419   40,2664  5 0156 0            INDEX    MPAC      +2     ADDS AUGMENTER.
 1190   REF   2  LAST  418   40,2665  3 2674 0            DCA      DEGTAB
 1191   REF 102  LAST  419   40,2666  52 155 1            DXCH     MPAC             ADJUSTED ANGLE IN A
 1192   REF   2  LAST  400   40,2667  0 7307 1            TC       SHORTMP
 1193   REF   9  LAST  418   40,2670  52 124 1            DXCH     SFTEMP1
 1194   REF 103  LAST  419   40,2671  20 155 1            DAS      MPAC
 1195   REF   1              40,2672  0 2702 0            TC       SCOUTEND


 1196                        40,2673   05605 1  DEGTAB    OCT      05605            HI PART OF      .18
 1197                        40,2674   03656 1            OCT      03656            LOW PART OF     .18
 1198                        40,2675   16314 0            OCT      16314            HI PART OF      .45
 1199                        40,2676   31463 1            OCT      31463            LO PART OF      .45

 1201   REF  10  LAST  419   40,2677  52 124 1  ARTOUTSF  DXCH     SFTEMP1          ASSUMES POINT AT LEFT OF DP SFCON
 1202   REF 104  LAST  419   40,2700  52 155 1            DXCH     MPAC
 1203   REF   1              40,2701  0 4415 0            TC       PRSHRTMP         IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
 1204   REF  21  LAST  412   40,2702  0 4635 0  SCOUTEND  TC       POSTJUMP
 1205   REF   2  LAST  417   40,2703   62566 0            CADR     DSPDCEND

 12051  REF  11  LAST  419   40,2704  52 124 1  AROUT1SF  DXCH     SFTEMP1          ASSUMES POINT BETWEEN HI AND LO PARTS OF
 12052  REF 105  LAST  419   40,2705  52 155 1            DXCH     MPAC             DP SFCON. SHIFTS RESULTS LEFT 14, BY
 12053  REF   2  LAST  419   40,2706  0 4415 0            TC       PRSHRTMP         TAKING RESULTS FROM MPAC+1, MPAC+2.
 12054  REF   1              40,2707  0 2711 1            TC       L14/OUT


 1206   REF   1              40,2710  0 2723 0  DP1OUTSF  TC       DPOUT            SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
 1207   REF 106  LAST  419   40,2711  56 156 0  L14/OUT   XCH      MPAC      +2     IN SFTEMP1, SFTEMP2. THEN SCALE RESULT
 1208   REF 107  LAST  419   40,2712  56 155 0            XCH      MPAC      +1     BY B14.
 1209   REF 108  LAST  419   40,2713  54 154 0            TS       MPAC
 1210   REF   2  LAST  419   40,2714  0 2702 0            TC       SCOUTEND


 1211   REF   2  LAST  419   40,2715  0 2723 0  DP2OUTSF  TC       DPOUT            SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
 1212   REF   3  LAST  419   40,2716  0 2702 0            TC       SCOUTEND


 1213   REF   3  LAST  419   40,2717  0 2723 0  DP3OUTSF  TC       DPOUT            ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1214   REF  11  LAST  410   40,2720  3 6242 0            CAF      SIX              LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
 1215   REF   1              40,2721  0 3153 0            TC       TPLEFTN          SHIFT LEFT 7.
 1216   REF   4  LAST  419   40,2722  0 2702 0            TC       SCOUTEND
 12165  REF 109  LAST  419        0162                MPAC+6     =       MPAC +6          USE MPAC +6 INSTEAD OF OVFIND

 1217   REF  78  LAST  419    40,2723  56 002 0  DPOUT     XCH     Q
 1218   REF   1               40,2724  54 162 0            TS      MPAC+6
 1219   REF   1               40,2725  0 2747 1            TC      READLO                GET FRESH DATA FOR BOTH HI AND LO.
 1220   REF   2  LAST  27     40,2726  0 7257 0            TC      TPAGREE               MAKE DP DATA AGREE
 1221   REF   2  LAST  400    40,2727  0 7103 1            TC      DMP
 1222   REF  12  LAST  419    40,2730   00123 1            ADRES   SFTEMP1
 1223   REF   2  LAST  420    40,2731  0 0162 1            TC      MPAC+6
R12231  THE FOLLOWING ROUTINE DISPLAYS TWO CONTIGUOUS SP POSITIVE INTEGERS
R12232  AS TWO POSITIVE DECIMAL INTEGERS IN RXD1-RXD2 AND RXD4-RXD5 (RXD3 IS
R12233  BLANKED). THE INTEGER IN THE LOWER NUMBERED ADDRESS IS DISPLAYED IN
R12234  RXD1-RXD2.

 12235  REF   3  LAST  411    40,2732  0 2536 0  2INTOUT   TC      5BLANK                TO BLANK RXD3
 122355 REF   2  LAST  402    40,2733  0 2413 0            TC      +ON                   TURN ON + SIGN
 12236  REF 110  LAST  420    40,2734  3 0154 1            CA      MPAC
 12237  REF   1               40,2735  0 2306 1            TC      DSPDECVN              DISPLAY 1ST INTEGER (LIKE VERB AND NOUN)
 122371 REF  13  LAST  418    40,2736  4 6245 0            CS      THREE
 122372 REF   9  LAST  417    40,2737  50 117 0            INDEX   DECOUNT
 122373 REF      LAST  416    40,2740  6 4317 0            AD      R1D1                  RXD4
 122374 REF  30  LAST  417    40,2741  54 777 1            TS      DSPCOUNT
 122375 REF   2  LAST  420    40,2742  0 2747 1            TC      READLO                GET 2ND INTEGER
 122376 REF 111  LAST  420    40,2743  3 0155 0            CA      MPAC +1
 122377 REF   2  LAST  420    40,2744  0 3306 1            TC      DSPDECVN              DISPLAY 2ND INTEGER (LIKE VERB AND NOUN)
 122378 REF  22  LAST  419    40,2745  0 4635 0            TC      POSTJUMP
 122379 REF   3  LAST  419    40,2746   62570 1            CADR    DSPDCEND +2


R1224   READLO PICKS UP FRESH DATA FOR BOTH HI AND LO AND LEAVES IT IN
R1225   MPAC, MPAC+1. THIS IS NEEDED FOR TIME DISPLAY. IT ZEROES MPAC+2, BUT
R1226   DOES NOT FORCE TPAGREE.

 1227   REF  79  LAST  420    40,2747  56 002 0  READLO    XCH     Q
 1228   REF   8  LAST   98    40,2750  54 144 1            TS      TEM4
 1229   REF   7  LAST  417    40,2751  50 140 1            INDEX   MIXBR
 1230                         40,2752  0 2752 0            TC      +0
 1231   REF   1               40,2753  0 2767 0            TC      RDLONOR
 1232   REF  10  LAST  420    40,2754  50 117 0            INDEX   DECOUNT
 1233   REF   3  LAST  410    40,2755  3 0150 0            CA      IDADITEM              GET IDADDTAB ENTRY FOR COMP K OF NOUN.
 1234   REF   4  LAST  410    40,2756  7 4356 1            MASK    LOW11                 E SUBK
 1235   REF   2  LAST  410    40,2757  0 4313 1            TC      SETEBANK              SET EB, LEAVE EADRES IN A.
 1236                         40,2760  0 0006 1  READLO1   EXTEND                        MIXED           NORMAL
 1237   REF 126  LAST  417    40,2761  5 0000 1            INDEX   A                     C(ESUBK)        C(E)
 1238                         40,2762  3 0001 0            DCA     0                     C((E SUBK)+1)        C(E+1)
 1239   REF 112  LAST  420    40,2763  52 155 1            DXCH    MPAC
 1240   REF  68  LAST  418    40,2764  3 4755 1            CAF     ZERO
 1241   REF 113  LAST  420    40,2765  54 156 1            TS      MPAC      +2
 1242   REF   9  LAST  420    40,2766  0 0144 0            TC      TEM4
 1243    REF  10  LAST  416    40,2767  3 0145 1  RDLONOR   CA      NOUNADD            E
 1244    REF   1               40,2770  0 2760 1  ENDRDLO   TC      READLO1


 1245                          42,3230                      BANK    42
 124501  REF   3  LAST  304    42,2000                      SETLOC  PINBALL3
 124502                        42,3230                      BANK

 12455   REF   1                                            COUNT*  $$/PIN
 1246    REF  78  LAST  417    42,3230  0 4616 1  HMSOUT    TC      BANKCALL           READ FRESH DATA FOR HI AND LO INTO MPAC,
 1247    REF   3  LAST  420    42,3231   60747 0            CADR    READLO             MPAC+1.
 1248    REF   3  LAST  420    42,3232  0 7257 0            TC      TPAGREE            MAKE DP DATA AGREE
 1249    REF   1               42,3233  0 3417 0            TC      SEPSECNR           LEAVE FRACT SEC/60 IN MPAC, MPAC+1.LEAVE
A1250                                                                                  WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1251    REF   3  LAST  420    42,3234  0 7103 1            TC      DMP                USE ONLY FRACT SEC/60 MOD 60
 1252    REF   1               42,3235   03271 0            ADRES   SECON2             MULT BY .06
 1253    REF   4  LAST  411    42,3236  3 4321 0            CAF     R3D1               GIVES CENTI-SEC/10EXP5 MOD 60
 1254    REF  31  LAST  420    42,3237  54 777 1            TS      DSPCOUNT
 1255    REF  79  LAST  421    42,3240  0 4616 1            TC      BANKCALL           DISPLAY SEC MOD 60
 1256    REF   2  LAST  417    42,3241   61226 0            CADR    DSPDECWD
 1257    REF   1               42,3242  0 3435 0            TC      SEPMIN             REMOVE REST OF SECONDS
 1258    REF   1               42,3243  3 3273 1            CAF     MINCON2            LEAVE FRACT MIN/60 IN MPAC+1. LEAVE
 1259    REF 114  LAST  420    42,3244  56 154 1            XCH     MPAC               WHOLE HOURS IN MPAC.
 1260    REF   1               42,3245  55 007 0            TS      HITEMOUT           SAVE WHOLE HOURS.
 1261    REF   2  LAST  421    42,3246  3 3274 0            CAF     MINCON2 +1
 1262    REF 115  LAST  421    42,3247  56 155 0            XCH     MPAC    +1         USE ONLY FRACT MIN/60 MOD 60
 1263    REF   3  LAST  419    42,3250  0 4415 0            TC      PRSHRTMP           IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1264                                                                                  MULT BY .0006
 1265    REF   3  LAST  411    42,3251  3 4320 1            CAF     R2D1               GIVES MIN/10EXP5 MOD 60
 1266    REF  32  LAST  421    42,3252  54 777 1            TS      DSPCOUNT
 1267    REF  80  LAST  421    42,3253  0 4616 1            TC      BANKCALL           DISPLAY MIN MOD 60
 1268    REF   3  LAST  421    42,3254   61226 0            CADR    DSPDECWD
 1269                          42,3255  0 0006 1            EXTEND                     MINUTES, SECONDS HAVE BEEN REMOVED
 1270    REF   1               42,3256  3 3300 1            DCA     HRCON1
 1271    REF 116  LAST  421    42,3257  52 155 1            DXCH    MPAC
 1272    REF   2  LAST  421    42,3260  3 1007 1            CA      HITEMOUT           USE WHOLE HOURS
 1273    REF   4  LAST  421    42,3261  0 4415 0            TC      PRSHRTMP           IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1274                                                                                  MULT BY .16384
 1275    REF   7  LAST  420    42,3262  3 4317 0            CAF     R1D1               GIVES HOURS/10EXP5
 1276    REF  33  LAST  421    42,3263  54 777 1            TS      DSPCOUNT
 1277    REF  81  LAST  421    42,3264  0 4616 1            TC      BANKCALL           USE REGULAR DSPDECWD, WITH ROUND OFF.
 1278    REF   4  LAST  421    42,3265   61226 0            CADR    DSPDECWD
 1279    REF   5  LAST  417    42,3266  0 0136 0            TC      ENTEXIT

 1280                          42,3267   25660 0  SECON1    2DEC*   1.666666666 E-4 B12*  2EXP12/6000
 1280                          42,3270   31742 1
 1281                          42,3271   01727 1  SECON2    OCT     01727              .06 FOR SECONDS DISPLAY
 1282                          42,3272   01217 1            OCT     01217
 1283                          42,3273   00011 1  MINCON2   OCT     00011              .0006 FOR MINUTES DISLPAY
 1284                          42,3274   32445 0            OCT     32445
 1285                          42,3275   02104 0  MINCON1   OCT      02104              .066..66 UPPED BY 2EXP-28
 1286                          42,3276   10422 1            OCT      10422
 1287                          42,3277   05174 0  HRCON1    2DEC     .16384
 1287                          42,3300   13261 0
 1288                          42,3301   00000 1            OCT      00000
 1289                          42,3302   00062 0  RNDCON    OCT      00062              .5 SEC


 1290   REF  82  LAST  421     42,3303  0 4616 1  M/SOUT    TC       BANKCALL           READ FRESH DATA FOR HI AND LO INTO MPAC,
 1291   REF   4  LAST  421     42,3304   60747 0            CADR     READLO             MPAC+1.
 1292   REF   4  LAST  421     42,3305  0 7257 0            TC       TPAGREE            MAKE DP DATA AGREE
 1293   REF 117  LAST  421     42,3306  10 154 0            CCS      MPAC               IF MAG OF (MPAC, MPAC+1) G/ 59 M 59 S,
 1294                          42,3307  0 3311 1            TC       +2                 DISPLAY 59B59, WITH PROPER SIGN.
 1295   REF   1                42,3310  0 3342 1            TC       M/SNORM            MPAC = +0. L/ 59M58.5S
 1296   REF   1                42,3311  6 3377 1            AD       M/SCON1            - HI PART OF (59M58.5S) +1  FOR CCS
 1297   REF 127  LAST  420     42,3312  10 000 0            CCS      A                  MAG OF MPAC - HI PART OF (59M58.5S)
 1298   REF   1                42,3313  0 3326 0            TC       M/SLIMIT           G/ 59M58.5S
 1299   REF   2  LAST  422     42,3314  0 3342 1            TC       M/SNORM            ORIGINAL MPAC = -0. L/ 59M58.5S
 1300   REF   3  LAST  422     42,3315  0 3342 1            TC       M/SNORM            L/ 59M58.5S
 1301   REF 113  LAST  422     42,3316  10 155 1            CCS      MPAC      +1       MAG OF MPAC = HI PART OF 59M58.5S
 1302                          42,3317  0 3321 1            TC       +2
 1303   REF   4  LAST  422     42,3320  0 3342 1            TC       M/SNORM            MPAC+1 = +0. L/ 59M58.5S
 1304   REF   1                42,3321  6 3400 0            AD       M/SCON2            - LO PART OF (59M58.5S) +1  FOR CCS
 1305   REF 128  LAST  422     42,3322  10 000 0            CCS      A                  MAG OF MPAC+1 - LO PART OF (59M58.5S)
 1306   REF   2  LAST  422     42,3323  0 3326 0            TC       M/SLIMIT           G/ 59M58.5S
 1307   REF   5  LAST  422     42,3324  0 3342 1            TC       M/SNORM            ORIGINAL MPAC+1 = -0. L/ 59M58.5S
 1308   REF   6  LAST  422     42,3325  0 3342 1            TC       M/SNORM            L/ 59M58.5S
 1309   REF 11   LAST  422     42,3326  10 154 0  M/SLIMIT  CCS      MPAC               = 59M58.5S     LIMIT
 1310   REF   1                42,3327  3 3402 1            CAF      M/SCON3            MPAC CANNOT BE +/- 0 AT THIS POINT.
 1311   REF   1                42,3330  0 3337 0            TC       +LIMIT             FORCE MPAC, MPAC+1 TO +/- 59M59.5S
 1312   REF   2  LAST  422     42,3331  4 3402 0            CS       M/SCON3
 1313   REF 120  LAST  422     42,3332  54 154 0            TS       MPAC               WILL DISPLAY 59M59S IN DSPDECNR
 1314   REF   3  LAST  422     42,3333  4 3403 1            CS       M/SCON3 +1
 1315   REF 121  LAST  422     42,3334  54 155 1  LIMITCOM  TS       MPAC      +1
 1316   REF   1                42,3335  3 3401 1            CAF      NORMADR            SET RETURN TO M/SNORM+1.
 1317   REF   2  LAST  421     42,3336  0 3420 1            TC       SEPSECNR +1
 1318   REF 122  LAST  422     42,3337  54 154 0  +LIMIT    TS       MPAC
 1319   REF   4  LAST  422     42,3340  3 3403 0            CAF      M/SCON3 +1
 1320   REF   1                42,3341  0 3334 0            TC       LIMITCOM
 1321   REF   1                42,3342  0 3404 1  M/SNORM   TC       SEPSEC             LEAVE FRACT SEC/60 IN MPAC,MPAC+1. LEAVE
A1322                                                                                   WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1323   REF   1                42,3343  3 3375 0            CAF      HISECON            USE ONLY FRACT SEC/60 MOD 60
 1324   REF   3  LAST  419     42,3344  0 7307 1            TC       SHORTMP            MULT BY .6 + 2EXP-14
 1325   REF  14  LAST  420     42,3345  4 6245 0            CS       THREE              GIVES SEC/100 MOD 60
 1326   REF  34  LAST  421     42,3346  26 777 1            ADS      DSPCOUNT           DSPCOUNT ALREADY SET TO RXD1
 1327   REF  83  LAST  422     42,3347  0 4616 1            TC       BANKCALL           DISPLAY SEC MOD 60 IN D4D5.
 1328   REF   1                42,3350   61266 1            CADR     DSPDC2NR
 1329   REF  69  LAST  420     42,3351  3 4755 1            CAF      ZERO
 1330   REF   5  LAST  405     42,3352  54 124 1            TS       CODE
 1331   REF  23  LAST  414     42,3353  4 4752 1            CS       TWO
 1332   REF  11  LAST  420   42,3354  50 117 0              INDEX   DECOUNT
 1333   REF   9  LAST  421   42,3355  6 4317 0              AD      R1D1               RXD3
 1334   REF   3  LAST  405   42,3356  54 143 0              TS      COUNT
 1335   REF  84  LAST  422   42,3357  0 4616 1              TC      BANKCALL           BLANK MIDDLE CHAR
 1336   REF   3  LAST  405   42,3360   61322 0              CADR    DSPIN
 1337   REF   2  LAST  421   42,3361  0 3435 0              TC      SEPMIN             REMOVE REST OF SECONDS
 1338   REF 123  LAST  422   42,3362  56 155 0              XCH     MPAC      +1       LEAVE FRACT MIN/60 IN MPAC+1
 1339                        42,3363  0 0006 1              EXTEND                     USE ONLY FRACT MIN/60 MOD 60
 1340   REF   1              42,3364  7 3376 1              MP      HIMINCON           MULT BY .6 + 2EXP-7
 1341   REF 124  LAST  423   42,3365  52 155 1              DXCH    MPAC               GIVES MIN/100 MOD 60
 1342   REF  12  LAST  423   42,3366  50 117 0              INDEX   DECOUNT
 1343   REF   2  LAST  423   42,3367  3 4317 0              CAF     R1D1               RXD1
 1344   REF  35  LAST  422   42,3370  54 777 1              TS      DSPCOUNT
 1345   REF  85  LAST  423   42,3371  0 4616 1              TC      BANKCALL           DISPLAY MIN MOD 60 IN D1D2.
 1346   REF   2  LAST  422   42,3372   61266 1              CADR    DSPDC2NR
 1347   REF  23  LAST  420   42,3373  0 4635 0              TC      POSTJUMP
 1348   REF   4  LAST  420   42,3374   62570 1              CADR    DSPDCEND +2

 1349                        42,3375   23147 1  HISECON     OCT     23147              .6 + 2EXP-14
 1350                        42,3376   23346 1  HIMINCON    OCT     23346              .6 + 2EXP-7

 1351                        42,3377   77753 0  M/SCON1     OCT     77753              - HI PART OF (59M58.5S) +1
 1352                        42,3400   41126 1  M/SCON2     OCT     41126              - LO PART OF (59M58.5S) +1
 1353   REF   7  LAST  422   42,3401   03343 0  NORMADR     ADRES   M/SNORM +1
 1354                        42,3402   00025 0  M/SCON3     OCT     00025              59M 59.5S
 1355                        42,3403   37016 1              OCT     37016


 1356   REF 125  LAST  423   42,3404  10 155 1  SEPSEC      CCS     MPAC      +1       IF +, ROUND BY ADDING .5 SEC
 1357   REF   1              42,3405  1 3414 1              TCF     POSEC              IF -, ROUND BY SUBTRACTING .5 SEC
 1358   REF   2  LAST  423   42,3406  1 3414 1              TCF     POSEC              FINDS TIME IN MPAC, MPAC+1
 1359                        42,3407  1 3410 0              TCF     +1                 ROUNDS OFF BY +/- .5 SEC
 1360                        42,3410  0 0006 1              EXTEND                     LEAVES WHOLE MIN IN BIT13 OF
 1361   REF   1              42,3411  4 3302 1              DCS     RNDCON    -1       LOTEMOUT AND ABOVE.
 1362   REF 126  LAST  423   42,3412  20 155 1  SEPSEC1     DAS     MPAC               LEAVES FRACT SEC/60 IN MPAC, MPAC+1.
 1363   REF   3  LAST  422   42,3413  1 3417 1              TCF     SEPSECNR
 1364                        42,3414  0 0006 1  POSEC       EXTEND
 1365   REF   2  LAST  423   42,3415  3 3302 0              DCA     RNDCON    -1
 1366   REF   1              42,3416  1 3412 1              TCF     SEPSEC1
 1367   REF  80  LAST  420   42,3417  56 002 0  SEPSECNR    XCH     Q                  THIS ENTRY AVOIDS ROUNDING BY .5 SEC
 1368   REF   1              42,3420  54 144 1              TS      SEPSCRET
 1369   REF   4  LAST  421   42,3421  0 7103 1              TC      DMP                MULT BY 2EXP12/6000
 1370   REF   1              42,3422   03267 1              ADRES   SECON1             GIVES FRACT SEC/60 IN BIT12 OF MPAC+1
 1371                        42,3423  0 0006 1              EXTEND                     AND BELOW.
 1372   REF 127  LAST  423   42,3424  3 0155 0              DCA     MPAC               SAVE MINUTES AND HOURS
 1373   REF   3  LAST  421   42,3425  53'010 0              DXCH    HITEMOUT
 1374   REF   1              42,3426  0 4404 0              TC      TPSL1
 1375   REF   2  LAST  423   42,3427  0 4404 0              TC      TPSL1              GIVES FRACT SEC/60 IN MPAC+1, MPAC+2.
 1376   REF  70  LAST  422   42,3430  3 4755 1              CAF     ZERO
 1377   REF 128  LAST  423   42,3431  55 156 0              XCH     MPAC      +2       LEAVE FRACT SEC/60 IN MPAC, MPAC+1.
 1378   REF 129  LAST  423   42,3432  56 155 0              XCH    MPAC    +1
 1379   REF 130  LAST  424   42,3433  56 154 1              XCH    MPAC
 1380   REF   2  LAST  423   42,3434  0 0144 0              TC     SEPSCRET


 1381   REF  81  LAST  423   42,3435  56 002 0   SEPMIN     XCH    Q                     FINDS WHOLE MINUTES IN BIT13
 1382   REF   1              42,3436  54 144 1              TS     SEPMNRET              OF LOTEMOUT AND ABOVE.
 1383   REF   1              42,3437  3 1010 1              CA     LOTEMOUT              REMOVES REST OF SECONDS.
 1384                        42,3440  0 0006 1              EXTEND                       LEAVES FRACT MIN/60 IN MPAC+1.
 1385   REF  20  LAST  299   42,3441  7 4751 1              MP     BIT3                  LEAVES WHOLE HOURS IN MPAC.
 1386                        42,3442  0 0006 1              EXTEND                       SR 12, THROW AWAY LP.
 1387   REF  22  LAST  292   42,3443  7 4737 1              MP     BIT13                 SR 2, TAKE FROM LP. = SL 12.
 1388   REF 131  LAST  424   42,3444  22 155 0              LXCH   MPAC    +1            THIS FORCES BITS 12-1 TO 0 IF +,
A1389                                                                                    FORCES BITS 12-1 TO 1 IF -.
 1390   REF   4  LAST  423   42,3445  3 1007 1              CA     HITEMOUT
 1391   REF 132  LAST  424   42,3446  54 154 0              TS     MPAC
 1392   REF   5  LAST  423   42,3447  0 7103 1              TC     DMP                   MULT BY 1/15
 1393   REF   1              42,3450   03275 1              ADRES  MINCON1               GIVES FRACT MIN/60 IN MPAC+1.
 1394   REF   2  LAST  424   42,3451  0 0144 0   ENDSPMIN   TC     SEPMNRET              GIVES WHOLE HOURS IN MPAC.


R1395   THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1396   WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
R1397   ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1398   OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1399   INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1400   DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


 1401   REF   1              40,2771                        SETLOC ENDRDLF   +1

 14011  REF   3 LAST  418 TO  421:    108    442*           COUNT* $$/PIN
 1402   REF   8  LAST  420   40,2771  50 140 1   DSPDPDEC   INDEX  MIXBR
 1403                        40,2772  0 2772 1              TC     +0
 1404                        40,2773  0 2775 0              TC     +2                    NORMAL NOUN
 1405   REF   3  LAST  412   40,2774  0 3420 1              TC     DSPALARM
 1406                        40,2775  0 0006 1              EXTEND
 1407   REF  11  LAST  421   40,2776  5 0145 1              INDEX  NOUNADD
 1408                        40,2777  3 0001 0              DCA    0
 1409   REF 133  LAST  424   40,3000  52 155 1              DXCH   MPAC
 1410   REF  10  LAST  423   40,3001  3 4317 0              CAF    R1D1
 1411   REF  36  LAST  423   40,3002  54 777 1              TS     DSPCOUNT
 1412   REF  71  LAST  423   40,3003  3 4755 1              CAF    ZERO
 1413   REF 134  LAST  424   40,3004  54 156 1              TS     MPAC  +2
 1414   REF   5  LAST  422   40,3005  0 7257 0              TC     TPAGREE
 1415   REF   1              40,3006  0 3273 1              TC     DSP2DEC
 1416   REF   6  LAST  421   40,3007  0 0136 0   ENDDPDEC   TC     ENTEXIT
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P1417   LOAD VERBS             IF ALARM CONDITION IS DETECTED DURING EXECUTE,
R1418   CHECK FAIL LIGHT IS TURNED ON AND ENDOFJOB. IF ALARM CONDITION IS
R1419   DETECTED DURING ENTER OF DATA, CHECK FAIL IS TURNED ON AND IT RECYCLES
R1420   TO EXECUTE  OF ORIGINAL LOAD VERB. RECYCLE CAUSED BY  1) DECIMAL MACHINE
R1421   CADR  2) MIXTURE OF OCTAL/DECIMAL DATA  3) OCTAL DATA INTO DECIMAL
R1422   ONLY NOUN  4) DEC DATA INTO OCT ONLY NOUN  5) DATA TOO LARGE FOR SCALE
R1423   6) FEWER THAN 3 DATA WORDS LOADED FOR HRS, MIN, SEC NOUN.8(2)-(6) ALARM
R1424   AND RECYCLE OCCUR AT FINAL ENTER OF SET. (1) ALARM AND RECYCLE OCCUR AT
R1425   ENTER OF CADR.

 1426   REF    1                 41,2616                            SETLOC ENDRTOUT

 14265  REF    2 LAST  406 TO  418:    398    398*                  COUNT*  $$/PIN
 1427   REF   24  LAST  422      41,2616  4 4752 1  ABCLOAD   CS      TWO
 1428   REF    3  LAST  414      41,2617  0 2424 1            TC      COMPTEST
 1429   REF    1                 41,2620  0 2460 1            TC      NOUNTEST         TEST IF NOUN CAN BE LOADED.
 1430   REF    1                 41,2621  3 3006 1            CAF     VBSP1LD
 1431   REF    2  LAST  404      41,2622  0 2337 1            TC      UPDATVB  -1
 1432   REF    1                 41,2623  0 2303 0            TC      REQDATX
 1433   REF    1                 41,2624  3 3007 0            CAF     VBSP2LD
 1434   REF    3  LAST  425      41,2625  0 2337 1            TC      UPDATVB  -1
 1435   REF    1                 41,2626  0 2305 0            TC      REQDATY
 1436   REF    1                 41,2627  3 3010 0            CAF     VBSP3LD
 1437   REF    4  LAST  425      41,2630  0 2337 1            TC      UPDATVB -1
 1438   REF    2  LAST  407      41,2631  0 2307 1            TC      REQDATZ


 1439   REF   12  LAST  419      41,2632  4 6242 1  PUTXYZ    CS      SIX              TEST THAT THE 3 DATA WORDS LOADED ARE
 1440   REF    1                 41,2633  0 3011 1            TC      ALLDC/OC         ALL DEC OR ALL OCT.
 1441                            41,2634  0 0006 1            EXTEND
 1442   REF    4  LAST  411      41,2635  3 2114 1            DCA     LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
 1443   REF    7  LAST  417      41,2636  52 006 0            DXCH    Z                ROUTINE.
 1444   REF   72  LAST  424      41,2637  3 4755 1            CAF     ZERO             X COMP
 1445   REF    1                 41,2640  0 3075 0            TC      PUTCOM
 1446   REF   12  LAST  424      41,2641  50 145 1            INDEX   NOUNADD
 1447                            41,2642  54 000 0            TS      0
 1448   REF   38  LAST  418      41,2643  3 4753 1            CAF     ONE              Y COMP
 1449   REF    2  LAST  425      41,2644  0 3075 0            TC      PUTCOM
 1450   REF   13  LAST  425      41,2645  50 145 1            INDEX    NOUNADD
 1451                            41,2646  54 001 1            TS      1
 1452   REF   25  LAST  425      41,2647  3 4752 0            CAF     TWO              Z COMP
 1453   REF    3  LAST  425      41,2650  0 3075 0            TC      PUTCOM
 1454   REF   14  LAST  425      41,2651  50 145 1            INDEX   NOUNADD
 1455                            41,2652  54 002 1            TS      2
 145501 REF    2  LAST  155      41,2653  4 4757 1            CS      SEVEN            IF NOUN 7 HAS JUST BEEN LOADED, SET
 145502 REF   10  LAST  411      41,2654  6 1002 1            AD      NOUNREG           FLAG BITS AS SPECIFIED.
 145503                          41,2655  0 0006 1            EXTEND
 145504                          41,2656  1 2660 1            BZF     +2
 145505 REF    2  LAST  406      41,2657  0 2775 0            TC      LOADLV
 145506 REF    4  LAST  416   41,2660  3 1003 0            CA      XREG              ECADR OF FLAG WORD.
 145507 REF    5  LAST  411   41,2661  0 4304 1            TC      SETNCADR +1        SET EBANK, NOUNADD.
 145508 REF    2  LAST  407   41,2662  3 1005 0            CA      ZREG              ZERO TO RESET BITS, NON-ZERO TO SET BITS
 145509                       41,2663  0 0004 0            INHINT
 14551                        41,2664  0 0006 1            EXTEND
 145511 REF    1              41,2665  1 2674 1            BZF     BITSOFF
 145512 REF   15  LAST  425   41,2666  50 145 1            INDEX   NOUNADD
 145513                       41,2667  4 0000 0            CS      0
 145514 REF    1              41,2670  7 1004 0            MASK    YREG              BITS TO BE PROCESSED.
 145515 REF   16  LAST  426   41,2671  50 145 1            INDEX   NOUNADD
 145516                       41,2672  26 000 0            ADS     0                 SET BITS.
 145517 REF    1              41,2673  0 2701 0            TC      BITSOFF1
 145518 REF    2  LAST  426   41,2674  4 1004 0  BITSOFF   CS      YREG              BITS TO BE PROCESSED.
 145519 REF   17  LAST  426   41,2675  50 145 1            INDEX   NOUNADD
 14552                        41,2676  7 0000 0            MASK    0
 145521 REF   18  LAST  426   41,2677  50 145 1            INDEX   NOUNADD
 145522                       41,2700  54 000 0            TS      0                 RESET BITS.
 145523                       41,2701  0 0003 1  BITSOFF1  RELINT
 1456   REF    3  LAST  425   41,2702  0 2775 0            TC      LOADLV

 1457   REF   39  LAST  425   41,2703  4 4753 0  ABLOAD    CS      ONE
 1458   REF    4  LAST  425   41,2704  0 2424 1            TC      COMPTEST
 1459   REF    2  LAST  425   41,2705  0 2460 1            TC      NOUNTEST          TEST IF NOUN CAN BE LOADED.
 1460   REF    2  LAST  425   41,2706  3 3006 1            CAF     VBSP1LD
 1461   REF    5  LAST  425   41,2707  0 2337 1            TC      UPDATVB -1
 1462   REF    2  LAST  425   41,2710  0 2303 0            TC      REQDATX
 1463   REF    2  LAST  425   41,2711  3 3007 0            CAF     VBSP2LD
 1464   REF    6  LAST  426   41,2712  0 2337 1            TC      UPDATVB -1
 1465   REF    2  LAST  425   41,2713  0 2305 0            TC      REQDATY
 1466   REF    9  LAST  408   41,2714  4 4756 0  PUTXY     CS      FIVE              TEST THAT THE 2 DATA WORDS LOADED ARE
 1467   REF    2  LAST  425   41,2715  0 3011 1            TC      ALLDC/OC          ALL DEC OR ALL OCT.
 1468                         41,2716  0 0006 1            EXTEND
 1469   REF    5  LAST  425   41,2717  3 2114 1            DCA     LODNNLOC          SWITCH BANKS TO NOUN TABLE READING
 1470   REF    8  LAST  425   41,2720  52 006 0            DXCH    Z                 ROUTINE.
 1471   REF   73  LAST  425   41,2721  3 4755 1            CAF     ZERO              X COMP
 1472   REF    4  LAST  425   41,2722  0 3075 0            TC      PUTCOM
 1473   REF   19  LAST  426   41,2723  50 145 1            INDEX   NOUNADD
 1474                         41,2724  54 000 0            TS      0
 1475   REF   40  LAST  426   41,2725  3 4753 1            CAF     ONE               Y COMP
 1476   REF    5  LAST  426   41,2726  0 3075 0            TC      PUTCOM
 1477   REF   20  LAST  426   41,2727  50 145 1            INDEX   NOUNADD
 1478                         41,2730  54 001 1            TS      1
 1479   REF    4  LAST  426   41,2731  0 2775 0            TC      LOADLV

 1481   REF    3  LAST  426   41,2732  0 2303 0  ALOAD     TC      REQDATX
 1482                         41,2733  0 0006 1            EXTEND
 1483   REF    6  LAST  426   41,2734  3 2114 1            DCA     LODNNLOC          SWITCH BANKS TO NOUN TABLE READING
 1484   REF    9  LAST  426   41,2735  52 006 0            DXCH    Z                 ROUTINE.
 1485   REF   74  LAST  426   41,2736  3 4755 1            CAF     ZERO              X COMP
 1486   REF    6  LAST  426   41,2737  0 3075 0            TC      PUTCOM
 1487   REF  21  LAST  426   41,2740  50 145 1            INDEX  NOUNADD
 1488                        41,2741  54 000 0            TS     0
 1489   REF   5  LAST  426   41,2742  0 2775 0            TC     LOADLV

 1490   REF  41  LAST  426   41,2743  4 4753 0  BLOAD     CS     ONE
 1491   REF   5  LAST  426   41,2744  0 2424 1            TC     COMPTEST
 1493   REF  22  LAST  419   41,2745  3 4735 1            CAF    BIT15               SET CLPASS FOR PASSO ONLY
 1494   REF  10  LAST  407   41,2746  55'015 0            TS     CLPASS
 1495   REF   3  LAST  426   41,2747  0 2305 0            TC     REQDATY
 1496                        41,2750  0 0006 1            EXTEND
 1497   REF   7  LAST  426   41,2751  3 2114 1            DCA    LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1498   REF  11  LAST  426   41,2752  52 006 0            DXCH   Z                   ROUTINE.
 1499   REF  42  LAST  427   41,2753  3 4753 1            CAF    ONE
 1500   REF   7  LAST  426   41,2754  0 3075 0            TC     PUTCOM
 1501   REF  22  LAST  427   41,2755  50 145 1            INDEX  NOUNADD
 1502                        41,2756  54 001 1            TS     1
 1503   REF   6  LAST  427   41,2757  0 2775 0            TC     LOADLV

 1504   REF  26  LAST  425   41,2760  4 4752 1  CLOAD     CS     TWO
 1505   REF   6  LAST  427   41,2761  0 2424 1            TC     COMPTEST
 1507   REF  23  LAST  427   41,2762  3 4735 1            CAF    BIT15               SET CLPASS FOR PASSO ONLY
 1508   REF  11  LAST  427   41,2763  55'015 0            TS     CLPASS
 1509   REF   3  LAST  425   41,2764  0 2307 1            TC     REQDATZ
 1510                        41,2765  0 0006 1            EXTEND
 1511   REF   8  LAST  427   41,2766  3 2114 1            DCA    LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1512   REF  11  LAST  427   41,2767  52 006 0            DXCH   Z                   ROUTINE.
 1513   REF  27  LAST  427   41,2770  3 4752 0            CAF    TWO
 1514   REF   8  LAST  427   41,2771  0 3075 0            TC     PUTCOM
 1515   REF  23  LAST  427   41,2772  50 145 1            INDEX  NOUNADD
 1516                        41,2773  54 002 1            TS     2
 1517   REF   7  LAST  427   41,2774  0 2775 0            TC     LOADLV

 1518   REF  75  LAST  426   41,2775  3 4755 1  LOADLV    CAF    ZERO
 1519   REF  13  LAST  407   41,2776  55'000 1            TS     DECBRNCH
 1520   REF  76  LAST  427   41,2777  4 4755 0            CS     ZERO
 1521   REF   1              41,3000  55'014 1            TS     LOADSTAT
 15215  REF   5  LAST  408   41,3001  0 4457 0            TC     RELDSP              RELEASE FOR PRIORITY DISPLAY PROBLEM.
 1522   REF   6  LAST  411   41,3002  4 4360 1            CS     VD1                 TO BLOCK NUMERICAL CHARACTERS AND
 1523   REF  37  LAST  424   41,3003  54 777 1            TS     DSPCOUNT            CLEARS AFTER A COMPLETED LOAD
 1524   REF  24  LAST  423   41,3004  0 4635 0            TC     POSTJUMP            AFTER COMPLETED LOAD, GO TO RECALTST
 1525   REF   1              41,3005   61547 0            CADR   RECALTST            TO SEE IF THERE IS RECALL FROM ENDIDLE.

 1526                        41,3006   00025 0  VBSP1LD   DEC    21                  VB21 = ALOAD
 1527                        41,3007   00026 0  VBSP2LD   DEC    22                  VB22 = BLOAD
 1528                        41,3010   00027 1  VBSP3LD   DEC    23                  VB23 = CLOAD


 1529   REF  13  LAST  423   41,3011  54 117 1  ALLDC/OC  TS     DECOUNT             TESTS THAT DATA WORDS LOADED ARE EITHER
 1530   REF  14  LAST  427   41,3012  4 1000 1            CS     DECBRNCH            ALL DEC OR ALL OCT. ALARMS IF NOT.
 1531   REF   3  LAST  405   41,3013  54 021 0            TS     SR
 1532    REF    4   LAST   427    41,3014  4 0021 0             CS       SR
 1533    REF    5   LAST   428    41,3015  4 0021 0             CS       SR                  SHIFTED RIGHT 2
 1534    REF  129   LAST   422    41,3016  10 000 0             CCS      A                   DEC COMP BITS IN LOW 3
 1535                             41,3017  1 3021 0             TCF      +2                  SOME ONES IN LOW 3
 1536    REF   82   LAST   424    41,3020  0 0002 0             TC       Q                   ALL ZEROS. ALL OCTAL.  OK
 1537    REF   14   LAST   427    41,3021  6 0117 0             AD       DECOUNT             DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
 1538                             41,3022  0 0006 1             EXTEND                       (BUT IT HAS BEEN DECREMENTED BY CCS)
 1539                             41,3023  1 3025 1             BZF      +2                  MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP.
 1540    REF    4   LAST   415    41,3024  0 4145 0             TC       ALMCYCLE            ALARM AND RECYCLE.
 1541    REF   83   LAST   428    41,3025  0 0002 0   GOQ       TC       Q                   ALL REQUIRED ARE DEC. OK


 1542    REF   84   LAST   428    41,3026  56 002 0   SFRUTNOR  XCH      Q                   GETS SF ROUTINE NUMBER FOR NORMAL CASE
 1543    REF    1                 41,3027  54 114 1             TS       EXITEM              CANT USE L FOR RETURN. TSTFORDP USES L.
 1544    REF    1                 41,3030  3 4347 0             CAF      MID5
 1545    REF    3   LAST   416    41,3031  7 0147 1             MASK     NNTYPTEM
 1546    REF    1                 41,3032  0 4322 0             TC       RIGHT5
 1547    REF    2   LAST   428    41,3033  0 0114 0             TC       EXITEM              SF ROUTINE NUMBER IN A

 1548    REF   85   LAST   428    41,3034  56 002 0   SFRUTMIX  XCH      Q                   GETS SF ROUTINE NUMBER FOR MIXED CASE
 1549    REF    3   LAST   428    41,3035  54 114 1             TS       EXITEM
 1550    REF   15   LAST   428    41,3036  50 117 0             INDEX    DECOUNT
 1551    REF    1                 41,3037  3 3066 1             CAF      DISPLACE            PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1552    REF   54   LAST   416    41,3040  54 001 1             TS       L
 1553    REF   16   LAST   428    41,3041  50 117 0             INDEX    DECOUNT
 1554    REF    2   LAST   399    41,3042  3 4346 1             CAF      LOW5                LOW5, MID5, OR HI5 IN A
 1555    REF    2   LAST   304    41,3043  7 0153 1             MASK     RUTMXTEM            GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
 1556    REF   55   LAST   428    41,3044  50 001 0             INDEX    L
 1557                             41,3045  0 0000 1             TC       0
R1558    DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1559    REF    4   LAST   428    41,3046  0 0114 0   SFRET1    TC       EXITEM              SF ROUTINE NUMBER IN A

 1560    REF   86   LAST   428    41,3047  56 002 0   SFCONUM   XCH      Q                   GETS 2X( SF CONSTANT NUMBER)
 1561    REF    5   LAST   428    41,3050  54 114 1             TS       EXITEM
 1562    REF    9   LAST   424    41,3051  50 140 1             INDEX    MIXBR
 1563                             41,3052  0 3052 0             TC       +0
 1564    REF    1                 41,3053  0 3071 1             TC       CONUMNOR            NORMAL NOUN
 1565    REF   17   LAST   428    41,3054  50 117 0             INDEX    DECOUNT             MIXED NOUN
 1566    REF    2   LAST   428    41,3055  3 3066 1             CAF      DISPLACE
 1567    REF   56   LAST   428    41,3056  54 001 1             TS       L                   PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1568    REF   18   LAST   428    41,3057  50 117 0             INDEX    DECOUNT
 1569    REF    3   LAST   428    41,3060  3 4346 1             CAF      LOW5
 1570    REF    4   LAST   428    41,3061  7 0147 1             MASK     NNTYPTEM
 1571    REF   57   LAST   428    41,3062  50 001 0             INDEX    L
 1572                             41,3063  0 0000 1             TC       0
R1573    DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1574                             41,3064  6 0000 1   SFRET     DOUBLE                       2X(SF CONSTANT NUMBER ) IN A
 1575    REF    6   LAST   428    41,3065  0 0114 0             TC       EXITEM

 1576    REF    1                 41,3066  0 3025 0   DISPLACE  TC       GOQ
 1577   REF   2  LAST  428   41,3067  0 4322 0            TC       RIGHT5
 1578   REF   3  LAST  416   41,3070  0 4331 1            TC       LEFT5

 1579   REF   4  LAST  428   41,3071  3 4346 1  CONUMNOR  CAF      LOW5            NORMAL NOUN ALWAYS GETS LOW 5 OF
 1580   REF   5  LAST  428   41,3072  7 0147 1            MASK     NNTYPTEM        NNTYPTAB FOR SF CONUM.
 1581                        41,3073  6 0000 1            DOUBLE
 1582   REF   7  LAST  428   41,3074  0 0114 0            TC       EXITEM          2X( SF CONSTANT NUMBER) IN A


 1583   REF  19  LAST  428   41,3075  54 117 1  PUTCOM    TS       DECOUNT
 1584   REF  87  LAST  428   41,3076  56 002 0            XCH      Q
 1585   REF   1              41,3077  54 115 0            TS       DECRET
 1586   REF  77  LAST  427   41,3100  3 4755 1            CAF      ZERO
 1537   REF   3  LAST  420   41,3101  54 162 0            TS       MPAC+6
 1588   REF  20  LAST  429   41,3102  50 117 0            INDEX    DECOUNT
 1589   REF   3  LAST  405   41,3103 .57'006 0            XCH      XREGLP
 1590   REF 135  LAST  424   41,3104  54 155 1            TS       MPAC   +1
 1591   REF  21  LAST  429   41,3105  50 117 0            INDEX    DECOUNT
 1592   REF   5  LAST  426   41,3106  57'003 0            XCH      XREG
 1593   REF 136  LAST  429   41,3107  54 154 0            TS       MPAC
 1594   REF  10  LAST  428   41,3110  50 140 1            INDEX    MIXBR
 1595                        41,3111  0 3111 0            TC       +0
 1596   REF   1              41,3112  0 3137 1            TC       PUTNORM         NORMAL NOUN
A1597   IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
 1598   REF  22  LAST  429   41,3113  50 117 0            INDEX    DECOUNT         GET IDADDTAB ENTRY FOR COMPONENT K
 1599   REF   4  LAST  420   41,3114  3 0150 0            CA       IDADITEM                  OF NOUN.
 1600   REF   5  LAST  420   41,3115  7 4356 1            MASK     LOW11           (ECADR)SUBK FOR CURRENT COMP OF NOUN
 1601   REF   6  LAST  426   41,3116  0 4303 0            TC       SETNCADR        ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 1602                        41,3117  0 0006 1            EXTEND                   C(NOUNADD) IN A UPON RETURN
 1603   REF  23  LAST  429   41,3120  60 117 0            SU       DECOUNT         PLACE (ESUBK)-K INTO NOUNADD
 1604   REF  24  LAST  427   41,3121  54 145 0            TS       NOUNADD
 1605   REF  15  LAST  427   41,3122  11'000 1            CCS      DECBRNCH
 1606   REF   1              41,3123  0 3174 0            TC       PUTDECSF        +  DEC
 1607   REF   1              41,3124  0 2452 0            TC       DCTSTCYC        +0 OCTAL
 1608   REF   3  LAST  417   41,3125  0 3034 0            TC       SFRUTMIX        TEST IF DEC ONLY BIT = 1. IF SO,
 1609   REF   3  LAST  416   41,3126  0 2261 0            TC       DPTEST          ALARM AND RECYCLE. IF NOT, CONTINUE.
 1610   REF   1              41,3127  0 3155 0            TC       PUTCOM2         NO DP
A1611                                                                              TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1612                                                                              +0 INTO MAJOR PART. SET NOUNADD FOR
A1613                                                                              LOADING OCTAL WORD INTO MINOR PART.
 1614   REF  25  LAST  429   41,3130  24 145 1  PUTDPCOM  INCR     NOUNADD         DP  (ESUBK)-K+1  OR  E+1
 1615   REF  26  LAST  429   41,3131  3 0145 1            CA       NOUNADD         NOUNADD NOW SET FOR MINOR PART
 1616   REF  24  LAST  429   41,3132  26 117 1            ADS      DECOUNT         (ESUBK)+1  OR  E+1  INTO DECOUNT
 1617   REF  78  LAST  429   41,3133  3 4755 1            CAF      ZERO            NOUNADD SET FOR MINOR PART
 1618   REF  25  LAST  429   41,3134  50 117 0            INDEX    DECOUNT
 1619                        41,3135  53'777 0            TS       0        -1     ZERO MAJOR PART(ESUBK OR E)
 1620   REF   2  LAST  429   41,3136  0 3155 0            TC       PUTCOM2

 1621   REF   2  LAST  407   41,3137  0 4311 0  PUTNORM   TC       SETNADD         ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 1622   REF  16  LAST  429   41,3140  11'000 1            CCS      DECBRNCH
 1623    REF    2  LAST  429   41,3141  0 3174 0            TC       PUTDECSF        +  DEC
 1624    REF    2  LAST  429   41,3142  0 2452 0            TC       DCTSTCYC        +0 OCTAL
 1625    REF    3  LAST  417   41,3143  0 3026 0            TC       SFRUTNOR        TEST IF DEC ONLY BIT = 1. IF SO,
 1626    REF    4  LAST  429   41,3144  0 2261 0            TC       DPTEST          ALARM AND RECYCLE. IF NOT, CONTINUE.
 1627    REF    3  LAST  429   41,3145  0 3151 1            TC       PUTCOM2 -4      NO DP
 1628    REF   79  LAST  429   41,3146  3 4755 1            CAF      ZERO            DP
 1629    REF   26  LAST  429   41,3147  54 117 1            TS       DECOUNT
 1630    REF    1              41,3150  0 3130 0            TC       PUTDPCOM

 1631    REF    8  LAST  416   41,3151  3 0146 1            CA       NNADTEM
 1632    REF   43  LAST  427   41,3152  6 4753 1            AD       ONE             IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1633                          41,3153  0 0006 1            EXTEND
 1634    REF    1              41,3154  1 3161 0            BZF      CHANLOAD
 1635    REF  137  LAST  429   41,3155  56 154 1  PUTCOM2   XCH      MPAC
 1636    REF    2  LAST  429   41,3156  0 0115 1            TC       DECRET

 1637    REF   38  LAST  427     C777                       EBANK=   DSPCOUNT
 1638    REF    1              41,3157   02147 1  GTSFINLC  2CADR    GTSFIN
 1638    REF    1              41,3160   64101 0


 1639    REF    3  LAST  425   41,3161  4 4757 1  CHANLOAD  CS       SEVEN           DONT LOAD CHAN 7. (IT = SUPERBANK).
 16391   REF    4  LAST  416   41,3162  6 1017 0            AD       NOUNCADR
 16392                         41,3163  0 0006 1            EXTEND
 16393   REF    8  LAST  427   41,3164  1 2775 1            BZF      LOADLV
 16394   REF    5  LAST  430   41,3165  3 1017 0            CA       NOUNCADR
 1640    REF    7  LAST  416   41,3166  7 5004 1            MASK     LOW9
 1641    REF  133  LAST  430   41,3167  56 154 1            XCH      MPAC
 16411                         41,3170  0 0006 1            EXTEND
 16412   REF  139  LAST  430   41,3171  5 0154 1            INDEX    MPAC
 1642                          41,3172  01 000 0            WRITE    0
 1643    REF    9  LAST  430   41,3173  0 2775 0            TC       LOADLV

R1644    PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1645    REF    2  LAST  416   41,3174  0 3047 1  PUTDECSF  TC       SFCONUM         2X(SF CON NUMB) IN A
 1646    REF   13  LAST  420   41,3175  54 123 0            TS       SFTEMP1
 1647                          41,3176  0 0006 1            EXTEND                   SWITCH BANKS TO SF CONSTANT TABLE
 1648    REF    1              41,3177  3 3160 0            DCA      GTSFINLC        READING ROUTINE.
 1649    REF   12  LAST  427   41,3200  52 006 0            DXCH     Z               LOADS SFTEMP1, SFTEMP2.
 1650    REF   11  LAST  429   41,3201  50 140 1            INDEX    MIXBR
 1651                          41,3202  0 3202 1            TC       +0
 1652    REF    1              41,3203  0 3206 0            TC       PUTSFNOR
 1653    REF    4  LAST  429   41,3204  0 3034 0            TC       SFRUTMIX
 1654    REF    1              41,3205  0 3207 1            TC       PUTDCSF2
 1655    REF    4  LAST  430   41,3206  0 3026 0  PUTSFNOR  TC       SFRUTNOR

 1656    REF  130  LAST  428   41,3207  50 000 1  PUTDCSF2  INDEX    A
 1657    REF    1              41,3210  3 3212 0            CAF      SFINTABR
 1658    REF    4  LAST  417    41,3211  0 4640 1             TC       BANKJUMP          SWITCH BANKS FOR EXPANSHION ROOM
 1659    REF    1               41,3212   62350 0  SFINTAB# CADR     GOALMCYC          ALARM AND RECYCLE IF DEC LOAD
A1660                                                                                    WITH OCTAL ONLY NOUN.
 1661    REF    1               41,3213   61106 1             CADR     BINROUND
 1662    REF    1               41,3214   61010 1             CADR     DEGINSF
 1663    REF    1               41,3215   61076 1             CADR     ARTHINSF
 1664    REF    1               41,3216   61114 1             CADR     DPINSF
 1665    REF    1               41,3217   61141 1             CADR     DPINSF2
 1666    REF    4  LAST  424    41,3220   61420 0             CADR     DSPALARM          LRPOSOUT CANT BE LOADED.
 1667    REF    2  LAST  431    41,3221   61114 1             CADR     DPINSF            SAME AS ARITHDP1
 1668    REF    1               41,3222   65452 1             CADR     HMSIN
 1669    REF    5  LAST  431    41,3223   61420 0             CADR     DSPALARM          MIN/SEC CANT BE LOADED.
 1671    REF    1               41,3224   61146 0             CADR     DPINSF4
 16711   REF    1               41,3225   61111 1             CADR     ARTIN1SF
 16712   REF    6  LAST  431    41,3226   61420 0             CADR     DSPALARM          2INTOUT CANT BE LOADED.
 16714   REF    2  LAST  431    41,3227   61010 1             CADR     DEGINSF           TESTS AT END FOR 360-CDU
 1672                           41,3230            ENDRUTIN EQUALS


R1673    SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1674    ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET


 1675    REF    1               40,3010                       SETLOC ENDDPDEC +1

 16755   REF    4 LAST  424 TO  425:     15    457*           COUNT* $$/PIN
R1676    DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

 1677    REF    6  LAST  424    40,3010  0 7103 1  DEGINSF    TC       DMP               SF ROUTINE FOR DEC DEGREES
 1678    REF    1               40,3011   03074 1             ADRES    DEGCON1           MULT BY 5.5  5(10)X2EXP-3
 1679    REF 140   LAST  430    40,3012  10 155 1             CCS      MPAC      +1      THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
 1680    REF  19   LAST  403    40,3013  3 4741 1             CAF      BIT11             LEFT 3, AND CAUSES 360.00 TO OF/UF
 1681                           40,3014  0 3016 0             TC       +2                WHEN SHIFTED LEFT AND ALARM.
 1682    REF  20   LAST  431    40,3015  4 4741 0             CS       BIT11
 1683    REF 141   LAST  431    40,3016  6 0155 0             AD       MPAC      +1
 1684    REF    1               40,3017  0 3165 0             TC       2ROUND    +2
 1685    REF    3  LAST  423    40,3020  0 4404 0             TC       TPSL1             LEFT 1
 1686    REF    4  LAST  431    40,3021  0 4404 0  DEGINSF2   TC       TPSL1             LEFT 2
 1687    REF    1               40,3022  0 3174 0             TC       TESTOFUF
 1688    REF    5  LAST  431    40,3023  0 4404 0             TC       TPSL1             RETURNS IF NO OF/UF (LEFT3)
 1689    REF 142   LAST  431    40,3024  10 154 0             CCS      MPAC
 1690    REF    1               40,3025  0 3031 0             TC       SIGNFIX           IF+, GO TO SIGNFIX
 1691    REF    2  LAST  431    40,3026  0 3031 0             TC       SIGNFIX           IF +0, GO TO SIGNFIX
 1692                           40,3027  4 0000 0             COM                        IF - , USE -MAGNITUDE +1
 1693    REF 143   LAST  431    40,3030  54 154 0             TS       MPAC              IF -0, USE +0
 1694    REF    4  LAST  429    40,3031  10 162 0  SIGNFIX    CCS      MPAC+6
 1695    REF    1               40,3032  0 3070 0             TC       SGNTO1            IF OVERFLOW
 1696    REF    1               40,3033  0 3043 0             TC       ENDSCALE          NO OVERFLOW/UNDERFLOW
 1697    REF 144   LAST  431    40,3034  10 154 0             CCS      MPAC              IF UF FORCE SIGN TO 0 EXCEPT -180
 1698    REF    5  LAST  415    40,3035  0 5705 0             TC       CCSHOLE
 1699    REF   1                40,3036  0 3066 1           TC       NEG180
 1700                           40,3037  0 3040 0           TC       +1
 1701    REF 145  LAST  431     40,3040  56 154 1           XCH      MPAC
 1702    REF   7  LAST  418     40,3041  7 4733 0           MASK     POSMAX
 1703    REF 146  LAST  432     40,3042  54 154 0           TS       MPAC
 1704    REF  12  LAST  430     40,3043  50 140 1 ENDSCALE INDEX    MIXBR              IF ROUTINE NO. IS NOT CDU DEGREES,
 17040                          40,3044  0 3044 1           TC       +0                  THEN THIS IS 360 - CDU DEGREES
 17041                          40,3045  0 3050 1           TC       +3                  AND ANGLE IN MPAC MUST BE REPLACED
 17042   REF   1                40,3046  0 3060 1           TC       SFMIXCAL            BY 360 DEGREES MINUS ITSELF.
 17043                          40,3047  0 3051 0 MIXBACK   TC       +2
 17044   REF   1                40,3050  0 3063 1           TC       SFNORCAL
 1705    REF 131  LAST  430     40,3051  4 0000 0 NORBACK   CS       A
 17051   REF  24  LAST  283     40,3052  6 4752 0           AD       BIT2
 17052                          40,3053  0 0006 1           EXTEND
 17053                          40,3054  1 3056 0           BZF      +2
 17054   REF   2  LAST  418     40,3055  0 2625 1           TC       360-CDU
 17055   REF  25  LAST  427     40,3056  0 4635 0 ENDSCAL1  TC       POSTJUMP
 17056   REF   4  LAST  430     40,3057   63155 0           CADR     PUTCOM2

 17057   REF  86  LAST  423     40,3060  0 4616 1 SFMIXCAL  TC       BANKCALL
 17058   REF   5  LAST  430     40,3061   63034 0           CADR     SFRUTMIX
 17059   REF   1                40,3062  0 3047 1           TC       MIXBACK

 170591  REF  87  LAST  432     40,3063  0 4616 1 SFNORCAL  TC       BANKCALL
 170592  REF   5  LAST  430     40,3064   63026 0           CADR     SFRUTNOR
 170593  REF   1                40,3065  0 3051 0           TC       NORBACK

 1706    REF   8  LAST  432     40,3066  4 4733 0 NEG180    CS       POSMAX
 1707    REF   2  LAST  431     40,3067  0 3042 1           TC       ENDSCALE  -1

 1708    REF 147  LAST  432     40,3070  4 0154 0 SGNTO1    CS       MPAC                IF OF FORCE SIGN TO 1
 1709    REF   9  LAST  432     40,3071  7 4733 0           MASK     POSMAX
 1710    REF 132  LAST  432     40,3072  4 0000 0           CS       A
 1711    REF   3  LAST  432     40,3073  0 3042 1           TC       ENDSCALE  -1

 1712                           40,3074   26161 0 DEGCON1   2DEC     5.555555555 B-3
 1712                           40,3075   30707 1

 1715    REF   7  LAST  431     40,3076  0 7103 1 ARTHINSF  TC       DMP                 SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
 1716    REF  14  LAST  430     40,3077   00123 1           ADRES    SFTEMP1             ASSUMES POINT BETWEEN HI AND LO PARTS
 1717    REF 148  LAST  432     40,3100  56 156 0           XCH      MPAC     +2         OF SFCON. SHIFTS RESULTS LEFT BY 14.
 1718    REF 149  LAST  432     40,3101  56 155 0           XCH      MPAC     +1         (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
 1719    REF 150  LAST  432     40,3102  56 154 1           XCH      MPAC
 1720                           40,3103  0 0006 1           EXTEND
 1721    REF   2  LAST  431     40,3104  1 3106 1           BZF      BINROUND
 1722    REF   5  LAST  428     40,3105  0 4145 0           TC       ALMCYCLE            TOO LARGE A LOAD. ALARM AND RECYCLE.
 1723    REF   2  LAST  431     40,3106  0 3163 0 BINROUND  TC       2ROUND
 1724    REF   2  LAST  431     40,3107  0 3174 0           TC       TESTOFUF
 1725    REF   1                40,3110  0 3056 1           TC       ENDSCAL1            RETURNS IF NO OF/UF
 17251  REF   8  LAST  432    40,3111  0 7103 1  ARTINISF TC      DMP              SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
 17252  REF  15  LAST  432    40,3112   00123 1           ADRES   SFTEMP1          ROUNDS MPAC+1 INTO MPAC.
 17253  REF   3  LAST  432    40,3113  0 3106 0           TC      BINROUND


 1739   REF   9  LAST  433    40,3114  0 7103 1  DPINSF   TC      DMP              SCALES MPAC, MPAC +1 BY SFTEMP1,
 1740   REF  16  LAST  433    40,3115   00123 1           ADRES   SFTEMP1          SFTEMP2.  STORES LOW PART OF RESULT
 1741   REF 151  LAST  432    40,3116  56 156 0           XCH     MPAC      +2     IN (E SUBK) +1 OR E+1
 1742                         40,3117  6 0000 1           DOUBLE
 1743   REF 152  LAST  433    40,3120  54 156 1           TS      MPAC      +2
 1744   REF  80  LAST  430    40,3121  3 4755 1           CAF     ZERO
 1745   REF 153  LAST  433    40,3122  6 0155 0           AD      MPAC      +1
 1746   REF   3  LAST  432    40,3123  0 3165 0           TC      2ROUND    +2
 1747   REF   3  LAST  432    40,3124  0 3174 0           TC      TESTOFUF
 1748   REF  13  LAST  432    40,3125  50 140 1           INDEX   MIXBR            RETURNS IF NO OF/UF
 1749                         40,3126  0 3126 1           TC      +0
 1750   REF   1               40,3127  0 3137 1           TC      DPINORM
 1751   REF  27  LAST  430    40,3130  3 0117 0           CA      DECOUNT          MIXEDNOUN
 1752   REF  27  LAST  429    40,3131  6 0145 1  DPINCOM  AD      NOUNADD              MIXED                NORMAL
 1753   REF  88  LAST  429    40,3132  54 002 1           TS      Q                  E SUBK             E
 1754   REF 154  LAST  433    40,3133  56 155 0           XCH     MPAC      +1
 1755   REF  89  LAST  433    40,3134  50 002 0           INDEX   Q
 1756                         40,3135  54 001 1           TS      1                PLACE LOW PART IN
 1757   REF   2  LAST  432    40,3136  0 3056 1           TC      ENDSCAL1         (E SUBK) +1    MIXED

 1758   REF  81  LAST  433    40,3137  3 4755 1  DPINORM  CAF     ZERO             E +1           NORMAL
 1759   REF   1               40,3140  0 3131 1           TC      DPINCOM


 1760   REF  10  LAST  433    40,3141  0 7103 1  DPINSF2  TC      DMP              ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1761   REF  17  LAST  433    40,3142   00123 1           ADRES   SFTEMP1          PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1762   REF  13  LAST  425    40,3143  3 6242 0           CAF     SIX              LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1
 1763   REF   2  LAST  419    40,3144  0 3153 0           TC      TPLEFTN          SHIFT LEFT 7.
 1764   REF   3  LAST  431    40,3145  0 3116 1           TC      DPINSF    +2


 1765   REF  11  LAST  433    40,3146  0 7103 1  DPINSF4  TC      DMP              ASSUMES POINT BETWEEN BITS 11-12 OF HIGH
 1766   REF  18  LAST  433    40,3147   00123 1           ADRES   SFTEMP1          PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1767   REF  28  LAST  427    40,3150  3 4752 0           CAF     TWO              LEFT BY 3, ROUNDS MPAC+2 INTO MPAC+1.
 1768   REF   3  LAST  433    40,3151  0 3153 0           TC      TPLEFTN          SHIFT LEFT 3.
 1769   REF   4  LAST  433    40,3152  0 3116 1           TC      DPINSF    +2


 1770   REF  90  LAST  433    40,3153  56 002 0  TPLEFTN  XCH     Q                SHIFTS MPAC, +1, +2 LEFT N. SETS OVFIND
 1771   REF   1               40,3154  54 124 1           TS      SFTEMP2          TO +1 FOR OF, -1 FOR UF.
 1772   REF  91  LAST  433    40,3155  56 002 0           XCH     Q                CALL WITH N-1 IN A.
 1773   REF  19  LAST  433    40,3156  54 123 0  LEFTNCOM TS      SFTEMP1              LOOP TIME .37 MSEC.
 1774   REF   6  LAST  431    40,3157  0 4404 0           TC      TPSL1
 1775   REF  20  LAST  433    40,3160  10 123 0           CCS     SFTEMP1
 1776   REF   1               40,3161  0 3156 0           TC      LEFTNCOM
 1777    REF   2  LAST  433    40,3162  0 0124 0            TC      SFTEMP2


 1778    REF 155  LAST  433    40,3163  56 155 0  2ROUND    XCH     MPAC       +1
 1779                          40,3164  6 0000 1            DOUBLE
 1780    REF 156  LAST  434    40,3165  54 155 1            TS      MPAC       +1
 1781    REF  92  LAST  433    40,3166  0 0002 0            TC      Q                   IF MPAC+1 DOES NOT OF/UF
 1782    REF 157  LAST  434    40,3167  6 0154 1            AD      MPAC
 1783    REF 158  LAST  434    40,3170  54 154 0            TS      MPAC
 1784    REF  93  LAST  434    40,3171  0 0002 0            TC      Q                   IF MPAC DOES NOT OF/UF
 1785    REF   5  LAST  431    40,3172  54 162 0            TS      MPAC+6
 1786    REF  94  LAST  434    40,3173  0 0002 0  2RNDEND   TC      Q


 1787    REF   6  LAST  434    40,3174  10 162 0  TESTOFUF CCS     MPAC+6              RETURNS IF NO OF/UF
 1788    REF   6  LAST  432    40,3175  0 4145 0            TC      ALMCYCLE            OF    ALARM AND RECYCLE.
 1789    REF  95  LAST  434    40,3176  0 0002 0            TC      Q
 1790    REF   7  LAST  434    40,3177  0 4145 0            TC      ALMCYCLE            UF    ALARM AND RECYCLE.


 1791    REF   1               42,3452                      SETLOC ENDSPMIN +1

 17915   REF   2 LAST   421 TC  424:    146     146*        COUNT* $$/PIN
 1792    REF   1               42,3452  0 3573 0  HMSIN     TC      ALL3DEC             IF ALL 3 WORDS WERE NOT LOADED, ALARM.
 1793    REF  12  LAST  433    42,3453  0 7103 1            TC      DMP                 XREG, XREGLP (=HOURS) WERE ALREADY PUT
 1794    REF   1               42,3454   03534 0            ADRES   WHOLECON            INTO MPAC, MPAC+1.
 1795    REF   1               42,3455  0 3543 0            TC      RND/TST             ROUND OFF TO WHOLE HRS IN MPAC+1.
 1796    REF  82  LAST  433    42,3456  3 4755 1            CAF     ZERO                ALARM IF MPAC NON ZERO (G/ 16383 ).
 1797    REF 159  LAST  434    42,3457  54 156 1            TS      MPAC       +2
 1798    REF   1               42,3460  3 3536 1            CAF     HRCON
 1799    REF 160  LAST  434    42,3461  54 154 0            TS      MPAC
 1800    REF   2  LAST  434    42,3462  3 3537 0            CAF     HRCON      +1
 1801    REF 161  LAST  434    42,3463  56 155 0            XCH     MPAC       +1
 1802    REF   4  LAST  422    42,3464  0 7307 1            TC      SHOFTMP
 1803    REF   1               42,3465  0 3554 0            TC      MPACTST             ALARM IF MPAC NON ZERO (G/ 745)
 1804    REF 162  LAST  434    42,3466  52 156 1            DXCH    MPAC       +1       STORE HOURS CONTRIBUTION
 1805    REF   1               42,3467  52 124 1            DXCH    HITEMIN
 1806    REF   3  LAST  426    42,3470  3 1004 1            CA      YREG                PUT YREG, YREGLP INTO MPAC, +1.
 1807    REF   2  LAST  101    42,3471  23 007 1            LXCH    YREGLP
 1808    REF 163  LAST  434    42,3472  52 155 1            DXCH    MPAC
 1809    REF  13  LAST  434    42,3473  0 7103 1            TC      DMP
 1810    REF   2  LAST  434    42,3474   03534 0            ADRES   WHOLECON
 1811    REF   2  LAST  434    42,3475  0 3543 0            TC      RND/TST             ROUND OFF TO WHOLE MIN IN MPAC+1
 1812    REF   1               42,3476  4 3541 0            CS      59MIN               ALARM IF MPAC NON ZERO (G/16383)
 1813    REF   1               42,3477  0 3561 0            TC      SIZETST             ALARM IF MPAC+1 G/ 59MIN
 1814    REF 164  LAST  434    42,3500  56 155 0            XCH     MPAC       +1
 1815                          42,3501  0 0006 1            EXTEND
 1816    REF   1               42,3502  7 3540 1            MP      MINCON              LEAVES MINUTES CONTRIBUTION IN A,L
 1817    REF   2  LAST  434    42,3503  20 124 1            DAS     HITEMIN             ADD IN MINUTES CONTRIBUTION
 1818                          42,3504  0 0006 1            EXTEND                      IF THIS DAS OVERFLOWS, G/ 745HR,39MIN
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1819                              42,3505  1 3507 1             BZF      +2
1820    REF   8  LAST 434         42,3506  0 4145 0             TC       ALMCYCLE
1821    REF   3  LAST 426         42,3507  3 1005 0             CA       ZREG                 PUT ZREG, ZREGLP INTO MPAC, +1.
1822    REF   2  LAST 101         42,3510  23'010 1             LXCH     ZREGLP
1823    REF 165  LAST 434         42,3511  52 155 1             DXCH     MPAC
1824    REF  14  LAST 434         42,3512  0 7103 1             TC       DMP
1825    REF   3  LAST 434         42,3513   03534 0             ADRES    WHOLECON
1826    REF   3  LAST 434         42,3514  0 3543 0             TC       RND/TST              ROUND OFF TO WHOLE CENTI-SEC IN MPAC+1
1827    REF   1                   42,3515  4 3542 0             CS       59.99SEC             ALARM IF MPAC NON ZERO (G/163.83 SEC)
1828    REF   2  LAST 434         42,3516  0 3561 0             TC       SIZETST              ALARM IF MPAC+1 G/59.99 SEC
1829    REF   3  LAST 434         42,3517  52 124 1             DXCH     HITEMIN              ADD IN SECONDS CONTRIBUTION
1830    REF 166  LAST 435         42,3520  20 155 1             DAS      MPAC                 IF THIS DAS OVERFLOWS,
1831                              42,3521  0 0006 1             EXTEND                        G/ 745 HR, 39 MIN, 14.55 SEC.
1832                              42,3522  1 3524 0             BZF      +2
1833    REF   9  LAST 435         42,3523  0 4145 0             TC       ALMCYCLE             ALARM AND RECYCLE
1834    REF  83  LAST 434         42,3524  3 4755 1             CAF      ZERO
1835    REF 167  LAST 435         42,3525  54 156 1             TS       MPAC       +2
1836    REF   6  LAST 424         42,3526  0 7257 0             TC       TPAGREE
1837    REF 168  LAST 435         42,3527  52 155 1             DXCH     MPAC
1838    REF  28  LAST 433         42,3530  50 145 1             INDEX    NCUNADD
1839                              42,3531  52 001 1             DXCH     0
1840    REF  26  LAST 432         42,3532  0 4635 0             TC       POSTJUMP
1841    REF  10  LAST 430         42,3533   62775 0             CADR     LOADLV

1842                              42,3534   00006 1 WHOLECON    OCT      00006                (10EXP5/2EXP14)2EXP14
1843                              42,3535   03240 1             OCT      03240
1844                              42,3536   00025 0 HRCON       OCT      00025                1 HOUR IN CENTI-SEC
1845                              42,3537   37100 1             OCT      37100
1846                              42,3540   13560 0 MINCON      OCT      13560                1 MINUTE IN CENTI-SEC
1847                              42,3541   00073 0 59MIN       OCT      00073                59 AS WHOLE
1848                              42,3542   13557 1 59.99SEC    OCT      13557                5999 CENTI-SEC


1849    REF 169  LAST 435         42,3543  56 156 0 RND/TST     XCH      MPAC       +2        ROUNDS MPAC+2 INTO MPAC+1.
1850                              42,3544  6 0000 1             DOUBLE                        ALARMS IF MPAC NOT 0
1851    REF 170  LAST 435         42,3545  54 156 1             TS       MPAC       +2
1852    REF  84  LAST 435         42,3546  3 4755 1             CAF      ZERO
1853    REF 171  LAST 435         42,3547  6 0155 0             AD       MPAC       +1
1854    REF 172  LAST 435         42,3550  54 155 1             TS       MPAC       +1
1855    REF  85  LAST 435         42,3551  3 4755 1             CAF      ZERO
1856    REF 173  LAST 435         42,3552  6 0154 1             AD       MPAC                 CANT OVFLOW
1857    REF 174  LAST 435         42,3553  56 154 1             XCH      MPAC
1858    REF 175  LAST 435         42,3554  10 154 0 MPACTST     CCS      MPAC                 ALARM IF MPAC NON ZERO
1859    REF  10  LAST 435         42,3555  0 4145 0             TC       ALMCYCLE             ALARM AND RECYCLE.
1860    REF  96  LAST 434         42,3556  0 0002 0             TC       Q
1861    REF  11  LAST 435         42,3557  0 4145 0             TC       ALMCYCLE             ALARM AND RECYCLE.
1862    REF  97  LAST 435         42,3560  0 0002 0             TC       Q

1863    REF 176  LAST 435         42,3561  54 156 1 SIZETST     TS       MPAC       +2        CALLED WITH - CON IN A
1864    REF 177  LAST 435         42,3562  10 155 1             CCS      MPAC       +1        GET MAG OF MPAC+1
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 1865   REF  44  LAST  430   42,3563  6 4753 1             AD      ONE
 1866                        42,3564  1 3566 0             TCF     +2
 1867   REF  45  LAST  435   42,3565  6 4753 1             AD      ONE
 1868   REF 178  LAST  435   42,3566  6 0156 0             AD      MPAC      +2
 1869                        42,3567  0 0006 1             EXTEND                   MAG OF MPAC+1 - CON
 1870                        42,3570  6 3572 1             BZMF    +2
 1871   REF  12  LAST  435   42,3571  0 4145 0             TC      ALMCYCLE         MAG OF MPAC+1 G/ CON. ALARM AND RECYCLE.
 1872   REF  98  LAST  435   42,3572  0 0002 0             TC      Q                MAG OF MPAC+1 L/= CON

R1873   ALL3DEC TESTS THAT ALL 3 WORDS ARE LOADED IN DEC (FOR HMSIN).
R1874   ALARM IF NOT.( TEST THAT BITS 3,4,5 OF DECBRNCH ARE ALL = 1)
 1875   REF   1              42,3573  4 3600 0  ALL3DEC    CS      OCT34BAR         GET BITS 3,4,5 IN A
 1876   REF  17  LAST  429   42,3574  7 1000 1             MASK    DECBRNCH         GET BITS 3,4,5 OF DECBRNCH IN A
 1877   REF   2  LAST  436   42,3575  6 3600 1             AD      OCT34BAR         BITS 3,4,5 OF DECBRNCH MUST ALL = 1
 1878   REF 133  LAST  432   42,3576  10 000 0             CCS     A
 1879   REF   1              42,3577  0 3603 1             TC      FORCEV25
 1880                        42,3600   77743 1  OCT34BAR   OCT     77743
 1881   REF   2  LAST  436   42,3601  0 3603 1             TC      FORCEV25
 1882   REF  99  LAST  436   42,3602  0 0002 0             TC      Q

 18825  REF   2  LAST  209   42,3603  4 6010 1  FORCEV25   CS      OCT31            FORCE VERB 25 TO BE EXECUTED BY RECYCLE
 18826  REF   2  LAST  407   42,3604  55'041 1             TS      VERBSAVE          IN CASE OPERATOR EXECUTED A LOWER LOAD
 18827  REF  13  LAST  436   42,3605  0 4145 0             TC      ALMCYCLE          VERB.  ALARM AND RECYCLE.
 1883                        42,3606            ENDHMSS    EQUALS
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R1884    MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1885    VERB PROCEED WITHOUT DATA, VERB RESEQUENCE,
R1886    ANOTHER MONITOR, OR ANY NVSUB CALL THAT PASSES THE DSPLOCK (PROVIDED
R18861   THAT THE OPERATOR HAS SOMEHOW ALLOWED THE ENDING OF A MONITOR WHICH
R18862   HE HAS INITIATED THROUGH THE KEYBOARD).

R1887    MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1888    EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1889    MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1890    NOUNCADR IN MONSAVE1, IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1891    MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT). BIT 14 OF MONSAVE1
R18911   INDICATES THE CURRENT MONITOR WAS EXTERNALLY INITIATED (EXTERNAL
R18912   MONITOR BIT). IT IS TURNED OFF BY RELDSP AND KILMONON.

R1892    MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1893    IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1894    IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1895    NVSUB (IF EXTERNAL MONITOR BIT IS OFF), VB=PROCEED WITHOUT DATA,
R1896    VB=RESEQUENCE, AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1897    IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1898    AND MONSAVE1 (TURNING OFF KILLER BIT AND EXTERNAL MONITOR BIT).

R1899    MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1900    REF    1               41,3230                        SETLOC ENDPUTIN

 1900*   REF    3 LAST  425 TO  431:    266    264*             COUNT* $$/PIN
 1901    REF    1               41,3230  4 3237 0  MONITOR      CS       BIT15/14
 1902    REF    6  LAST  430    41,3231  7 1017 1               MASK     NOUNCADR
 1903    REF 179  LAST  436     41,3232  54 155 1  MONIT1       TS       MPAC     +1       TEMP STORAGE
 19031   REF    7  LAST  424    41,3233  4 0136 1               CS       ENTEXIT
 19032   REF    4  LAST  407    41,3234  6 4217 1               AD       ENDINST
 19033   REF 134  LAST  436     41,3235  10 000 0               CCS      A
 19034   REF    1               41,3236  0 3245 1               TC       MONIT2
 19035                          41,3237   60000 1  BIT15/14     OCT      60000
 19036   REF    2  LAST  437    41,3240  0 3245 1               TC       MONIT2
 19037   REF   38  LAST  415    41,3241  3 4736 1               CAF      BIT14             EXTERNALLY INITIATED MONITOR,
 19038   REF 180  LAST  437     41,3242  26 155 1               ADS      MPAC +1           SET BIT 14 FOR MONSAVE1.
 190381  REF   86  LAST  435    41,3243  3 4755 1               CAF      ZERO
 190382  REF    1               41,3244  55'022 1               TS       MONSAVE2          ZERO NVMONOPT OPTIONS
 1904    REF    3  LAST  232    41,3245  3 6074 1  MONIT2       CAF      LOW7
 1905    REF   17  LAST  414    41,3246  7 1001 0               MASK     VERBREG
 1906    REF    4  LAST  429    41,3247  0 4331 1               TC       LEFT5
 1907    REF    5  LAST  400    41,3250  54 022 0               TS       CYL
 1908    REF    6  LAST  437    41,3251  4 0022 0               CS       CYL
 1909    REF    7  LAST  437    41,3252  56 022 1               XCH      CYL
 1910    REF   11  LAST  425    41,3253  6 1002 1               AD       NOUNREG
 1911    REF 181  LAST  437     41,3254  54 154 0               TS       MPAC              TEMP STORAGE
 1912    REF   87  LAST  437    41,3255  3 4755 1               CAF      ZERO
 1913   REF    3  LAST  398    41,3256  55'012 1            TS       DSPLOCK         +0 INTO DSPLOCK SO MONITOR CAN RUN.
 1914   REF    4  LAST  407    41,3257  11'042 1            CCS      CADRSTOP        TURN OFF KR LITE IF CADRSTOP AND DSPLIST
 1915                          41,3260  0 3262 1            TC       +2              ARE BOTH EMPTY. (LITE COMES ON IF NEW
 1916   REF    1               41,3261  0 4502 1            TC       RELDSP1         MONITOR IS KEYED IN OVER OLD MONITOR.)
 1917                          41,3262  0 0004 0            INHINT
 1918   REF    2  LAST  222    41,3263  11'020 0            CCS      MONSAVE
 1919                          41,3264  0 3271 0            TC       +5              IF MONSAVE WAS +, NO REQUEST
 1920   REF   46  LAST  436    41,3265  3 4753 1            CAF      ONE             IF MONSAVE WAS 0, REQUEST MONREQ
 1921   REF   15  LAST  367    41,3266  0 5203 0            TC       WAITLIST
 1922   REF   39  LAST  430       0777                      EBANK=   DSPCOUNT
 1923   REF    1               41,3267   03275 1            2CADR    MONREQ
 1923   REF    1               41,3270   62101 0
 1924   REF  182  LAST  437    41,3271  52 155 1            DXCH     MPAC            PLACE MONITOR VERB AND NOUN INTO MONSAVE
 1925   REF    3  LAST  438    41,3272  53'021 1            DXCH     MONSAVE         ZERO THE KILL MONITOR BIT
 1926                          41,3273  0 0003 1            RELINT                   SET UP EXTERNAL MONITOR BIT
 1927   REF    4  LAST  406    41,3274  0 0136 0            TC       ENTRET


 1928   REF    1               41,3275  0 4400 1  MONREQ    TC       LODSAMPT        CALLED BY WAITLIST
 1929   REF    2  LAST  222    41,3276  11'021 1            CCS      MONSAVE1        TIME IS SNATCHED IN RUPT FOR NOUN 65
 1930                          41,3277  0 3303 1            TC       +4              IF KILLER BIT = 0, ENTER REQUESTS
 1931                          41,3300  0 3303 1            TC       +3              IF KILLER BIT = 0, ENTER REQUESTS
 1932   REF    1               41,3301  0 3314 1            TC       KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1933   REF    2  LAST  438    41,3302  0 3314 1            TC       KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1934   REF    1               41,3303  3 3320 0            CAF      MONDEL
 1935   REF   16  LAST  438    41,3304  0 5203 0            TC       WAITLIST        ENTER WAITLIST REQUEST FOR MONREQ
 1936   REF   40  LAST  438       0777                      EBANK=   DSPCOUNT
 1937   REF    2  LAST  438    41,3305   03275 1            2CADR    MONREQ
 1937                          41,3306   62101 0
 1938   REF    2  LAST  158    41,3307  3 4355 0            CAF      CHRPRIO
 1939   REF    5  LAST  328    41,3310  0 5072 1            TC       NOVAC           ENTER EXEC REQUEST FOR MONDO
 1940   REF   41  LAST  438       0777                      EBANK=   DSPCOUNT
 1941   REF    1               41,3311   02321 1            2CADR    MONDO
 1941   REF    1               41,3312   62101 0
 1942   REF   11  LAST  384    41,3313  0 5261 1            TC       TASKOVER

 1943   REF   88  LAST  437    41,3314  3 4755 1  KILLMON   CAF      ZERO            ZERO MONSAVE AND TURN KILLER BIT OFF
 1944   REF    4  LAST  438    41,3315  55'020 0            TS       MONSAVE
 1945   REF    3  LAST  438    41,3316  55'021 1            TS       MONSAVE1        TURN OFF KILL MONITOR BIT.
 1946   REF   12  LAST  438    41,3317  0 5261 1            TC       TASKOVER        TURN OFF EXTERNAL MONITOR BIT.
 1947                          41,3320   00144 0  MONDEL    OCT      144             FOR 1 SEC MONITOR INTERVALS


 1948   REF    4  LAST  438    41,3321  11'021 1  MONDO     CCS      MONSAVE1        CALLED BY EXEC
 1949                          41,3322  0 3326 0            TC       +4              IF KILLER BIT = 0, CONTINUE
 1950                          41,3323  0 3326 0            TC       +3              IF KILLER BIT = 0, CONTINUE
 1951   REF   47  LAST  404    41,3324  0 5155 0            TC       ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1952   REF   48  LAST  438    41,3325  0 5155 0            TC       ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1953   REF    4  LAST  438    41,3326  11'012 1            CCS      DSPLOCK
 1954   REF    1               41,3327  0 3351 0            TC       MONBUSY         NVSUB IS BUSY
 1955    REF   4  LAST  437   41,3330  3 6074 1            CAF      LOW7
 1956    REF   5  LAST  438   41,3331  7 1020 0            MASK     MONSAVE
 1958    REF   1              41,3332  0 2317 0            TC       UPDATNN  -1     PLACE NOUN INTO NOUNREG AND DISPLAY IT
 1960    REF   1              41,3333  3 4144 1            CAF      MID7
 1961    REF   6  LAST  439   41,3334  7 1020 0            MASK     MONSAVE         CHANGE MONITOR VERB TO DISPLAY VERB
 1962    REF   1              41,3335  6 3347 1            AD       MONREF          -DEC10, STARTING IN BIT8
 1963    REF   1              41,3336  54 023 1            TS       EDOP            RIGHT 7
 1964    REF   2  LAST  439   41,3337  3 0023 0            CA       EDOP
 1965    REF  18  LAST  437   41,3340  55'001 0            TS       VERBREG
 1966    REF   1              41,3341  3 3350 1            CAF      MONBACK         SET RETURN TO PASTEVB AFTER DATA DISPLAY
 1967    REF   5  LAST  438   41,3342  54 136 1            TS       ENTRET
 1968    REF   2  LAST  437   41,3343  4 3237 0            CS       BIT15/14
 1969    REF   5  LAST  438   41,3344  7 1021 1            MASK     MONSAVE1        PUT ECADR INTO MPAC +2. INTMCTBS WILL
 1970    REF 183  LAST  438   41,3345  54 156 1            TS       MPAC     +2     DISPLAY IT AND SET NOUNCADR, NOUNADD,
 1971    REF   1              41,3346  0 2046 1  ENDMONDO  TC       TESTNN          EBANK.

 1972                            4124                      BLOCK    2

 197201  REF   1                 4000                      SETLOC   FFTAG8
 197202                          4124                      BANK

 19725   REF   1                                           COUNT*   $$/PIN
 1973    REF   2  LAST  439      4124  3 4144 1  PASTEVB   CAF      MID7
 1974    REF   2  LAST  437      4125  7 1022 1            MASK     MONSAVE2        NVMONOPT PASTE OPTION
 1975                            4126  0 0006 1            EXTEND
 1976                            4127  1 4131 1            BZF      +2
 1977    REF   1                 4130  0 4132 0            TC       PASTEOPT        PASTE PLEASE VERB FOR NVMONOPT
 1978    REF   7  LAST  439      4131  3 1020 1            CA       MONSAVE         PASTE MONITOR VERB - PASTE OPTION IS 0
 19782   REF   3  LAST  439      4132  54 023 1  PASTEOPT  TS       EDOP            RIGHT 7
 19783   REF   4  LAST  439      4133  3 0023 0            CA       EDOP            PLACE MONITOR VERB OR PLEASE VERB INTO
 197832  REF  88  LAST  432      4134  0 4616 1            TC       BANKCALL         VERBREG AND DISPLAY IT.
 197833  REF   7  LAST  426      4135   62337 1            CADR     UPDATVB  -1
 197835  REF  89  LAST  438      4136  3 4755 1            CAF      ZERO            ZERO REQRET SO THAT PASTED VERBS CAN
 197838  REF  10  LAST  411      4137  55'013 0            TS       REQRET           BE EXECUTED BY OPERATOR.
 19784   REF   3  LAST  439      4140  3 1022 0            CA       MONSAVE2
 19785   REF   1                 4141  0 4255 1            TC       BLANKSUB        PROCESS NVMONOPT BLANK OPTION IF ANY
 19786                           4142  0 4143 0            TC       +1
 19787   REF  49  LAST  438      4143  0 5155 0  ENDPASTE  TC       ENDOFJOB

 1979                            4144   37600 0  MID7      OCT      37600


 1980    REF   1              41,3347                      SETLOC   ENDMONDO +1
 19805   REF   4 LAST  437 TO  439:     79    743*         COUNT*   $$/PIN
 1981                         41,3347   75377 0  MONREF    OCT      75377           -DEC10, STARTING IN BIT8
 1982    REF   1              41,3350   04124 1  MONBACK   ADRES    PASTEVB

 1983    REF   2  LAST  398   41,3351  0 4374 0  MONBUSY   TC       RELDSPON        TURN KEY RELEASE LIGHT
 1984    REF  50  LAST  439   41,3352  0 5155 0            TC       ENDOFJOB
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R1985   DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
R1986   IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
R1987   DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

R19871  FOR BANKS L/E 27, THIS IS ENOUGH.

R19872  FOR BANKS G/E 30, THE THIRD COMPONENT OF NOUN 26 (PRIO, ADRES, BBCON)
R19873  MUST BE PRELOADED WITH THE DESIRED SUPERBANK BITS (BITS 5,6,7).
R19874             V23N26 SHOULD BE USED.

R19875  SUMMARY
R19876  FOR BANKS L/E 27,                             V27N01E(FCADR)E
R19877  FOR BANKS G/E 30,     V23N26E(SUPERBITS)E     V27N01E(FCADR)E

  1988  REF  11  LAST  424    41,3353  3 4317 0  DSPFMEM   CAF     R1D1              IF F/F, DATACALL USES BANK 02 OR 03.
  1989  REF  42  LAST  438    41,3354  54 777 1            TS      DSPCOUNT
 19891  REF  17  LAST  374    41,3355  3 1047 0            CA      DSPTEM1 +2        SUPERBANK BITS WERE PRELOADED INTO
 19892  REF  58  LAST  428    41,3356  54 001 1            TS      L                 3RD COMPONENT OF NOUN 26.
  1990  REF   7  LAST  437    41,3357  3 1017 0            CA      NOUNCADR          ORIGINAL FCADR LOADED STILL IN NOUNCADR.
  1991  REF   1               41,3360  0 4651 1            TC      SUPDACAL          CALL WITH FCADR IN A, SUPERBITS IN L.
  1992  REF   3  LAST  414    41,3361  0 3363 1            TC      DSPOCTWD
  1993  REF  51  LAST  439    41,3362  0 5155 0  ENDSPF    TC      ENDOFJOB
```

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P1994    WORD DISPLAY ROUTINES

 1995    REF   4  LAST  433   40,3200                               SETLOC  TESTOFUF +4
 19955   REF   5 LAST  431 TO  434:   120    577*                   COUNT*  $$/PIN
 1996    REF 100  LAST  436   40,3200  56 002 0  DSPSIGN  XCH     Q
 1997    REF   1              40,3201  54 144 1           TS      DSPWDRET
 1998    REF 184  LAST  439   40,3202  10 154 0           CCS     MPAC
 1999                         40,3203  0 3213 1           TC      +8D
 2000                         40,3204  0 3213 1           TC      +7
 2001    REF  47  LAST  438   40,3205  6 4753 1           AD      ONE
 2002    REF 185  LAST  441   40,3206  54 154 0           TS      MPAC
 2003    REF   2  LAST  402   40,3207  0 2433 1           TC      -ON
 2004    REF 186  LAST  441   40,3210  4 0155 1           CS      MPAC  +1
 2005    REF 187  LAST  441   40,3211  54 155 1           TS      MPAC     +1
 2006    REF   2  LAST  441   40,3212  0 0144 0           TC      DSPWDRET
 2007    REF   3  LAST  420   40,3213  0 2413 0           TC      +ON
 2008    REF   3  LAST  441   40,3214  0 0144 0           TC      DSPWDRET

 2009                         40,3215  0 0006 1  DSPRND   EXTEND                         ROUND BY 5 EXP-6
 2010    REF   1              40,3216  3 3261 1           DCA     DECROUND -1
 2011    REF 188  LAST  441   40,3217  20 155 1           DAS     MPAC
 2012                         40,3220  0 0006 1           EXTEND
 2013                         40,3221  1 3225 0           BZF     +4
 2014                         40,3222  0 0006 1           EXTEND
 2015    REF   1              40,3223  3 4733 1           DCA     DPOSMAX
 2016    REF 189  LAST  441   40,3224  52 155 1           DXCH    MPAC
 2017    REF 101  LAST  441   40,3225  0 0002 0           TC      Q

R2018    DSPDECWD CONVERTS C( MPAC, MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2019    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT ROUNDS BY 5 EXP-6.

 2020    REF 102  LAST  441   40,3226  56 002 0  DSPDECWD XCH     Q
 2021    REF   1              40,3227  54 115 0           TS      WDRET
 2022    REF   1              40,3230  0 3200 0           TC      DSPSIGN
 2023    REF   1              40,3231  0 3215 1           TC      DSPRND
 2024    REF   7  LAST  333   40,3232  3 4751 0           CAF     FOUR
 2025    REF   1              40,3233  54 137 0  DSPDCWD1 TS      WDCNT
 2026    REF   1              40,3234  3 4363 0           CAF     BINCON
 2027    REF   5  LAST  434   40,3235  0 7307 1           TC      SHORTMP
 2028    REF 190  LAST  441   40,3236  50 154 1  TRACE1   INDEX   MPAC
 2029    REF   3  LAST  399   40,3237  3 4066 0           CAF     RELTAB
 2030    REF   5  LAST  429   40,3240  7 4346 0           MASK    LOW5
 2031    REF   6  LAST  422   40,3241  54 124 1           TS      CODE
 2032    REF  90  LAST  439   40,3242  3 4755 1           CAF     ZERO
 2033    REF 191  LAST  441   40,3243  56 156 0           XCH     MPAC     +2
 2034    REF 192  LAST  441   40,3244  56 155 0           XCH     MPAC     +1
 2035    REF 193  LAST  441   40,3245  54 154 0           TS      MPAC
 2036    REF  43  LAST  440   40,3246  56 777 0           XCH     DSPCOUNT
 2037    REF   4  LAST  423   40,3247  54 143 0  TRACE1S  TS      COUNT
 2038    REF 135  LAST  437   40,3250  10 000 0           CCS     A                      DECREMENT DSPCOUNT EXCEPT AT +0
 2039    REF  44  LAST  441   40,3251  54 777 1             TS       DSPCOUNT
 2040    REF   4  LAST  423   40,3252  0 3322 1             TC       DSPIN
 2041    REF   2  LAST  441   40,3253  10 137 0             CCS      WDCNT
 2042    REF   1              40,3254  0 3233 0             TC       DSPDCWD1
 2043    REF   7  LAST  427   40,3255  4 4360 1             CS       VD1
 2044    REF  45  LAST  442   40,3256  54 777 1             TS       DSPCOUNT
 2045    REF   2  LAST  441   40,3257  0 0115 1             TC       WDRET

 2046                         40,3260   00000 1             OCT      00000
 2047                         40,3261   02476 0  DECROUND   OCT      02476

R2048    DSPDECNR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2049    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

 2050    REF 103  LAST  441   40,3262  56 002 0  DSPDECNR   XCH      Q
 2051    REF   3  LAST  442   40,3263  54 115 0             TS       WDRET
 2052    REF   2  LAST  441   40,3264  0 3200 0             TC       DSPSIGN
 2053    REF   2  LAST  442   40,3265  0 3232 1             TC       DSPDCWD1 -1

R2054    DSPDC2NR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 2 CHAR DECIMAL
R2055    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

 2056    REF 104  LAST  442   40,3266  56 002 0  DSPDC2NR   XCH      Q
 2057    REF   4  LAST  442   40,3267  54 115 0             TS       WDRET
 2058    REF   3  LAST  442   40,3270  0 3200 0             TC       DSPSIGN
 2059    REF  48  LAST  441   40,3271  3 4753 1             CAF      ONE
 2060    REF   3  LAST  442   40,3272  0 3233 0             TC       DSPDCWD1


R2061    DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R2062    STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 2063    REF 105  LAST  442   40,3273  56 002 0  DSP2DEC    XCH      Q
 2064    REF   5  LAST  442   40,3274  54 115 0             TS       WDRET
 2065    REF  91  LAST  441   40,3275  3 4755 1             CAF      ZERO
 2066    REF   7  LAST  441   40,3276  54 124 1             TS       CODE
 2067    REF  15  LAST  422   40,3277  3 6245 1             CAF      THREE
 2068    REF   3  LAST  403   40,3300  0 3404 1             TC       11DSPIN           -R2 OFF
 2069    REF   8  LAST  441   40,3301  3 4751 0             CAF      FOUR
 2070    REF   4  LAST  442   40,3302  0 3404 1             TC       11DSPIN           +R2 OFF
 2071    REF   4  LAST  442   40,3303  0 3200 0             TC       DSPSIGN
 2072    REF   4  LAST  421   40,3304  3 4320 1             CAF      R2D1
 2073    REF   4  LAST  442   40,3305  0 3233 0  END2DEC    TC       DSPDCWD1

R2074    DSPDECVN DISPLAYS C(A) UPON ENTRY AS A 2 CHAR DECIMAL BEGINNING IN THE
R2075    DSP LOC SPECIFIED IN DSPCOUNT.
R2076    C(A) SHOULD BE IN FORM N X 2EXP-14. THIS IS SCALED TO FORM N/100 BEFORE
R2077    DISPLAY CONVERSION.
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 2078                            40,3306  0 0006 1  DSPDECVN EXTEND
 2079    REF   1                 40,3307  7 3316 1           MP       VNDSPCON         MULT BY .01
 2080    REF 194  LAST  441      40,3310  22 154 1           LXCH     MPAC             TAKE RESULTS FROM L.(MULT BY 2EXP14).
 2081    REF  92  LAST  442      40,3311  3 4755 1           CAF      ZERO
 2082    REF 195  LAST  443      40,3312  54 155 1           TS       MPAC     +1
 2083    REF 106  LAST  442      40,3313  56 002 0           XCH      Q
 2084    REF   6  LAST  442      40,3314  54 115 0           TS       WDRET
 2085    REF   3  LAST  423      40,3315  0 3271 0           TC       DSPDC2NF +3      NO SIGN, NO POUND, 2 CHAR

 2086                            40,3316   00244 0  VNDSPCON OCT      00244            .01 ROUNDED UP


 2087    REF   3  LAST  420      40,3317  0 3306 1  GOVNUPDT TC       DSPDECVN         THIS IS NOT FOR GENERAL USE. REALLY PART
 2088    REF  27  LAST  435      40,3320  0 4635 0           TC       POSTJUMP         OF UPDATVB.
 2089    REF   2  LAST  411      40,3321   62347 0           CADR     UPDAT1   +2

 2090                            40,3322            ENDECVN  EQUALS


 2091    REF   1                 41,3363                     SETLOC   ENDSPF   +1
 20915   REF   5 LAST  439 TO  441:     12    755*           COUNT*   $$/PIN
R2092    DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R2093    CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.

 2094    REF   8  LAST  437      41,3363  54 022 0  DSPOCTWD TS       CYL
 2095    REF 107  LAST  443      41,3364  56 002 0           XCH      Q
 2096    REF   7  LAST  443      41,3365  54 115 0           TS       WDRET            MUST USE SAME RETURN AS DSP2BIT.
 2097    REF   3  LAST  437      41,3366  3 4736 1           CAF      BIT14            TO BLANK SIGNS
 2098    REF  46  LAST  442      41,3367  26 777 1           ADS      DSPCOUNT
 2099    REF   9  LAST  442      41,3370  3 4751 0           CAF      FOUR
 2100    REF   3  LAST  442      41,3371  54 137 0  WDAGAIN  TS       WDCNT
 2101    REF   9  LAST  443      41,3372  4 0022 0           CS       CYL
 2102    REF  10  LAST  443      41,3373  4 0022 0           CS       CYL
 2103    REF  11  LAST  443      41,3374  4 0022 0           CS       CYL
 2104    REF 136  LAST  441      41,3375  4 0000 0           CS       A
 2105    REF   1                 41,3376  7 4757 1           MASK     DSPMSK
 2106    REF 137  LAST  443      41,3377  50 000 1           INDEX    A
 2107    REF   4  LAST  441      41,3400  3 4066 0           CAF      RELTAB
 2108    REF   6  LAST  441      41,3401  7 4346 0           MASK     LOW5
 2109    REF   8  LAST  442      41,3402  54 124 1           TS       CODE
 2110    REF  47  LAST  443      41,3403  56 777 0           XCH      DSPCOUNT
 2111    REF   5  LAST  441      41,3404  54 143 0           TS       COUNT
 2112    REF 138  LAST  443      41,3405  10 000 0           CCS      A                DECREMENT DSPCOUNT EXCEPT AT +0
 2113    REF  48  LAST  443      41,3406  54 777 1           TS       DSPCOUNT
 2114    REF  28  LAST  443      41,3407  0 4635 0           TC       POSTJUMP
 2115    REF   1                 41,3410   61412 1           CADR     DSPOCTIN
 2116    REF   4  LAST  443      41,3411  10 137 0  OCTBACK  CCS      WDCNT
 2117    REF   1                 41,3412  0 3371 1           TC       WDAGAIN          +
 2118    REF   1  LAST  442      41,3413  4 4360 1  DSPLV    CS       VD1              TO BLOCK NUMERICAL CHARACTERS, CLEARS,
 2119    REF  49  LAST  443      41,3414  54 777 1           TS       DSPCOUNT         AND SIGNS AFTER A COMPLETED DISPLAY.
 2120    REF    8  LAST  443    41,3415  0 0115 1                TC      WDRET

 2121    REF    4  LAST  430       4757             DSPMSK      =       SEVEN

R2122    DSP2BIT DISPLAYS C(A) UPON ENTRY AS A 2 CHAR OCT BEGINNING IN THE DSP
R2123    LOC SPECIFIED IN DSPCOUNT BY PRE CYCLING RIGHT C(A) AND USING THE LOGIC
R2124    OF THE 5 CHAR OCTAL DISPLAY

 2125    REF    3  LAST  232    41,3416  54 020 1   DSP2BIT     TS      CYR
 2126    REF  108  LAST  443    41,3417  56 002 0               XCH     Q
 2127    REF    9  LAST  444    41,3420  54 115 0               TS      WDRET
 2128    REF   49  LAST  442    41,3421  3 4753 1               CAF     ONE
 2129    REF    5  LAST  443    41,3422  54 137 0               TS      WDCNT
 2130    REF    4  LAST  444    41,3423  4 0020 1               CS      CYR
 2131    REF    5  LAST  444    41,3424  4 0020 1               CS      CYR
 2132    REF    6  LAST  444    41,3425  56 020 0               XCH     CYR
 2133    REF   12  LAST  443    41,3426  54 022 0               TS      CYL
 2134    REF    2  LAST  443    41,3427  0 3376 0               TC      WDAGAIN +5

R2135    FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
R2136    ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
R2137    FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
R2138    DSPTAB ENTRY INTO DSREL.

 2139    REF    1               40,3322                         SETLOC ENDECVN

 21395   REF    6 LAST  441 TO  443:     82    659*             COUNT* $$/PIN
 2140    REF  109  LAST  444    40,3322  56 002 0   DSPIN       XCH     Q               CANT USE L FOR RETURN, SINCE MANY OF THE
 2141    REF    1               40,3323  54 114 1               TS      DSEXIT          ROUTINES CALLING DSPIN USE L AS RETURN.
 2142    REF    7  LAST  443    40,3324  3 4346 1               CAF     LOW5
 2143    REF    6  LAST  443    40,3325  7 0143 0               MASK    COUNT
 2144    REF    6  LAST  428    40,3326  54 021 0               TS      SR
 2145    REF    7  LAST  444    40,3327  56 021 1               XCH     SR
 2146    REF    1               40,3330  54 141 1               TS      DSREL
 2147    REF   19  LAST  295    40,3331  3 4753 1               CAF     BIT1
 2148    REF    7  LAST  444    40,3332  7 0143 0               MASK    COUNT
 2149    REF  139  LAST  443    40,3333  10 000 0               CCS     A
 2150                           40,3334  0 3336 1               TC      +2              LEFT IF COUNT IS ODD
 2151    REF    1               40,3335  0 3346 0               TC      DSPIN1  -1      RIGHT IF COUNT IS EVEN
 2152    REF    9  LAST  443    40,3336  56 124 0               XCH     CODE
 2153    REF    1               40,3337  0 4340 1               TC      SLEFT5          DOES NOT USE CYL
 2154    REF   10  LAST  444    40,3340  54 124 1               TS      CODE
 2155    REF   40  LAST  443    40,3341  3 4736 1               CAF     BIT14
 2156    REF    8  LAST  444    40,3342  7 0143 0               MASK    COUNT
 2157    REF  140  LAST  444    40,3343  10 000 0               CCS     A
 2158    REF   29  LAST  433    40,3344  3 4752 0               CAF     TWO             BIT14 = 1, BLANK SIGN
 2159    REF   50  LAST  444    40,3345  6 4753 1               AD      ONE             BIT14 = 0, LEAVE SIGN ALONE
 2160    REF    9  LAST  444    40,3346  54 143 0               TS      COUNT           +0 INTO COUNT FOR RIGHT
```

```
A2161                                                                                +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A2162                                                                                +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
 2163                           40,3347  0 0004 0  DSPIN1    INHINT
 2164  REF   2  LAST  444       40,3350  50 141 0            INDEX   DSREL
 2165  REF  24  LAST  405       40,3351  11'023 0            CCS     DSPTAB
 2166                           40,3352  0 3354 0            TC      +2                  IF +
 2167  REF   6  LAST  431       40,3353  0 5705 0            TC      CCSHOLE
 2168  REF  51  LAST  444       40,3354  6 4753 1            AD      ONE                 IF-
 2169  REF   1                  40,3355  54 142 1            TS      DSMAG
 2170  REF  10  LAST  444       40,3356  50 143 1            INDEX   COUNT
 2171  REF   1                  40,3357  7 3400 1            MASK    DSMSK
 2172                           40,3360  0 0006 1            EXTEND
 2173  REF  11  LAST  444       40,3361  60 124 0            SU      CODE
 2174                           40,3362  0 0006 1            EXTEND
 2175  REF   1                  40,3363  1 3376 1            BZF     DSLV                SAME
 2176  REF  11  LAST  445       40,3364  50 143 1  DFRNT     INDEX   COUNT
 2177  REF   2  LAST  445       40,3365  4 3400 1            CS      DSMSK               MASK WITH 77740,76037,75777, OR 74037
 2178  REF   2  LAST  445       40,3366  7 0142 1            MASK    DSMAG
 2179  REF  12  LAST  445       40,3367  6 0124 0            AD      CODE
 2180  REF 141  LAST  444       40,3370  4 0000 0            CS      A
 2181  REF   3  LAST  445       40,3371  50 141 0            INDEX   DSREL
 2182  REF  25  LAST  445       40,3372  57'023 1            XCH     DSPTAB
 2183                           40,3373  0 0006 1            EXTEND
 2184  REF   2  LAST  445       40,3374  6 3376 0            BZMF    DSLV                DSPTAB ENTRY WAS -
 2185  REF   7  LAST  405       40,3375  25'016 1            INCR    NOUT                DSPTAB ENTRY WAS +
 2186                           40,3376  0 0003 1  DSLV      RELINT
 2187  REF   2  LAST  444       40,3377  0 0114 0            TC      DSEXIT

 2188                           40,3400   00037 0  DSMSK     OCT     37
 2189                           40,3401   01740 0            OCT     1740
 2190                           40,3402   02000 0            OCT     2000
 2191                           40,3403   03740 1            OCT     3740


R2192  FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R2193  BIT11 OF CODE.

 2194  REF   4  LAST  445       40,3404  54 141 1  11DSPIN   TS      DSREL
 2195  REF  30  LAST  444       40,3405  3 4752 0            CAF     TWO
 2196  REF  12  LAST  445       40,3406  54 143 0            TS      COUNT
 2197  REF 110  LAST  444       40,3407  56 002 0            XCH     Q                   MUST USE SAME RETURN AS DSPIN
 2198  REF   3  LAST  445       40,3410  54 114 1            TS      DSEXIT
 2199  REF   2  LAST  444       40,3411  0 3347 1            TC      DSPIN1


 2200  REF   5  LAST  442       40,3412  0 3322 1  DSPOCTIN  TC      DSPIN               SO DSPOCTWD DOESNT USE SWCALL
 2201                           40,3413  3 3415 1            CAF     +2
 2202  REF   5  LAST  431       40,3414  0 4640 1            TC      BANKJUMP
 2203  REF   1                  40,3415  63411 0  ENDSPOCT  CADR    OCTBACK
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R2204    DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R2205    ABORT WITH 01501.
R2206    DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R2207    DO TC ENTRET.

 22075   REF   9  LAST  443    40,3416   4 4360 1  PREDSPAL  CS      VD1
 22076   REF  50  LAST  443    40,3417  54 777 1             TS      DSPCOUNT
 2208    REF   1               40,3420   4 3441 1  DSPALARM  CS      NVSBENDL
 2209    REF   8  LAST  437    40,3421   6 0136 0            AD      ENTEXIT
 2210                          40,3422   0 0006 1            EXTEND
 2211    REF  16  LAST  399    40,3423   1 3436 1            BZF     CHARALRM +2
 22111   REF   1               40,3424   4 3440 0            CS      MONADR            IF THIS IS A MONITOR, KILL IT
 22112   REF   9  LAST  446    40,3425   6 0136 0            AD      ENTEXIT
 22113                         40,3426   0 0006 1            EXTEND
 22114                         40,3427   1 3431 0            BZF     +2
 22115   REF  17  LAST  446    40,3430   0 3434 1            TC      CHARALRM
 22116   REF   1               40,3431   0 4204 0            TC      KILMONON
 22117   REF   4  LAST  264    40,3432   0 4364 1            TC      FALTON
 22118   REF   2  LAST  439    40,3433   0 4124 1            TC      PASTEVB           PUT MONITOR VERB BACK IN VERBREG
 2212    REF   5  LAST  446    40,3434   0 4364 1  CHARALRM  TC      FALTON            NOT NVSJB INITIATED. TURN ON OPR ERROR
 2213    REF  52  LAST  440    40,3435   0 5155 0            TC      ENDOFJOB
 2214    REF   2  LAST  244    40,3436   0 5652 0            TC      POODOO
 2217                          40,3437    01501 1            OCT     01501
 22171   REF   3  LAST  446    40,3440    04124 1  MONADR    GENADR  PASTEVB
 2218    REF   1               40,3441   0 4202 0  NVSBENDL  TC      NVSUBEND


R2219    ALMCYCLE TURNS ON CHECK FAIL LIGHT, REDISPLAYS THE ORIGINAL VERB THAT
R2220    WAS EXECUTED, AND RECYCLES TO EXECUTE THE ORIGINAL VERB/NOUN COMBINATION
R2221    THAT WAS LAST EXECUTED. USED FOR BAD DATA DURING LOAD VERBS AND BY
R2222    MCTRS. ALSO BY MMCHANG IF 2 NUMERICAL CHARACTERS WERE NOT PUNCHED IN
R2223    FOR MM CODE.

 2224    REF   3  LAST  439       4145                       SETLOC  MID7     +1
 22245   REF   2 LAST  438 TO  439:     17      17*          COUNT*  $$/PIN
 2225    REF   6  LAST  446       4145   0 4364 1  ALMCYCLE  TC      FALTON            TURN ON CHECK FAIL LIGHT.
 2228    REF   3  LAST  436       4146   4 1041 1            CS      VERBSAVE          GET ORIGINAL VERB THAT WAS EXECUTED
 2229    REF  11  LAST  439       4147  55'013 0             TS      REQRET            SET FOR ENTPASO
 2230    REF  89  LAST  439       4150   0 4616 1            TC      BANKCALL          PUTS ORIGINAL VERB INTO VERBREG AND
 2231    REF   8  LAST  439       4151    62337 1            CADR    UPDATVB -1        DISPLAYS IT IN VERB LIGHTS.
 2232    REF  29  LAST  443       4152   0 4635 0            TC      POSTJUMP
 2233    REF   2  LAST  399       4153    62002 1  ENDALM    CADR    ENTER


R2234    MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
R2235    IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R2236    MM LIGHTS.
R2237    IT DEMANDS 2 NUMERICAL CHARACTERS BE PUNCHED IN FOR NEW MM CODE.
R2238    IF NOT, IT RECYCLES.
```

```
  2239   REF   1                41,3430                         SETLOC DSP2BIT  +1CD

  22395  REF   6 LAST  443 TO  444:      37    792*             COUNT* $$/PIN
  2240   REF   1                41,3430  0 3452 1   MMCHANG     TC       REQMM          ENTPASHI ASSUMES THE TC REQMM AT MMCHANG
A 2241                                                                                  IF THIS MOVES AT ALL, MUST CHANGE
A 2242                                                                                  MMADREF AT ENTPASHI.
  2243   REF  21   LAST  376    41,3431  3 4747 1               CAF      BIT5           OCT20 = ND2.
  2244   REF  51   LAST  446    41,3432  6 0777 0               AD       DSPCOUNT       DSPCOUNT MUST = -ND2.
  2245                          41,3433  0 0006 1               EXTEND                  DEMAND THAT 2 NUM CHAR WERE PUNCHED IN.
  2246                          41,3434  1 3436 1               BZF      +2
  2247   REF  14   LAST  436    41,3435  0 4145 0               TC       ALMCYCLE       DSPCOUNT NOT= -ND2. ALARM AND RECYCLE.
  2248   REF  93   LAST  443    41,3436  3 4755 1               CAF      ZERO           DSPCOUNT = -ND2.
  2249   REF  12   LAST  437    41,3437  57'002 1               XCH      NOUNREG
  2250   REF 196   LAST  443    41,3440  54 154 0               TS       MPAC
  2251   REF   -   LAST  411    41,3441  3 4361 1               CAF      ND1
  2252   REF  52   LAST  447    41,3442  54 777 1               TS       DSPCOUNT
  2253   REF  90   LAST  446    41,3443  0 4616 1               TC       BANKCALL
  2254   REF   4   LAST  405    41,3444   60601 0               CADR     2BLANK
  2255   REF  10   LAST  446    41,3445  4 4360 1               CS       VD1            BLOCK NUM CHAR IN
  2256   REF  53   LAST  447    41,3446  54 777 1               TS       DSPCOUNT
  2257   REF 197   LAST  447    41,3447  3 0154 1               CA       MPAC
  2258   REF  30   LAST  446    41,3450  0 4635 0               TC       POSTJUMP
  2259   REF   1                41,3451   10040 1               CADR     MODROUTB       GO THRU STANDARD LOC.


  2260   REF   2   LAST  298    04,2040             MODROUTB =         V37
  2261   REF 111   LAST  445    41,3452  4 0002 1   REQMM       CS       Q
  2262   REF  12   LAST  446    41,3453  55'013 0               TS       REQRET
  2263   REF   5   LAST  447    41,3454  3 4361 1               CAF      ND1
  2264   REF  54   LAST  447    41,3455  54 777 1               TS       DSPCOUNT
  2265   REF  94   LAST  447    41,3456  3 4755 1               CAF      ZERO
  2266   REF  13   LAST  447    41,3457  55'002 0               TS       NOUNREG
  2267   REF  91   LAST  447    41,3460  0 4616 1               TC       BANKCALL
  2268   REF   5   LAST  447    41,3461   60601 0               CADR     2BLANK
  2269   REF   3   LAST  411    41,3462  0 4427 1               TC       FLASHON
  2270   REF  52   LAST  445    41,3463  3 4753 1               CAF      ONE
  2271   REF  18   LAST  436    41,3464  55'000 1               TS       DECBRNCH       SET FOR DEC
  2272   REF  10   LAST  446    41,3465  0 0136 0               TC       ENTEXIT


R 2273   VBRQEXEC ENTERS REQUEST TO EXEC      FOR ANY ADDRESS WITH ANY PRIORITY.
R 2274   IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R 2275   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R 2276   COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R 2277   COMPONENT 2  JOB ADRES (12 BIT )
R 2278   COMPONENT 3  BBCON

  2279   REF  20   LAST  444    41,3466  3 4753 1   VBRQEXEC CAF         BIT1
  2280   REF  18   LAST  440    41,3467  7 1045 0               MASK     DSPTEM1
  2281   REF 142   LAST  445    41,3470  10 000 0               CCS      A
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 2282   REF   1                  41,3471  0 3510 0            TC       SETVAC             IF BIT1 = 1, FINDVAC
 2283   REF   1                  41,3472  3 4351 1            CAF      TCNOVAC            IF BIT1 = 0, NOVAC
 2284   REF 198  LAST  447       41,3473  54 154 0  REQEX1    TS       MPAC               TC NOVAC  OR  TC FINDVAC INTO MPAC
 2285   REF  21  LAST  447       41,3474  4 4753 0            CS       BIT1
 2286   REF  19  LAST  447       41,3475  7 1045 0            MASK     DSPTEM1
 2287   REF 199  LAST  448       41,3476  54 160 1            TS       MPAC      +4       PRIO INTO MPAC+4 AS A TEMP
 2288   REF   6  LAST  427       41,3477  0 4457 0  REQUESTC  TC       RELDSP
 2289   REF   5  LAST  437       41,3500  3 4217 1            CA       ENDINST
 2290   REF 200  LAST  448       41,3501  54 157 0            TS       MPAC      +3       TC ENDOFJOB INTO MPAC+3
 2291                            41,3502  0 0006 1            EXTEND
 2292   REF  20  LAST  448       41,3503  3 1047 0            DCA      DSPTEM1   +1       JOB ADRES INTO MPAC+1
 2293   REF 201  LAST  448       41,3504  52 156 1            DXCH     MPAC      +1       BBCON INTO MPAC+2
 2294   REF 202  LAST  448       41,3505  3 0160 0            CA       MPAC      +4       PRIO IN A
 2295                            41,3506  0 0004 0            INHINT
 2296   REF 203  LAST  448       41,3507  0 0154 1            TC       MPAC

 2297   REF   1                  41,3510  3 4354 1  SETVAC    CAF      TCFINDVC
 2298   REF   1                  41,3511  0 3473 1            TC       REQEX1

R2299   VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R2300   IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R2301   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2302   COMPONENT 1  DELAY (LOW BITS)
R2303   COMPONENT 2  TASK ADRES (12 BIT)
R2304   COMPONENT 3  BBCON

 2305   REF   1                  41,3512  3 4352 1  VBRQWAIT  CAF      TCWAIT
 2306   REF 204  LAST  448       41,3513  54 154 0            TS       MPAC               TC WAITLIST INTO MPAC
 2307   REF  21  LAST  448       41,3514  3 1045 1            CA       DSPTEM1            TIME DELAY
 2308   REF   1                  41,3515  0 3476 1  ENDRQWT   TC       REQUESTC  -1

R2309   REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R2310   TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R2311   LEAVE IT IN A, INHINT AND TC MPAC.


 2312   REF   2  LAST  446       40,3442                      SETLOC   NVSBENDL  +1
 23125  REF   7 LAST  444 TO  446:     80    739*             COUNT*   $$/PIN
 2313   REF  53  LAST  447       40,3442  3 4753 1  VBPROC    CAF      ONE                PROCEED WITHOUT DATA
 2314   REF   2  LAST  427       40,3443  55 014 1            TS       LOADSTAT
 2315   REF   2  LAST  446       40,3444  0 4204 0            TC       KILMONON           TURN ON KILL MONITOR BIT
 2316   REF   7  LAST  448       40,3445  0 4457 0            TC       RELDSP
 2317   REF   3  LAST  406       40,3446  0 4433 1            TC       FLASHOFF
 2318   REF   2  LAST  427       40,3447  0 3547 1            TC       RECALTST           SEE IF THERE IS ANY RECALL FROM ENDIDLE

 2319   REF  54  LAST  448       40,3450  4 4753 0  VBTERM    CS       ONE
 2320   REF   2  LAST  409       40,3451  0 3443 1            TC       VBPROC    +1       TERM VERB SETS LOADSTAT NEG
```

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R23201   PROCKEY PERFORMS THE SAME FUNCTION AS VBPROC.  IT MUST BE CALLED UNDER
R23202   EXECUTIVE CONTROL, WITH CHPPRIO.
 23205   REF  95  LAST  447   40,3452  3 4755 1  PROCKEY  CAF     ZERO                 SET REQRET FOR ENTER PASS 0.
 23206   REF  13  LAST  447   40,3453  55'013 0           TS      REQRET
 23207   REF  11  LAST  447   40,3454  4 4360 1           CS      VD1                  BLOCK NUMERICAL CHARACTERS, SIGNS, CLEAR
 23208   REF  55  LAST  447   40,3455  54 777 1           TS      DSPCOUNT
 23209   REF   3  LAST  448   40,3456  0 3442 0           TC      VBPROC

R2321    VBRESEQ WAKES ENDIDLE AT SAME LINE AS FINAL ENTER OF LOAD (L+3).
R2322    (MAIN USE IS INTENDED AS RESPONSE TO INTERNALLY INITIATED FLASHING
R2323     DISPLAYS IN ENDIDLE. SHOULD NOT BE USED WITH LOAD VERBS,PLEASE PERFORM,
R2324     OR PLEASE MARK VERBS BECAUSE THEY ALREADY USE L+3 IN ANOTHER CONTEXT.)

 2325    REF  96  LAST  449   40,3457  4 4755 0  VBRESEQ  CS      ZERO                 MAKE IT LOOK LIKE DATA IN.
 2326    REF   4  LAST  449   40,3460  0 3443 1           TC      VBPROC +1

R2327    FLASH IS TURNED OFF BY PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE,
R2328    END OF LOAD.
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P2329    KEY RELEASE ROUTINE

R2330    THIS ROUTINE ALWAYS TURNS OFF THE UPACT LIGHT AND ALWAYS CLEARS DSPLOCK.

R2331    THE HIGHEST PRIORITY FUNCTION OF THE KEY RELEASE BUTTON IS THE
R2332    UNSUSPENDING OF A SUSPENDED MONITOR WHICH WAS EXTERNALLY INITIATED.
R2333    THIS FUNCTION IS ACCOMPLISHED BY CLEARING DSPLOCK AND TURNING OFF
R2334    THE KEY RELEASE LIGHT IF BOTH DSPLIST AND CADRSTOR ARE EMPTY.

R2335    IF NO SUCH MONITOR EXISTS, THEN RELDSP IS EXECUTED TO CLEAR DSPLOCK
R2336    AND THE EXTERNAL MONITOR BIT (FREEING THE DISPLAY SYSTEM FOR INTERNAL
R2337    USE), TURN OFF THE KEY RELEASE LIGHT, AND WAKE UP ANY JOB IN DSPLIST.

R2338    IN ADDITION IF THERE IS A JOB IN ENDIDLE, THEN CONTROL IS TRANSFERRED
R2339    TO PINBRNCH (IN DISPLAY INTERFACE ROUTINE) TO RE-EXECUTE THE SERIES OF
R23391   NVSUB CALLS ETC. THAT PRECEDED THE ENDIDLE CALL STILL AWAITING RESPONSE.
R2340    THIS FEATURE IS INTENDED FOR USE WHEN THE OPERATOR HAS BEEN REQUESTED TO
R2341    RESPOND TO SOME INTERNAL ACTION THAT USED ENDIDLE, BUT HE HAS WRITTEN
R2342    OVER THE INFORMATION ON THE DISPLAY PANEL BY SOME DISPLAYS OF HIS OWN
R2343    INITIATION WHICH DO NOT SERVE AS RESPONSES. HITTING KEY RLSE WILL
R2344    RE-ESTABLISH THE DISPLAYS TO THE STATE THEY WERE IN BEFORE HE OBSCURED
R2345    THEM, SO THAT HE CAN SEE THE WAITING REQUEST.  THIS WORKS ONLY FOR
R2346    INTERNAL PROGRAMS THAT USED ENDIDLE THROUGH MARGARETS DISPLAY
R2347    SUBROUTINES.

 2348    REF  21  LAST  424    40,3461  4 4751 1  VBRELDSP CS       BIT3
 2349                          40,3462  0 0006 1           EXTEND
 2350    REF  11  LAST  219    40,3463  03 011 1           WAND     DSALMOUT          TURN OFF UPACT LITE
 2351    REF   2  LAST  398    40,3464  10 115 0           CCS      21/22REG          OLD DSPLOCK
 2352    REF  41  LAST  444    40,3465  3 4736 1           CAF      BIT14
 2353    REF   6  LAST  439    40,3466  7 1021 1           MASK     MONSAVE1          EXTERNAL MONITOR BIT (EMB)
 2354    REF 143  LAST  447    40,3467  10 000 0           CCS      A
 2355    REF   1               40,3470  0 3477 0           TC       UNSUSPEN          OLD DSPLOCK AND EMB BOTH 1, UNSUSPEND.
 2356    REF   8  LAST  448    40,3471  0 4457 0  TSTLTS4  TC       RELDSP            NOT UNSUSPENDING EXTERNAL MONITOR,
 2357    REF   5  LAST  438    40,3472  11'042 1           CCS      CADRSTOR           RELEASE DISPLAY SYSTEM AND
 2358                          40,3473  0 3475 1           TC       +2                 DO RE-ESTABLISH IF CADRSTOR IS FULL.
 2359    REF  53  LAST  446    40,3474  0 5155 0           TC       ENDOFJOB
 2360    REF  31  LAST  447    40,3475  0 4635 0           TC       POSTJUMP
 2361    REF   4  LAST  298    40,3476   21050 1           CADR     PINBRNCH
 2362    REF  97  LAST  449    40,3477  3 4755 1  UNSUSPEN CAF      ZERO              EXTERNAL MONITOR IS SUSPENDED,
 2363    REF   5  LAST  438    40,3500  55'012 1           TS       DSPLOCK            JUST UNSUSPEND IT BY CLEARING DSPLOCK.
 2364    REF   6  LAST  450    40,3501  11'042 1           CCS      CADRSTOR           TURN KEY RELEASE LIGHT OFF IF BOTH
 2365    REF  54  LAST  450    40,3502  0 5155 0           TC       ENDOFJOB           CADRSTOR AND DSPLIST ARE EMPTY.
 2366    REF   2  LAST  438    40,3503  0 4502 1           TC       RELDSP1
 23661   REF  55  LAST  450    40,3504  0 5155 0           TC       ENDOFJOB

 2367                          40,3505            ENDRELDS EQUALS
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R2368    NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R2369    USED TO CALL THE COMBINATION OF ANY DISPLAY, LOAD, OR MONITOR VERB
R2370    TOGETHER WITH ANY NOUN AVAILABLE TO THE KEYBOARD.
R23701   PLACE 0VVVVVVVNNNNNNN INTO A.
R23702   V-S ARE THE 7 BIT VERB CODE.  N-S ARE THE 7 BIT NOUN CODE.

R23703   IF NVSUB IS CALLED WITH THE FOLLOWING NEGATIVE NUMBERS (RATHER THAN THE
R23704   VERB-NOUN CODE) IN A, THEN THE DISPLAY IS BLANKED AS FOLLOWS-
R23705    -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

R2371    NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R2372    MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R2373     NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R2374    SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R2375    IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R2376    ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R2377    FURTHER ACTION).

R2378    IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R2379    SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R2380    IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R2381    ALARM CONDITION BEFORE RETURN TO CALLER.

R2382    THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R2383    KEY, EXCEPT ERROR LIGHT RESET
R2384    IT IS RELEASED BY THE KEY RELEASE BUTTON, ALL EXTENDED VERBS,
R2385    PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE, INITIALIZE EXECUTIVE,
R2386    RECALL PART OF RECALTST IF ENDIDLE WAS USED,
R2387    VB = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
R2388    MONITOR SET UP.

R23881   THE DISPLAY SYSTEM IS ALSO BLOCKED BY THE EXTERNAL MONITOR BIT, WHICH
R23882   INDICATES AN EXTERNALLY INITIATED MONITOR IS RUNNING (SEE MONITOR)

R2389    A NVSUB CALL THAT PASSES DSPLOCK AND THE EXTERNAL MONITOR BIT ENDS OLD
R23891   MONITOR.

R2390    DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R2391    LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R23911   NVSUB SHOULD BE USED TWICE IN SUCCESSION FOR :PLEASE PERFORM: SITUATIONS
R23912   (SIMILARLY FOR PLEASE MARK). FIRST PLACE THE CODED NUMBER FOR WHAT
R23913   ACTION IS DESIRED OF OPERATOR INTO THE REGISTERS REFERRED TO BY THE
R23914   :CHECKLIST: NOUN. GO TO NVSUB WITH A DISPLAY VERB AND THE :CHECKLIST:
R23915   NOUN. GO TO NVSUB AGAIN WITH THE :PLEASE PERFORM: VERB AND ZEROS IN THE
R23916   LOW 7 BITS. THIS :PASTES UP: THE :PLEASE PERFORM: VERB INTO THE VERB
R23917   LIGHTS.

R23918   NVMONOPT IS AN ENTRY SIMILAR TO NVSUB, BUT REQUIRING AN ADDITIONAL
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R239181 PARAMETER IN L. IT SHOULD BE USED ONLY WITH A MONITOR VERB-NOUN CODE IN
R239182 A. AFTER EACH MONITOR DISPLAY A *PLEASE* VERB WILL BE PASTED IN THE VERB
R239183 LIGHTS OR DATA WILL BE BLANKED (OR BOTH) ACCORDING TO THE OPTIONS
R239184 SPECIFIED IN L. IF BITS 8-14 OF L ARE OTHER THAN ZERO, THEN THEY WILL
R239185 BE INTERPRETED AS A VERB CODE AND PASTED IN THE VERB LIGHTS. (THIS VERB
R239186 CODE SHOULD DESIGNATE ONE OF THE *PLEASE* VERBS.) IF BITS 1-3 OF L ARE
R239187 OTHER THAN ZERO, THEN THEY WILL BE USED TO BLANK DATA BY BEING FED TO
R239188 BLANKSUB. IF NVMONOPT IS USED WITH A VERB OTHER THAN A MONITOR VERB,
R239189 THE PARAMETER IN L HAS NO EFFECT.

R2392   NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTO
R2393   ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

 2394   REF    1                  4154                      SETLOC ENDALM   +1

 23945  REF    3 LAST  446 TO  447:      7      24*         COUNT* $$/PIN
 2395                             4154  22 007 0  NVSUB     LXCH    7                  ZERO NVMONOPT OPTIONS
 2396   REF    1                  4155  54 123 0  NVMONOPT  TS      NVTEMP
 2397   REF   42  LAST   450      4156  3 4736 1            CAF     BIT14
 23971  REF    7  LAST   450      4157  7 1021 1            MASK    MONSAVE1           EXTERNAL MONITOR BIT
 23972  REF    6  LAST   450      4160  6 1012 0            AD      DSPLOCK
 23973  REF  144  LAST   450      4161  10 000 0            CCS     A
 23974  REF  112  LAST   447      4162  0 0002 0            TC      Q                  DSP SYST BLOCKED. RET TO 1+ CALLING LOC
 2398   REF   55  LAST   448      4163  3 4753 1            CAF     ONE                DSP SYST AVAILABLE
 2399   REF  113  LAST   452      4164  6 0002 0  NVSBCOM   AD      Q
 2400   REF    1                  4165  55'037 0            TS      NVQTEM             2+ CALLING LOC INTO NVQTEM
 24001  REF    4  LAST   439      4166  23'022 0            LXCH    MONSAVE2           STORE NVMONOPT OPTIONS
 2401   REF    3  LAST   448      4167  0 4204 0            TC      KILMONON           TURN ON KILL MONITOR BIT
 2402   REF    1                  4170  3 4201 0  NVSUBCOM  CAF     NVSBBBNK

 2403   REF   11  LAST   370      4171  56 006 1            XCH     BBANK
 24031                            4172  0 0006 1            EXTEND                     SAVE OLD SUPERBITS
 24032  REF    4  LAST   274      4173  04 007 1            ROR     SUPERBNK
 2404   REF    1                  4174  55'040 0            TS      NVBNKTEM
 24041  REF    2  LAST   274      4175  3 4201 0            CAF     PINSUPBT
 24042                            4176  0 0006 1            EXTEND
 24043  REF    5  LAST   452      4177  01 007 1            WRITE   SUPERBNK
 2405   REF    1                  4200  0 2000 0            TC      NVSUBB             GO TO NVSUB1 THRU STANDARD LOC
 2406   REF   56  LAST   449      0777                      EBANK=  DSPCOUNT
 2407   REF    2  LAST   406      4201   62101 0  NVSBBBNK  BBCON   NVSUB1

 24071  REF    2  LAST   452      4201            PINSUPBT  =       NVSBBBNK           CONTAINS THE PINBALL SUPERBITS.

 2412   REF    2  LAST   452      4202  53'040 0  NVSUBEND  DXCH    NVQTEM             NVBNKTEM MUST = NVQTEM+1
 2413   REF    2  LAST   283      4203  0 5165 0            TC      SUPDXCHZ           DTCB WITH SUPERBIT SWITCHING

 2414   REF    1               41,3516                      SETLOC ENDRQWT +1

 241405 REF    7 LAST  447 TO  448:     54     846*         COUNT* $$/PIN
R241412 BLANKDSP BLANKS DISPLAY ACCORDING TO OPTION NUMBER IN NVTEMP AS FOLLOWS
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R241415  -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

 241419 REF   5  LAST  444   41,3516  6 4757 0  BLANKDSP AD      SEVEN          7,8,9,OR 10 (A HAD 0,1,2,OR 3)
 241422                      41,3517  0 0004 0           INHINT
 241425 REF  13  LAST  445   41,3520  54 124 1           TS      CODE           BLANK SPECIFIED DSPTABS
 241429 REF  21  LAST  254   41,3521  4 4740 1           CS      BIT12
 241432 REF  14  LAST  453   41,3522  50 124 0           INDEX   CODE
 241435 REF  26  LAST  445   41,3523  57'023 1           XCH     DSPTAB
 241439 REF 145  LAST  452   41,3524  10 000 0           CCS     A
 241442 REF   8  LAST  445   41,3525  25'016 1           INCR    NOUT
 241445                      41,3526  0 3527 1           TC      +1
 241449 REF  15  LAST  453   41,3527  10 124 1           CCS     CODE
 241452 REF   1              41,3530  0 3520 0           TC      BLANKDSP +2
 241455                      41,3531  0 0003 1           RELINT
 241459 REF   2  LAST  452   41,3532  50 123 1           INDEX   NVTEMP
 241462                      41,3533  0 3540 0           TC      +5
 241465                      41,3534  0 3535 1           TC      +1             NVTEMP HAS -4 (NEVER TOUCH MODREG)
 241469 REF  19  LAST  439   41,3535  55'001 0           TS      VERBREG                   -3
 241472 REF  14  LAST  447   41,3536  55'002 0           TS      NOUNREG                   -2
 241475 REF  12  LAST  427   41,3537  55'015 0           TS      CLPASS                    -1
 241479 REF  12  LAST  449   41,3540  4 4360 1           CS      VD1
 241482 REF  57  LAST  452   41,3541  54 777 1           TS      DSPCOUNT
 241485 REF   4  LAST  448   41,3542  0 4433 1           TC      FLASHOFF       PROTECT AGAINST INVISIBLE FLASH
 241489 REF   1              41,3543  0 3566 1           TC      ENTSET -2      ZEROS REQRET

 2415   REF   2  LAST  453   41,3544  3 3570 0  NVSUB1   CAF     ENTSET         IN BANK
 2416   REF   6  LAST  439   41,3545  54 136 1           TS      ENTRET         SET RETURN TO NVSUBEND
 24161  REF   3  LAST  453   41,3546  10 123 0           CCS     NVTEMP         WHAT NOW
 24162                       41,3547  0 3553 1           TC      +4             NORMAL NVSUB CALL (EXECUTE VN OR PASTE)
 24163  REF  19  LAST  415   41,3550  0 2351 1           TC      GODSPALM
 24164  REF   2  LAST  453   41,3551  0 3516 0           TC      BLANKDSP       BLANK DISPLAY AS SPECIFIED
 24165  REF  20  LAST  453   41,3552  0 2351 1           TC      GODSPALM
 2417   REF   5  LAST  439   41,3553  3 6074 1           CAF     LOW7
 2418   REF   4  LAST  453   41,3554  7 0123 0           MASK    NVTEMP
 2419   REF 205  LAST  448   41,3555  54 157 0           TS      MPAC     +3    TEMP FOR NOUN (CANT USE MPAC. DSPDECVN
 2420   REF   5  LAST  453   41,3556  3 0123 1           CA      NVTEMP                              USES MPAC, +1, +2
 2422   REF   5  LAST  439   41,3557  54 023 1           TS      EDOP           RIGHT 7
 2423   REF   6  LAST  453   41,3560  3 0023 0           CA      EDOP
 2424   REF 206  LAST  453   41,3561  54 160 1           TS      MPAC     +4    TEMP FOR VERB (CANT USE MPAC+1. DSPDECVN
A2425                                                                                               USES MPAC, +1, +2).
 2426   REF 207  LAST  453   41,3562  10 157 0           CCS     MPAC     +3    TEST NOUN
 2427   REF   1              41,3563  0 3571 1           TC      NVSUB2         IF NOUN NOT +0, GO ON
 2428   REF 208  LAST  453   41,3564  3 0160 0           CA      MPAC     +4
 2429   REF   9  LAST  446   41,3565  0 2337 1           TC      UPDATVB -1     IF NOUN = +0, DISPLAY VERB . THEN RETURN
 24291  REF  98  LAST  450   41,3566  3 4755 1           CAF     ZERO           ZERO REQRET SO THAT PASTED VERBS CAN
 24292  REF  14  LAST  449   41,3567  55'013 0           TS      REQRET         BE EXECUTED BY OPERATOR.
 2430   REF   2  LAST  446   41,3570  0 4202 0  ENTSET   TC      NVSUBEND
 2431   REF 209  LAST  453   41,3571  10 160 1  NVSUB2   CCS     MPAC +4        TEST VERB
 2432                        41,3572  0 3576 0           TC      +4             IF VERB NOT +0, GO ON
 2433   REF 210  LAST  453   41,3573  3 0157 1           CA      MPAC     +3
 2434    REF   2  LAST  439   41,3574  0 2317 0            TC      UPDATNN -1      IF VERB = +0, DISPLAY NOUN. THEN RETURN
 2435    REF   3  LAST  453   41,3575  0 4202 0            TC      NVSUBEND
 2436    REF 211  LAST  453   41,3576  3 0156 0            CA      MPAC     +2     TEMP FOR MACH CADR TO BE SPEC. (DSPDECVN
 2437    REF 212  LAST  454   41,3577  54 161 0            TS      MPAC     +5                 USES MPAC, +1, +2)
 2438    REF 213  LAST  454   41,3600  3 0160 0            CA      MPAC     +4
 2439    REF  10  LAST  453   41,3601  0 2337 1            TC      UPDATVB -1      IF BOTH NOUN AND VERB NOT +0, DISPLAY
 2440    REF 214  LAST  454   41,3602  3 0157 1            CA      MPAC     +3     BOTH AND GO TO ENTPASO.
 2441    REF   3  LAST  454   41,3603  0 2317 0            TC      UPDATNN -1
 2442    REF  99  LAST  453   41,3604  3 4755 1            CAF     ZERO
 2443    REF   3  LAST  448   41,3605  55'014 1            TS      LOADSTAT        SET FOR WAITING FOR DATA CONDITION
 2444    REF  13  LAST  453   41,3606  55'015 0            TS      CLPASS
 2445    REF  15  LAST  453   41,3607  55'013 0            TS      REQRET          SET REQRET FOR PASS 0.
 2446    REF 215  LAST  454   41,3610  3 0161 1            CA      MPAC     +5     RESTORES MACH CADR TO BE SPEC TO MPAC+2
 2447    REF 216  LAST  454   41,3611  54 156 1            TS      MPAC     +2     FOR USE IN INTMCTBS (IN ENTPASO).
 2448    REF   3  LAST  406   41,3612  0 2035 0  ENDNVSB1 TC      ENTPASO


R2449    IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
R2450    NOUNCADR IN ENTPASO (INTMCTBS ).


 2451    REF   4  LAST  454        4204                    SETLOC  NVSUBEND +2
 24515   REF   4 LAST  452 TO  452:     24     48*         COUNT*  $$/PIN
A2452                                                                              FORCE BIT 15 OF MONSAVE1 TO 1.
 2453    REF  24  LAST  427        4204  3 4735 1  KILMONON CAF     BIT15             THIS IS THE KILL MONITOR BIT.
 2454    REF   8  LAST  452        4205  55'021 1            TS      MONSAVE1        TURN OFF BIT 14, THE EXTERNAL
A2455                                                                               MONITOR BIT.
 2458    REF 114  LAST  452        4206  0 0002 0            TC      Q


R2459    LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R2460               +1  PROCEED NO DATA. SET BY SPECIAL VERB
R2461              -1 TERMINATE   SET BY SPECIAL VERB
R2462              -0     DATA IN       SET BY END OF LOAD ROUTINE
R2463                 OR RESEQUENCE    SET BY VERB 32


R2464    L  TC ENDIDLE  (FIXED FIXED)
R2465    ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R2466    WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R2467    ENDIDLE CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2468    SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.
R2469    RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
R2470    L+1         FOR TERMINATE
R2471    L+2         FOR PROCEED WITHOUT DATA
R2472    L+3         FOR DATA IN, OR RESEQUENCE
R2473    IT DOES NOTHING IF LOADSTAT INDICATES WAITING FOR DATA.


R2474    ENDIDLE ABORTS (WITH CODE 01206) IF A SECOND JOB ATTEMPTS TO GO TO SLEEP
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R2475    IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO ENDIDLE WHEN
R2476    1) CADRSTOR NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF ENDIDLE IS
R2477    EXCEEDED. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)
R2478    2) DSPLIST NOT= +0. THIS INDICATES A JOB IS ALREADY ASLEEP DUE TO
R2479    NVSUBUSY.

 2480    REF 115  LAST  454      4207  22 002 0  ENDIDLE   LXCH    Q              RETURN ADDRESS INTO L.
 2481    REF   1                 4210  0 4220 0            TC      ISCADR+0       ABORT IF CADRSTOR NOT= +0
 2482    REF   1                 4211  0 4224 1            TC      ISLIST+0       ABORT IF DSPLIST NOT= +0
 2483    REF  59  LAST  440      4212  3 0001 0            CA      L              DONT SET DSPLOCK TO 1 SO CAN USE
 2484    REF   4  LAST  370      4213  7 5012 0            MASK    LOW10          ENDIDLE WITH NVSUB INITIATED MONITOR.
 2485    REF   1                 4214  6 0004 0            AD      FBANK          SAME STRATEGY FOR CADR AS MAKECADR.
 2486    REF   7  LAST  450      4215  55'042 1            TS      CADRSTOR
 2487    REF   2  LAST  374      4216  0 5133 0            TC      JOBSLEEP


 2488    REF  56  LAST  450      4217  0 5155 0  ENDINST   TC      ENDOFJOB


 2489    REF   8  LAST  455      4220  11'042 1  ISCADR+0  CCS     CADRSTOR       ABORTS (CODE 01206) IF CADRSTOR NOT= +0.
 2490    REF   1                 4221  0 4227 1            TC      DSPABORT       RETURNS IF CADRSTOR = +0.
 2491    REF 116  LAST  455      4222  0 0002 0            TC      Q
 2492    REF   2  LAST  455      4223  0 4227 1            TC      DSPABORT

 2493    REF   2  LAST  222      4224  11'043 0  ISLIST+0  CCS     DSPLIST        ABORTS (CODE 01206) IF DSPLIST NOT= +0.
 2494    REF   3  LAST  455      4225  0 4227 1            TC      DSPABORT       RETURNS IF DSPLIST = +0.
 2495    REF 117  LAST  455      4226  0 0002 0            TC      Q
 2496    REF   3  LAST  446      4227  0 5652 0  DSPABORT  TC      POODOO
 2497                            4230   01206 1            OCT     01206


R2498    JAMTERM ALLOWS PROGRAMS TO PERFORM THE TERMINATE FUNCTION.
R2499    IT DOES ENDOFJOB.

 2500    REF   3  LAST  452      4231  3 4201 0  JAMTERM   CAF     PINSUPBT
 2501                            4232  0 0006 1            EXTEND
 25011   REF   6  LAST  452      4233  01 007 1            WRITE   SUPERBNK
 25012   REF   2  LAST  209      4234  3 4242 1            CAF     34DEC
 25013   REF  16  LAST  454      4235  55'013 0            TS      REQRET         LEAVE ENTER SET FOR ENTPASS0.
 2502    REF  13  LAST  453      4236  4 4360 1            CS      VD1
 2503    REF  58  LAST  453      4237  54 777 1            TS      DSPCOUNT
 2504    REF  32  LAST  450      4240  0 4635 0            TC      POSTJUMP
 2505    REF   2  LAST  409      4241   61450 1            CADR    VBTERM

 2506                            4242   00042 1  34DEC     DEC     34


R2507    JAMPROC ALLOWS PROGRAMS TO PERFORM THE PROCEED/PROCEED WITHOUT DATA
R2508    FUNCTION. IT DOES ENDOFJOB.
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 2509    REF   4  LAST  455        4243  3 4201 0  JAMPROC   CAF      PINSUPBT
 2510                              4244  0 0006 1            EXTEND
 25101   REF   7  LAST  455        4245  01 007 1            WRITE    SUPERBNK
 25102   REF   1                   4246  3 4254 0            CAF      33DEC
 25103   REF  17  LAST  455        4247  55'013 0            TS       REQRET              LEAVE ENTER SET FOR ENTPASS0.
 2511    REF  14  LAST  455        4250  4 4360 1            CS       VD1
 2512    REF  59  LAST  455        4251  54 777 1            TS       DSPCOUNT
 2513    REF  33  LAST  455        4252  0 4635 0            TC       POSTJUMP
 2514    REF   5  LAST  449        4253   61442 1            CADR     VBPROC

 2515                              4254   00041 1  33DEC     DEC      33


R2532    BLANKSUB BLANKS ANY COMBINATION OF R1, R2, R3.
R2533    CALL WITH BLANKING CODE IN A.
R2534    BIT1=1 BLANKS R1, BIT2=1 BLANKS R2, BIT3=1 BLANKS R3.
R2535    ANY COMBINATION OF THESE BITS IS ACCEPTED.

R2536    DSPCOUNT IS RESTORED TO STATE IT WAS IN BEFORE BLANKSUB WAS EXECUTED.

 2538    REF   6  LAST  453        4255  7 4757 1  BLANKSUB MASK     SEVEN
 25381   REF   6  LAST  453        4256  54 123 0            TS       NVTEMP              STORE BLANKING CODE IN NVTEMP.
 2539    REF  43  LAST  452        4257  3 4736 1            CAF      BIT14
 2540    REF   9  LAST  454        4260  7 1021 1            MASK     MONSAVE1            EXTERNAL MONITOR BIT
 25401   REF   7  LAST  452        4261  6 1012 0            AD       DSPLOCK
 25402   REF 146  LAST  453        4262  10 000 0            CCS      A
 25403   REF 118  LAST  455        4263  0 0002 0            TC       Q                   DSP SYST BLOCKED. RET TO 1+ CALLING LOC
 25404   REF 119  LAST  456        4264  24 002 0            INCR     Q                   DSP SYST AVAILABLE
A2541                                                                                    SET RETURN FOR 2+ CALLING LOC
 25411   REF   7  LAST  456        4265  10 123 0            CCS      NVTEMP
 25412                             4266  1 4270 1            TCF      +2
 25413   REF 120  LAST  456        4267  0 0002 0            TC       Q                   NOTHING TO BLANK. RET TO 2+ CALLING LOC
 2542    REF 121  LAST  456        4270  22 002 0            LXCH     Q                   SET RETURN FOR 2 + CALLING LOC
 2544    REF   1                   4271  3 4302 1            CAF      BLNKBBNK
 2545    REF  12  LAST  452        4272  56 006 1            XCH      BBANK
 25451                             4273  0 0006 1            EXTEND
 25452   REF   8  LAST  456        4274  04 007 1            ROR      SUPERBNK            SAVE OLD SUPERBITS.
 2546    REF  45  LAST  414        4275  52 131 0            DXCH     BUF
 25461   REF   5  LAST  456        4276  3 4201 0            CAF      PINSUPBT
 25462                             4277  0 0006 1            EXTEND
 25463   REF   9  LAST  456        4300  01 007 1            WRITE    SUPERBNK
 2547    REF   1                   4301  0 3505 1            TC       BLNKSUB1

 2548    REF  60  LAST  456        0777                      EBANK=   DSPCOUNT
 25481   REF   2  LAST  456        4302   60101 1  BLNKBBNK  BBCON    BLNKSUB1
 2549                              4303            ENDBLFF   EQUALS

 2550    REF   1             40,3505                         SETLOC   ENDRELDS
 25505   REF   8 LAST  448 TO  452:    35    774*            COUNT*   $$/PIN
 2551    REF  61  LAST  456  40,3505  3 0777 0  BLNKSUB1  CA       DSPCOUNT            SAVE OLD DSPCOUNT FOR LATER RESTORATION
 25511 REF  46  LAST  456   40,3506  54 132 0            TS      BUF      +2
 25512 REF  22  LAST  448   40,3507  3 4753 1            CAF     BIT1             TEST BIT1. SEE IF R1 TO BE BLANKED.
 2552  REF   1              40,3510  0 3527 1            TC      TESTBIT
 2553  REF  12  LAST  440   40,3511  3 4317 0            CAF     R1D1
 2554  REF   4  LAST  420   40,3512  0 2535 0            TC      5BLANK -1
 2555  REF  25  LAST  432   40,3513  3 4752 0            CAF     BIT2             TEST BIT 2. SEE IF R2 TO BE BLANKED.
 2556  REF   2  LAST  457   40,3514  0 3527 1            TC      TESTBIT
 2557  REF   5  LAST  442   40,3515  3 4320 1            CAF     R2D1
 2558  REF   5  LAST  457   40,3516  0 2535 0            TC      5BLANK -1
 2559  REF  22  LAST  450   40,3517  3 4751 0            CAF     BIT3             TEST BIT3. SEE IF R3 TO BE BLANKED.
 2560  REF   3  LAST  457   40,3520  0 3527 1            TC      TESTBIT
 2561  REF   5  LAST  421   40,3521  3 4321 0            CAF     R3D1
 2562  REF   6  LAST  457   40,3522  0 2535 0            TC      5BLANK -1
 2563  REF  47  LAST  457   40,3523  3 0132 1            CA      BUF      +2      RESTORE DSPCOUNT TO STATE IT HAD
 2564  REF  62  LAST  456   40,3524  54 777 1            TS      DSPCOUNT               BEFORE BLANKSUB.
 2565  REF  48  LAST  457   40,3525  52 131 0            DXCH    BUF              CALL L+2 DIRECTLY.
 2566  REF   3  LAST  452   40,3526  0 5166 0            TC      SUPDXCHZ +1      DTCB WITH SUPERBIT SWITCHING

 2567  REF   8  LAST  456   40,3527  7 0123 0  TESTBIT   MASK    NVTEMP           NVTEMP CONTAINS BLANKING CODE.
 2568  REF 147  LAST  456   40,3530  10 000 0            CCS     A
 2569  REF 122  LAST  456   40,3531  0 0002 0            TC      Q                IF CURRENT BIT = 1, RETURN TO L+1.
 2570  REF 123  LAST  457   40,3532  50 002 0            INDEX   Q                IF CURRENT BIT = 0, RETURN TO L+3.
 2571                       40,3533  0 0002 0            TC      2

 2572                       40,3534            ENDBSUB1  EQUALS

R257205 DSPMM DOES NOT DISPLAY MODREG DIRECTLY. IT PUTS IN EXEC REQUEST WITH
R257206 PRIO 30000 FOR DSPMMJB AND RETURNS TO CALLER.

R257207 IF MODREG CONTAINS -0, DSPMMJB BLANKS THE MODE LIGHTS.

R257209 DSPMM MUST BE IN BANK 27 0  LOWER, SO IT CAN BE CALLED VIA BANKCALL.

 25721                      07,2667                      BANK    7
 257215 REF  1              04,2000                      SETLOC  PINBALL4
 257217                     04,2636                      BANK

 257216 REF  1                                           COUNT*  $$/PIN
 25722 REF 124  LAST  457   04,2636  56 002 0  DSPMM     XCH     Q
 25723 REF 217  LAST  454   04,2637  54 154 0            TS      MPAC
 25724                      04,2640  0 0004 0            INHINT
 25725 REF   3  LAST  438   04,2641  3 4355 0            CAF     CHRPRIO
 25726 REF   6  LAST  438   04,2642  0 5072 1            TC      NOVAC
 25727 REF  63  LAST  457      0777                      EBANK=  DSPCOUNT
 25728 REF   1              04,2643   03534 0            2CADR   DSPMMJB
 25728 REF   1              04,2644   60101 1
 257285                     04,2645  0 0003 1            RELINT
 25729 REF 218  LAST  457   04,2646  0 0154 1  ENDSPMM   TC      MPAC
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R2573    DSPMM  PLACE MAJOR MODE CODE INTO MODREG

 25735   REF    1                 40,3534                           SETLOC ENDBSUB1

 25736   REF    9 LAST   456 TO   457:      23    797*              COUNT* $$/PIN
 2574    REF    1                 40,3534   3 4362 1  DSPMMJB    CAF     MD1              GETS HERE THRU DSPMM
 2575    REF   64   LAST   457    40,3535   56 777 0             XCH     DSPCOUNT
 2576    REF    1                 40,3536   54 140 0             TS      DSPMMTEM         SAVE DSPCOUNT
 2579    REF    8   LAST   280    40,3537   11'011 1             CCS     MODREG .
 2580    REF   56   LAST   452    40,3540   6 4753 1             AD      ONE
 25801   REF    4   LAST   443    40,3541   0 3306 1             TC      DSPDECVN         IF MODREG IS + OR +0, DISPLAY MODREG
 25802                            40,3542   0 3544 1             TC      +2               IF MODREG IS -NZ, DO NOTHING
 25803   REF    6   LAST   447    40,3543   0 2601 1             TC      2BLANK           IF MODREG IS -0, BLANK MM
 2581    REF    2   LAST   458    40,3544   56 140 1             XCH     DSPMMTEM         RESTORE DSPCOUNT
 2582    REF   65   LAST   458    40,3545   54 777 1             TS      DSPCOUNT
 2583    REF   57   LAST   455    40,3546   0 5155 0             TC      ENDOFJOB


R2584    RECALTST IS ENTERED DIRECTLY AFTER DATA IS LOADED (OR RESEQUENCE VERB IS
R2585    EXECUTED), TERMINATE VERB IS EXECUTED, OR PROCEED WITHOUT DATA VERB IS
R2586    EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R2587    IF CADRSTOR NOT= +0, IT PUTS +0 INTO DSPLOCK, AND TURNS OFF KEY RLSE
R2588    LIGHT IF DSPLIST IS EMPTY (LEAVES KEY RLSE LIGHT ALONE IF NOT EMPTY).

 2589    REF    9   LAST   455    40,3547   11'042 1  RECALTST CCS     CADRSTOR
 2590    REF    1                 40,3550   0 3552 0             TC      RECAL1
 2591    REF   58   LAST   458    40,3551   0 5155 0             TC      ENDOFJOB         NORMAL EXIT IF KEYBOARD INITIATED
 2592    REF  100   LAST   454    40,3552   3 4755 1  RECAL1     CAF     ZERO
 2593    REF   10   LAST   458    40,3553   57'042 0             XCH     CADRSTOR
 2594                             40,3554   0 0004 0             INHINT
 2595    REF    3   LAST   374    40,3555   0 5137 1             TC      JOBWAKE
 2596    REF    4   LAST   454    40,3556   11'014 1             CCS     LOADSTAT
 2597    REF    1                 40,3557   0 3601 0             TC      DOPROC           + PROCEED WITHOUT DATA
 2598    REF   59   LAST   458    40,3560   0 5155 0             TC      ENDOFJOB         PATHALOGICAL CASE EXIT
 2599    REF    1                 40,3561   0 3577 1             TC      DOTERM           -   TERMINATE
 2600    REF   31   LAST   445    40,3562   3 4752 0             CAF     TWO              -0 DATA IN OR RESEQUENCE
 2601    REF    2   LAST   372    40,3563   50 064 0  RECAL2     INDEX   LOCCTR
 2602    REF    3   LAST   372    40,3564   6 0164 1             AD      LOC              LOC IS + FOR BASIC JOBS
 2603    REF    3   LAST   458    40,3565   50 064 0             INDEX   LOCCTR
 2604    REF    4   LAST   458    40,3566   54 164 0             TS      LOC
 26041   REF   15   LAST   453    40,3567   3 1002 1             CA      NOUNREG          SAVE VERB IN MPAC, NOUN IN MPAC+1 AT
 26042   REF   60   LAST   455    40,3570   54 001 1             TS      L                TIME OF RESPONSE TO ENDIDLE FOR
 26043   REF   20   LAST   453    40,3571   3 1001 1             CA      VERBREG          POSSIBLE LATER TESTING BY JOB THAT HAS
 26044   REF    4   LAST   458    40,3572   50 064 0             INDEX   LOCCTR           BEEN WAKED UP.
 26045   REF  219   LAST   457    40,3573   52 155 1             DXCH    MPAC
 2605                             40,3574   0 0003 1             RELINT
 2606    REF    9   LAST   450    40,3575   0 4457 0  RECAL3     TC      RELDSP
 2607    REF   60   LAST   458    40,3576   0 5155 0             TC      ENDOFJOB
 2608    REF 101  LAST  458    40,3577  3 4755 1  DOTERM    CAF     ZERO
 2609    REF   1               40,3600  0 3563 1            TC      RECAL2

 2610    REF  57  LAST  458    40,3601  3 4753 1  DOPROC    CAF     ONE
 2611    REF   2  LAST  459    40,3602  0 3563 1            TC      RECAL2
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P2612    MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED

  2613    REF   1                   4303                          SETLOC ENDBLFF

  26135   REF   5 LAST  454 TC  456:     63   111*                COUNT* $$/PIN
R 2614    SETNCADR          E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R 2615                      ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

  2616    REF   8  LAST  440        4303  55'017 1  SETNCADR TS      NOUNCADR         STORE ECADR
  2617    REF  13  LAST  388        4304  54 003 0           TS      EBANK            SET EBANK BITS
  2618    REF   2  LAST  191        4305  7 4357 0           MASK    LOW8
  2619    REF   1                   4306  6 5007 0           AD      OCT1400
  2620    REF  29  LAST  435        4307  54 145 0           TS      NOUNADD          PUT E ADRES INTO NOUNADD
  2621    REF 125  LAST  457        4310  0 0002 0           TC      Q


R 2622    SETNADD           GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R 2623                      E ADRES AND PUTS IT INTO NOUNADD.

  2624    REF   9  LAST  460        4311  3 1017 0  SETNADD  CA      NOUNCADR
  2625    REF   7  LAST  429        4312  1 4304 0           TCF     SETNCADR +1


R 2626    SETEBANK          E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R 2627                      DERIVED AND LEFT IN A.

  2628    REF  14  LAST  460        4313  54 003 0  SETEBANK TS      EBANK            SET EBANK BITS
  2629    REF   3  LAST  460        4314  7 4357 0           MASK    LOW8
  2630    REF   2  LAST  460        4315  6 5007 0           AD      OCT1400          E ADRES LEFT IN A
  2631    REF 126  LAST  460        4316  0 0002 0           TC      Q


  2632                              4317   00016 0  R1D1     OCT     16               THESE 3 CONSTANTS FORM A PACKED TABLE.
  2633                              4320   00011 1  R2D1     OCT     11               DONT SEPARATE.
  2634                              4321   00004 0  R3D1     OCT     4

  2635    REF   7  LAST  444        4322  54 020 1  RIGHT5   TS      CYR
  2636    REF   8  LAST  460        4323  4 0020 1           CS      CYR
  2637    REF   9  LAST  460        4324  4 0020 1           CS      CYR
  2638    REF  10  LAST  460        4325  4 0020 1           CS      CYR
  2639    REF  11  LAST  460        4326  4 0020 1           CS      CYR
  2640    REF  12  LAST  460        4327  56 020 0           XCH     CYR
  2641    REF 127  LAST  460        4330  0 0002 0           TC      Q

  2642    REF  13  LAST  444        4331  54 022 0  LEFT5    TS      CYL
  2643    REF  14  LAST  460        4332  4 0022 0           CS      CYL
  2644    REF  15  LAST  460        4333  4 0022 0           CS      CYL
  2645    REF  16  LAST  460        4334  4 0022 0           CS      CYL
  2646    REF  17  LAST  460        4335  4 0022 0           CS      CYL
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 2647  REF  18  LAST  460      4336  56 022 1             XCH     CYL
 2648  REF 123  LAST  460      4337  0 0002 0             TC      Q

 2649                          4340  6 0000 1  SLEFT5     DOUBLE
 2650                          4341  6 0000 1             DOUBLE
 2651                          4342  6 0000 1             DOUBLE
 2652                          4343  6 0000 1             DOUBLE
 2653                          4344  6 0000 1             DOUBLE
 2654  REF 129  LAST  461      4345  0 0002 0             TC      Q


 2655                          4346   00037 0  LOW5       OCT     37                  THESE 3 CONSTANTS FORM A PACKED TABLE.
 2656                          4347   01740 0  MID5       OCT     1740                DONT SEPARATE.
 2657                          4350   76000 0  HI5        OCT     76000               MUST STAY HERE

 2658  REF   7  LAST  457      4351  0 5072 1  TCNOVAC    TC      NOVAC
 2659  REF  17  LAST  438      4352  0 5203 0  TCWAIT     TC      WAITLIST
 2660  REF  13  LAST  438      4353  0 5261 1  TCTSKOVR   TC      TASKOVER
 2661  REF  16  LAST  384      4354  0 5105 0  TCFINDVC   TC      FINDVAC


 2662                          4355   30000 1  CHRPRIO    OCT     30000               EXEC PRIORITY OF CHARIN


 2663                          4356   03777 0  LOW11      OCT     3777
 2664  REF   6  LAST  429      4356            B12-1      EQUALS  LOW11
 2665                          4357   00377 1  LOW8       OCT     377


 2667                          4360   00023 0  VD1        OCT     23                  THESE 3 CONSTANTS FORM A PACKED TABLE.
 2668                          4361   00021 1  ND1        OCT     21                  DONT SEPARATE.
 2669                          4362   00025 0  MD1        OCT     25

 2670                          4363   00012 1  BINCON     DEC     10

 2671  REF  20  LAST  405      4364  3 4745 0  FALTON     CA      BIT7                TURN ON OPERATOR ERROR LIGHT
 2672                          4365  0 0006 1             EXTEND
 2673  REF  12  LAST  450      4366  05 011 1             WOR     DSALMOUT            BIT 7 OF CHANNEL 11
 2674  REF 130  LAST  461      4367  0 0002 0             TC      Q

 2675  REF  21  LAST  461      4370  4 4745 1  FALTOF     CS      BIT7                TURN OFF OPERATOR ERROR LIGHT
 2676                          4371  0 0006 1             EXTEND
 2677  REF  13  LAST  461      4372  03 011 1             WAND    DSALMOUT            BIT 7 OF CHANNEL 11
 2678  REF 131  LAST  461      4373  0 0002 0             TC      Q

 2679  REF  22  LAST  447      4374  3 4747 1  RELDSPON   CAF     BIT5                TURN ON KEY RELEASE LIGHT
 2680                          4375  0 0006 1             EXTEND
 2681  REF  14  LAST  461      4376  05 011 1             WOR     DSALMOUT            BIT 5 OF CHANNEL 11
 2682  REF 132  LAST  461      4377  0 0002 0             TC      Q
 2683                               4400  0 0006 1  LODSAMPT EXTEND
 2684   REF  13  LAST  366          4401  3 0025 0           DCA     TIME2
 2685   REF   5  LAST  315          4402  52 014 0           DXCH    SAMPTIME
 2686   REF 133  LAST  461          4403  0 0002 0           TC      Q

 2687                               4404  0 0006 1  TPSL1    EXTEND                      SHIFTS MPAC, +1, +2 LEFT 1
 2688   REF 220  LAST  458          4405  3 0156 0           DCA     MPAC      +1        LEAVES OVFIND SET TO +/- 1 FOR OF/UF
 2689   REF 221  LAST  462          4406  20 156 1           DAS     MPAC      +1
 2690   REF 222  LAST  462          4407  6 0154 1           AD      MPAC
 2691   REF 223  LAST  462          4410  26 154 0           ADS     MPAC
 2692                               4411  54 007 1           TS      7                   TS A DOES NOT CHANGE A ON OF/UF.
 2693   REF 134  LAST  462          4412  0 0002 0           TC      Q                   NO NET OF/UF
 2694   REF   7  LAST  434          4413  54 162 0           TS      MPAC+6              MPAC +6 SET TO +/-1 FOR OF/UF
 2695   REF 135  LAST  462          4414  0 0002 0           TC      Q

R2696   IF MPAC, +1 ARE EACH +NZ OR +0 AND C(A)=-0, SHORTMP WRONGLY GIVES +0.
R2697   IF MPAC, +1 ARE EACH -NZ OR -0 AND C(A)=+0, SHORTMP WRONGLY GIVES +0.
R2698   PRSHRTMP FIXES FIRST CASE ONLY, BY MERELY TESTING C(A) AND IF IT = -0,
R2699   SETTING RESULT TO -0.
R2700    (DO NOT USE PRSHRTMP UNLESS MPAC, +1 ARE EACH +NZ OR +0, AS THEY ARE
R2701    WHEN THEY CONTAIN TH E SF CONSTANTS.)

 2702   REF   2  LAST   97          4415  54 135 1  PRSHRTMP TS      MPTEMP
 2703   REF 148  LAST  457          4416  10 000 0           CCS     A
 2704   REF   3  LAST  462          4417  3 0135 0           CA      MPTEMP              C(A) +, DO REGULAR SHORTMP
 2705   REF   6  LAST  441          4420  1 7310 0           TCF     SHORTMP +1          C(A) +0, DO REGULAR SHORTMP
 2706                               4421  1 4417 0           TCF     -2                  C(A) -, DO REGULAR SHORTMP
 2707   REF 102  LAST  459          4422  4 4755 0           CS      ZERO                C(A) -0, FORCE RESULT TO -0 AND RETURN.
 2708   REF 224  LAST  462          4423  54 154 0           TS      MPAC
 2709   REF 225  LAST  462          4424  54 155 1           TS      MPAC      +1
 2710   REF 226  LAST  462          4425  54 156 1           TS      MPAC      +2
 2711   REF 136  LAST  462          4426  0 0002 0           TC      Q

 2712   REF  35  LAST  326          4427  3 4746 0  FLASHON  CAF     BIT6                TURN ON V/N FLASH
 2713                               4430  0 0006 1           EXTEND                      BIT 6 OF CHANNEL 11
 2714   REF  15  LAST  461          4431  05 011 1           WOR     DSALMOUT
 2715   REF 137  LAST  462          4432  0 0002 0           TC      Q

 2716   REF  36  LAST  462          4433  4 4746 1  FLASHOFF CS      BIT6                TURN OFF V/N FLASH
 2717                               4434  0 0006 1           EXTEND
 2718   REF  16  LAST  462          4435  03 011 1           WAND    DSALMOUT            BIT 6 OF CHANNEL 11
 2719   REF 138  LAST  462          4436  0 0002 0           TC      Q
```

```
P2720    INTERNAL USE OF KEYBOARD AND DISPLAY PROGRAM

R2721    USER MUST SCHEDULE CALLS TO NVSUB SO THAT THERE IS NO CONFLICT OF USE OR
R2722    CONFUSION TO OPERATOR. THE OLD GRABLOCK (INTERNAL/INTERNAL INTERLOCK)
R2723    HAS BEEN REMOVED AND THE INTERNAL USER NO LONGER HAS THE PROTECTION THIS
R2724    OFFERED.

R2725    THERE ARE TWO WAYS A JOB CAN BE PUT TO SLEEP BY THE KEYBOARD + DISPLAY
R2726    PROGRAM.     1) BY ENDIDLE
R2727                 2) BY NVSUBUSY
R2728    THE BASIC CONVENTION IS THAT ONLY ONE JOB WILL BE PERMITTED ASLEEP VIA
R2729    THE KEYBOARD + DISPLAY PROGRAM AT A TIME. IF A JOB ATTEMPTS TO GO TO
R2730    SLEEP BY MEANS OF (1) OR (2) AND THERE IS ALREADY A JOB ASLEEP THAT WAS
R2731    PUT TO SLEEP BY (1) OR (2), THEN AN ABORT IS CAUSED.


R2732    THE CALLING SEQUENCE FOR NVSUB IS
R2733              CAF     V/N
R2734    L         TC      NVSUB
R2735    L+1       RETURN HERE IF OPERATOR HAS INTERVENED
R2736    L+2       RETURN HERE AFTER EXECUTION


R2737           A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2738    YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES THE KEYBOARD + DISPLAY
R2739    SYSTEM. NVSUBUSY ALSO TURNS ON THE KEY RELEASE LIGHT.
R2740    NVSUBUSY CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2741    SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.


R2742              THE CALLING SEQUENCE IS
R2743                CAF     WAKEFCADR
R2744                TC      NVSUBUSY


R2745    .


R2746    NVSUBUSY IS INTENDED FOR USE WHEN AN INTERNAL PROGRAM FINDS THE OPERATOR
R2747    IS USING THE KEYBOARD + DISPLAY PROGRAM (BY HIS OWN INITIATION). IT IS
R2748    NOT INTENDED FOR USE WHEN ONE INTERNAL PROGRAM FINDS ANOTHER INTERNAL
R2749    PROGRAM USING THE KEYBOARD + DISPLAY PROGRAM.


R2750    NVSUBUSY ABORTS (WITH CODE 01206) IF A SECOND JOB ATTEMPTS TO GO TO
R2751    SLEEP IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO NVSUBUSY
R2752    WHEN
R2753    1) DSPLIST NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF THE DSPLIST
R2754       IS EXCEEDED.
R2755    2) CADRSTOR NOT= +0. THIS INDICATES THAT A JOB IS ALREADY USING
```

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R2756    ENDIDLE. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)

 2757    REF   1                 4437  4 4444 0  PRENVBSY CS      2K+3          SPECIAL ENTRANCE FOR ROUTINES IN FIXED
 2758    REF 139  LAST  462      4440  6 0002 0           AD      Q             BANKS ONLY DESIRING THE FCADR OF(LOC
 2759    REF   2  LAST  455      4441  6 0004 0           AD      FBANK         FROM WHICH THE TC PRENVBSY WAS DONE) -2
 2760    REF  34  LAST  456      4442  0 4635 0  NVSUBUSY TC      POSTJUMP      TO BE ENTERED.
 2761    REF   1                 4443   10647 0           CADR    NVSUBSY1
 2762                            4444   02003 0  2K+3     OCT     2003

R27625   NVSUBSY1 MUST BE IN BANK 27 OR LOWER, SO IT WILL PUT CALLER TO SLEEP
R27626   WITH HIS PROPER SUPERBITS.

 2763    REF   1              04,2647                     SETLOC ENDSPMM +1
 27635   REF   2 LAST  457 TO  458:     9      9*         COUNT* $$/PIN
 2764    REF  61  LAST  458   04,2647  54 001 1  NVSUBSY1 TS      L
 2769    REF   2  LAST  455   04,2650  0 4220 0           TC      ISCADR+0      ABORT IF CADRSTOR NOT= +0.
 2770    REF   2  LAST  455   04,2651  0 4224 1           TC      ISLIST+0      ABORT IF DSPLIST NOT= +0.
 2771    REF   3  LAST  439   04,2652  0 4374 0           TC      RELDSPON
 2772    REF  62  LAST  464   04,2653  3 0001 0           CA      L
 2773    REF   3  LAST  455   04,2654  55 043 0           TS      DSPLIST
 2774    REF   3  LAST  455   04,2655  0 5133 0  ENDNVBSY TC      JOBSLEEP


R2775    NVSBWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R2776    SYSTEM IS NOT BUSY, IT EXECUTES V/N AND RETURNS TO L+1 (L= LOC FROM
R2777    WHICH THE TC NVSBWAIT WAS DONE). IF SYSTEM IS BUSY, IT PUTS CALLING JOB
R2778    TO SLEEP WITH L-1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN SYSTEM
R2779    IS NOT BUSY.

 2780    REF   1                 4445                     SETLOC NVSUBUSY +3
 27805   REF   6 LAST  460 TO  464:     98    209*        COUNT* $$/PIN
 2781                            4445  22 007 0  NVSBWAIT LXCH    7             ZERO NVMONOPT OPTIONS
 2782    REF   9  LAST  457      4446  54 123 0           TS      NVTEMP
 2783    REF  44  LAST  456      4447  3 4736 1           CAF     BIT14
 27831   REF  10  LAST  456      4450  7 1021 1           MASK    MONSAVE1      EXTERNAL MONITOR BIT
 27832   REF   8  LAST  456      4451  6 1012 0           AD      DSPLOCK
 27833   REF 149  LAST  462      4452  10 000 0           CCS     A
 27834   REF   1                 4453  1 4455 0           TCF     NVSBWT1       BUSY
 2784    REF   1                 4454  1 4164 1           TCF     NVSBCOM       FREE. NVSUB WILL SAVE L+1 FOR RETURN
A2785                                                                           AFTER EXECUTION.
 2786    REF 140  LAST  464      4455  24 002 0  NVSBWT1  INCR    Q             L+2. PRENVBSY WILL PUT L-1 INTO LIST AND
 2787    REF   1                 4456  1 4437 1           TCF     PRENVBSY      GO TO SLEEP.


R2788    RELDSP IS USED BY VBPROC, VBTERM, VBRQEXEC, VBRQWAIT, VBRELDSP, EXTENDED
R2789    VERB DISPATCHER, VBRESEQ, RECALTST.
R2790    RELDSP1 IS USED BY MONITOR SET UP, VBRELDSP.
 2791    REF 141  LAST  464      4457  56 002 0  RELDSP   XCH     Q             SET DSPLOCK TO +0, TURN RELDSP LIGHT
 2792    REF   1                 4460  54 144 1           TS      RELRET        OFF,  SEARCH DSPLIST
 27921   REF  45  LAST  464      4461  4 4736 0           CS      BIT14
 27922                           4462  0 0004 0             INHINT
 27923  REF  11  LAST  464        4463  7 1021 1             MASK     MONSAVE1
 27924  REF  12  LAST  465        4464  55'021 1             TS       MONSAVE1       TURN OFF EXTERNAL MONITOR BIT
 2793   REF   4  LAST  464        4465  11'043 0             CCS      DSPLIST
 2794                             4466  0 4470 0             TC       +2
 2795   REF   1                   4467  0 4473 0             TC       RELDSP2        LIST EMPTY
 2796   REF 103  LAST  462        4470  3 4755 1             CAF      ZERO
 2797   REF   5  LAST  465        4471  57'043 1             XCH      DSPLIST
 2799   REF   4  LAST  458        4472  0 5137 1             TC       JOBWAKE
 2800                             4473  0 0003 1   RELDSP2   RELINT
 2801   REF  23  LAST  461        4474  4 4747 0             CS       BIT5           TURN OFF KEY RELEASE LIGHT
 2802                             4475  0 0006 1             EXTEND                  (BIT 5 OF CHANNEL 11)
 2803   REF  17  LAST  462        4476  03 011 1             WAND     DSALMOUT
 2804   REF 104  LAST  465        4477  3 4755 1             CAF      ZERO
 2805   REF   9  LAST  464        4500  55'012 1             TS       DSPLOCK
 2807   REF   2  LAST  464        4501  0 0144 0             TC       RELRET
 2808   REF 142  LAST  464        4502  56 002 0   RELDSP1   XCH      Q              SET DSPLOCK TO +0. NO DSPLIST SEARCH.
 2809   REF   3  LAST  465        4503  54 144 1             TS       RELRET         TURN KEY RLSE LIGHT OFF IF DSPLIST IS
A2810                                                                                EMPTY. LEAVE KEY RLSE LIGHT ALONE IF
A2811                                                                                DSPLIST IS NOT EMPTY.
 2812   REF   6  LAST  465        4504  11'043 0             CCS      DSPLIST
 2813                             4505  0 4507 1             TC       +2             +  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2814   REF   2  LAST  465        4506  0 4473 0             TC       RELDSP2        +0 EMPTY. TURN OFF KEY RLSE LIGHT
 2815   REF 105  LAST  465        4507  3 4755 1             CAF      ZERO           -  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2816   REF  10  LAST  465        4510  55'012 1             TS       DSPLOCK
 2817   REF   4  LAST  465        4511  0 0144 0             TC       RELRET

 2818                             4512             ENDPINBF  EQUALS
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P28191  PINTEST IS NEEDED FOR AUTO CHECK OF PINBALL.
 28182  REF   2  LAST  262   43,2002              PINTEST  EQUALS LST2FAN
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P2819   VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2820   OFF THE CAUTION AND STATUS LIGHTS.

 2821   REF   1                41,3613                       SETLOC ENDNVSB1 +1

 28215  REF   8 LAST  452 TO  454:     61   907*             COUNT* $$/PIN
 2822                          41,3613  0 0004 0  VBTSTLTS INHINT
 2823   REF  23  LAST  457     41,3614  4 4753 0           CS     BIT1             SET BIT 1 OF IMODES33 SO IMUMON WONT
 2824   REF  19  LAST  222     41,3615  7 1303 1           MASK   IMODES33         TURN OUT ANY LAMPS.
 2825   REF  24  LAST  467     41,3616  6 4753 1           AD     BIT1
 2826   REF  20  LAST  467     41,3617  55'303 1           TS     IMODES33

 2827   REF   1                41,3620  3 3656 1           CAF    TSTCON1          TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2828                          41,3621  0 0006 1           EXTEND                  V/N FLASH, OPERATOR ERROR.
 2829   REF  18  LAST  465     41,3622  05 011 1           WOR    DSALMOUT
 2830   REF   1                41,3623  3 3657 0           CAF    TSTCON2          TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2831   REF  27  LAST  453     41,3624  55'036 1           TS     DSPTAB   +11D    PROG ALM.
 2832   REF  21  LAST  418     41,3625  3 4742 1           CAF    BIT10            TURN ON TEST ALARM OUTBIT
 2833                          41,3626  0 0006 1           EXTEND
 2834   REF   5  LAST  220     41,3627  05 013 0           WOR    CHAN13
 2835   REF   5  LAST  400     41,3630  3 4363 0           CAF    TEN
 2836   REF   1                41,3631  54 117 1  TSTLTS1  TS     ERCNT
 2837   REF   1                41,3632  4 3654 1           CS     FULLDSP
 2838   REF   2  LAST  467     41,3633  50 117 0           INDEX  ERCNT
 2839   REF  28  LAST  467     41,3634  55'023 0           TS     DSPTAB
 2840   REF   3  LAST  467     41,3635  10 117 1           CCS    ERCNT
 2841   REF   1                41,3636  0 3631 0           TC     TSTLTS1
 2842   REF   1                41,3637  4 3655 0           CS     FULLDSP1
 2843   REF  29  LAST  467     41,3640  55'024 1           TS     DSPTAB   +1      TURN ON 3 PLUS SIGNS
 2844   REF  30  LAST  467     41,3641  55'027 1           TS     DSPTAB   +4
 2845   REF  31  LAST  467     41,3642  55'031 0           TS     DSPTAB   +6
 2846   REF   1                41,3643  3 4760 1           CAF    ELEVEN
 2847   REF   9  LAST  453     41,3644  55'016 0           TS     NOUT
 2848                          41,3645  0 0003 1           RELINT
 2849   REF   1                41,3646  3 3661 0           CAF    SHOLTS
 2850                          41,3647  0 0004 0           INHINT
 2851   REF  18  LAST  461     41,3650  0 5203 0           TC     WAITLIST
 2852   REF  32  LAST  467       1023                      EBANK= DSPTAB
 2853   REF   1                41,3651   03662 0           2CADR  TSTLTS2
 2853   REF   1                41,3652   62102 0
 2854   REF  61  LAST  458     41,3653  0 5155 0           TC     ENDOFJOB         DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A2855                                                                              ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2856                                                                              LIGHTS TEST WILL BE SEEN.

 2857                          41,3654   05675 0  FULLDSP  OCT    05675            DISPLAY ALL 8:S
 2858                          41,3655   07675 1  FULLDSP1 OCT    07675            DISPLAY ALL 8:S AND +
 2859                          41,3656   00175 1  TSTCON1  OCT    00175
A2860                                                                              UPLINK ACTIVITY, TEMP, KEY RLSE,
A2861                                                                              V/N FLASH, OPERATOR ERROR.
```

```
 2862                             41,3657   40674 0  TSTCON2  OCT      40674          DSPTAB+11D BITS 3,4,5,6,8,9. LR LITES,
A2863                                                                                 NO ATT, GIMBAL LOCK, TRACKER, PROG ALM.
 2864                             41,3660   00115 1  TSTCON3  OCT      00115          CHAN 11  BITS 1, 3, 4, 7.
A2865                                                                                 UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
 2866                             41,3661   00764 1  SHOLTS   OCT      764            5 SEC


 2867   REF   4  LAST  457        41,3662  3 4355 0  TSTLTS2  CAF      CHRPRIO        CALLED BY WAITLIST
 2868   REF   8  LAST  461        41,3663  0 5072 1           TC       NOVAC
 2869   REF  33  LAST  467           1023                     EBANK=   DSPTAB
 2870   REF   1                   41,3664   03667 0           2CADR    TSTLTS3
 2870   REF   1                   41,3665   62102 0
 2871   REF  14  LAST  461        41,3666  0 5261 1           TC       TASKOVER


 2872   REF   1                   41,3667  4 3660 0  TSTLTS3  CS       TSTCON3        CALLED BY EXECUTIVE
 2873                             41,3670  0 0004 0           INHINT
 2874                             41,3671  0 0006 1           EXTEND                  TURN OFF  UPLINK ACTIVITY, TEMP,
 2875   REF  19  LAST  467        41,3672  03 011 1           WAND     DSALMOUT       OPERATOR ERROR.
 2876   REF  22  LAST  467        41,3673  4 4742 0           CS       BIT10          TURN OFF TEST ALARM OUTBIT
 2877                             41,3674  0 0006 1           EXTEND
 2878   REF   6  LAST  467        41,3675  03 013 0           WAND     CHAN13
 28781  REF  22  LAST  332        41,3676  3 4750 1           CAF      BIT4           MAKE NO ATT FOLLOW BIT 4 OF CHANNEL 12
 28782                            41,3677  0 0006 1           EXTEND                    (NO ATT LIGHT ON IF IN COARSE ALIGN)
 28783  REF  22  LAST  288        41,3700  02 012 0           RAND     CHAN12
 2879   REF  25  LAST  454        41,3701  6 4735 1           AD       BIT15          TURN OFF AUTO, HOLD, FREE, SPARE,
 2880   REF  34  LAST  468        41,3702  55'036 1           TS       DSPTAB  +11D   GIMBAL LOCK, SPARE, TRACKER, PROG ALM
 2881   REF   1                   41,3703  4 3726 0           CS       13-11,1        SET BITS TO INDICATE ALL LAMPS OUT. TEST
 2882   REF  21  LAST  467        41,3704  7 1303 1           MASK     IMODES33       LIGHTS COMPLETE.
 2883   REF   3  LAST  223        41,3705  6 5026 0           AD       PRIO16
 2884   REF  22  LAST  468        41,3706  55'303 1           TS       IMODES33

 2885   REF   1                   41,3707  4 3730 1           CS       OCT55000
 2886   REF  42  LAST  227        41,3710  7 1302 0           MASK     IMODES30
 2887   REF   4  LAST  260        41,3711  6 5025 0           AD       PRIO15         15000.
 2888   REF  43  LAST  468        41,3712  55'302 0           TS       IMODES30

 2889   REF   1                   41,3713  4 3727 1           CS       RFAILS2
 2890   REF  27  LAST  323        41,3714  7 0110 0           MASK     RADMODES
 2891   REF   4  LAST  185        41,3715  6 4745 0           AD       RCDUFBIT
 2892   REF  28  LAST  468        41,3716  54 110 0           TS       RADMODES

 2893                             41,3717  0 0003 1           RELINT

 2894   REF  92  LAST  447        41,3720  0 4616 1           TC       BANKCALL       REDISPLAY C(MODREG)
 2895   REF   1                   41,3721   10636 0           CADR     DSPMM
 2896   REF   4  LAST  452        41,3722  0 4204 0           TC       KILMONON       TURN ON KILL MONITOR BIT.
 2897   REF   5  LAST  453        41,3723  0 4433 1           TC       FLASHOFF       TURN OFF V/N FLASH.
 2898   REF  35  LAST  464        41,3724  0 4635 0           TC       POSTJUMP       DOES RELDSP AND GOES TO PINBRNCH IF
 2899   REF   1                   41,3725   61471 1           CADR     TSTLTS4         ENDIDLE IS AWAITING OPERATOR RESPONSE.
 2901                       41,3726   16001 1  13-11,1  OCT      16001
 2902                       41,3727   00330 1  RFAILS2  OCT      330          RADAR CDU AND DATA FAIL FLAGS.
 2903                       41,3730   55000 1  OCT55000 OCT      55000
 2904                       41,3731            ENDPINS2 EQUALS
```

```
P2905    ERROR LIGHT RESET (RSET) TURNS OFF,
R2906    UPLINK ACTIVITY, AUTO, HOLD, FREE, OPERATOR ERROR,
R2907    PROG ALM, TRACKER FAIL.
R2908    LEAVES GIMBAL LOCK AND NO ATT ALONE.
R2909    IT ALSO ZEROES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART.
R2910    IT ALSO SETS :CAUTION RESET: TO 1.
R2911    IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

  2912   REF   2  LAST  458   40,3603                             SETLOC DOPROC  +2
  29125  REF  10 LAST  458 TO  460:    39    836*                 COUNT* $$/PIN
  2913   REF   3  LAST  450   40,3603  56 115 1  ERROR            XCH    21/22REG           RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
  2914   REF  11  LAST  465   40,3604  55'012 1                   TS     DSPLOCK            LIGHT RESET LEAVES DSPLOCK UNCHANGED.
  2915                        40,3605  0 0004 0                   INHINT
  2916   REF  23  LAST  468   40,3606  3 4742 1                   CAF    BIT10              TURN ON :CAUTION RESET: OUTBIT
  2917                        40,3607  0 0006 1                   EXTEND
  2918   REF  20  LAST  468   40,3610  05 011 1                   WOR    DSALMOUT           BIT10 CHAN 11
  2919   REF   1              40,3611  3 3672 1                   CAF    GL+NOATT           LEAVE GIMBAL LOCK AND NO ATT INTACT,
  2920   REF  35  LAST  468   40,3612  7 1036 1                   MASK   DSPTAB +11D        TURNING OFF AUTO, HOLD, FREE,
  2921   REF  26  LAST  468   40,3613  6 4735 1                   AD     BIT15              PROG ALARM, AND TRACKER.
  2922   REF  36  LAST  470   40,3614  55'036 1                   TS     DSPTAB +11D
  2923   REF   4  LAST  468   40,3615  4 5026 1                   CS     PRIO16             RESET FAIL BITS WHICH GENERATE PROG
  2924   REF  23  LAST  468   40,3616  7 1303 1                   MASK   IMODES33           ALARM SO THAT IF THE FAILURE STILL
  2925   REF   5  LAST  470   40,3617  6 5026 0                   AD     PRIO16             EXISTS, THE ALARM WILL COME BACK.
  2926   REF  24  LAST  470   40,3620  55'303 1                   TS     IMODES33
  2927   REF  24  LAST  470   40,3621  4 4742 0                   CS     BIT10
  2928   REF  44  LAST  468   40,3622  7 1302 0                   MASK   IMODES30
  2929   REF  25  LAST  470   40,3623  6 4742 1                   AD     BIT10
  2930   REF  45  LAST  470   40,3624  55'302 0                   TS     IMODES30

  2931   REF   1              40,3625  4 3671 0                   CS     RFAILS
  2932   REF  29  LAST  468   40,3626  7 0110 0                   MASK   RADMODES
  2933   REF   5  LAST  468   40,3627  6 4745 0                   AD     RCDUFBIT
  2934   REF  30  LAST  470   40,3630  54 110 0                   TS     RADMODES

  2935   REF  26  LAST  470   40,3631  4 4742 0                   CS     BIT10              TURN OFF :TEST ALARM: OUTBIT.
  2936                        40,3632  0 0006 1                   EXTEND
  2937   REF   7  LAST  468   40,3633  03 013 0                   WAND   CHAN13
  2938   REF   1              40,3634  4 3670 1                   CS     ERCON              TURN OFF UPLINK ACTIVITY,
  2939                        40,3635  0 0006 1                   EXTEND                    OPERATOR ERROR.
  2940   REF  21  LAST  470   40,3636  03 011 1                   WAND   DSALMOUT
  2941   REF   2  LAST  441   40,3637  3 4363 0  TSTAB            CAF    BINCON             (DEC 10)
  2942   REF   4  LAST  467   40,3640  54 117 1                   TS     ERCNT              ERCNT = COUNT
  2943                        40,3641  0 0004 0                   INHINT
  2944   REF   5  LAST  470   40,3642  50 117 0                   INDEX  ERCNT
  2945   REF  37  LAST  470   40,3643  11'023 0                   CCS    DSPTAB
  2946   REF  58  LAST  459   40,3644  6 4753 1                   AD     ONE
  2947   REF   1              40,3645  0 3652 0                   TC     ERPLUS
  2948   REF  59  LAST  470   40,3646  6 4753 1                   AD     ONE
  2949   REF 150  LAST  464   40,3647  4 0000 0  ERMINUS          CS     A
  2950   REF   1              40,3650  7 3673 1                   MASK   NOTBIT12
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 2951    REF   1                 40,3651  0 3655 1            TC       ERCOM
 2952    REF 151  LAST   470     40,3652  4 0000 0  ERPLUS    CS       A
 2953    REF   2  LAST   470     40,3653  7 3673 1            MASK     NOTBIT12
 2954    REF 152  LAST   471     40,3654  4 0000 0            CS       A                 MIGHT WANT TO RESET CLPASS, DECBRNCH,
 2955    REF   6  LAST   470     40,3655  50 117 0  ERCOM     INDEX    ERCNT             ETC.
 2956    REF  38  LAST   470     40,3656  55'023 0            TS       DSPTAB
 2957                            40,3657  0 0003 1            RELINT
 2958    REF   7  LAST   471     40,3660  10 117 1            CCS      ERCNT
 2959    REF   1                 40,3661  0 3640 0            TC       TSTAB    +1
 2960    REF 106  LAST   465     40,3662  3 4755 1            CAF      ZERO
 2961    REF   5  LAST   305     40,3663  54 375 1            TS       FAILREG
 29611   REF   6  LAST   471     40,3664  54 376 1            TS       FAILREG +1
 29612   REF   7  LAST   471     40,3665  54 377 0            TS       FAILREG +2
 2962    REF   2  LAST   108     40,3666  55'357 0            TS       SFAIL
 2963    REF  62  LAST   467     40,3667  0 5155 0            TC       ENDOFJOB

 2964                            40,3670   00104 1  ERCON     OCT      104               CHAN 11 BITS 3,7.
A2965                                                                                    UPLINK ACTIVITY, AND OPERATOR ERROR.
 2966                            40,3671   00330 1  RFAILS    OCT      330               RADAR CDU AND DATA FAIL FLAGS.
 29665                           40,3672   00050 1  GL+NOATT  OCT      00050             NO ATT AND GIMBAL LOCK LAMPS
 2967                            40,3673   73777 1  NOTBIT12  OCT      73777


 2968                            40,3674            ENDPINS1  EQUALS


 2969    REF   5  LAST   320     30,2000                      SBANK=   LOWSUPER
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R0100    MOD NO: 0                        DATE: 1 MAY 1968

R0101    MOD BY: DIGITAL DEVEL GROUP      LOG SECTION R60,R62

R0102    FUNCTIONAL DESCRIPTION:

R0103    CALLED AS A GENERAL SUBROUTINE TO MANEUVER THE LM TO A SPECIFIED
R0104    ATTITUDE.

R0105    1. IF THE 3-AXIS FLAG IS NOT SET THE FINAL CDU ANGLES ARE
R0106    CALCULATED (VECPOINT).

R0107    2. THE FDAI BALL ANGLES (NOUN 18) ARE CALCULATED (BALLANGS).

R0108    3. REQUEST FLASHING DISPLAY V50 N18 PLEASE PERFORM AUTO MANEUVER.

R0109    4. IF PRIORITY DISPLAY FLAG IS SET DO A PHASECHANGE. THEN AWAIT
R0110    ASTRONAUT RESPONSE.

R0111    5. DISPLAY RESPONSE RETURNS:

R0112         A. ENTER - RESET 3-AXIS FLAG AND RETURN TO CLIENT.

R0113         B. TERMINATE - IF IN P00 GO TO STEP 5A. OTHERWISE CHECK IF R61 IS
R0114            THE CALLING PROGRAM. IF IN R61 AN EXIT IS MADE TO GOTOV56. IF
R0115            NOT IN R61 AN EXIT IS DONE VIA GOTOPOOH.

R0116         C. PROCEED - CONTINUE WITH PROGRAM AT STEP 6.

R0117    6. IF THE 3-AXISFLAG IS NOT SET, THE FINAL CDU ANGLES ARE CALCULATED
R0118        (VECPOINT).

R0119    7. THE FDAI BALL ANGLES (NOUN 18) ARE CALCULATED (BALLANGS).

R0120    8. IF THE G+N SWITCH IS NOT SET GO BACK TO STEP 3.

R0121    9. IF THE AUTO SWITCH IS NOT SET GO BACK TO STEP 3.

R0122    10. NONFLASHING DISPLAY V06N18 (FDAI ANGLES).

R0123    11. DO A PHASECHANGE.

R0124    12. DO A MANEUVER CALCULATION AND ICDU DRIVE ROUTINE TO ACHIEVE FINAL

R0125         GIMBAL ANGLES (GOMANUR).
R0126    13. AT END OF MANEUVER GO TO STEP 3.

R0127               IF SATISFACTORY MANEUVER STEP 5A EXITS R60.
R0128               FOR FURTHER ADJUSTMENT OF THE VEHICLE ATTITUDE ABOUT THE
R0129               DESIRED VECTOR, THE ROUTINE MAY BE PERFORMED AGAIN STARTING AT
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R0130              STEP 5C.

R0131   CALLING SEQUENCE:  TC BANKCALL
R0132                      CADR R60LEM

R0133   ERASABLE INITIALIZATION REQUIRED : SCAXIS, POINTVSM (FOR VECPOINT)
R0134                                      3AXISFLG.

R0135   SUBROUTINES CALLED: VECPOINT, BALLANGS, GOPERF2R, LINUS, GODSPEF,
R0136                       GOMANUR, DOWNFLAG, PHASCHNG, UPFLAG

R0137   NORMAL EXIT MODES: CAF TEMPR60   (CALLERS RETURN ADDRESS)
R0138                      TC  BANKJUMP

R0139   ALARMS: NONE

R0140   OUTPUT: NONE

R0141   DEBRIS: CPHI, CTHETA, CPSI, 3AXISFLG, TBASE2


 0142                       34,2000                        BANK    34
 0143   REF   1             26,2000                        SETLOC  MANUVER
 0144                       26,2123                        BANK

 0145   REF   1               1164                         EBANK=  TEMPR60

 0146   REF   1                                            COUNT*  $$/R06
 0147   REF   2  LAST  271  26,2123   0 4645 1  R60LEM     TC      MAKECADR
 0148   REF   2  LAST  473  26,2124   55'164 1             TS      TEMPR60

 0149   REF   1             26,2125   3 4746 0  REDOMANN   CAF     3AXISBIT
 0150   REF  13  LAST  290  26,2126   7 0101 0             MASK    FLAGWRD5        IS 3-AXIS FLAG SET
 0151   REF 153  LAST  471  26,2127  10 000 0              CCS     A
 0152   REF   1             26,2130   1 2136 0             TCF     TOBALL          YES
 0153   REF  27  LAST  388  26,2131   0 6037 0             TC      INTPRET
 0154                       26,2132    77624 1             CALL
 0155   REF   2  LAST  340  26,2133    56040 0                     VECPOINT        TO COMPUTE FINAL ANGLES
 0156   REF   5  LAST  369  26,2134    00322 1             STORE   CPHI            STORE FINAL ANGLES - CPHI,CTHETA,CPSI
 0157                       26,2135    77776 1             EXIT

 0158   REF  93  LAST  468  26,2136   0 4616 1  TOBALL     TC      BANKCALL
 01585  REF   2  LAST  340  26,2137    54266 1             CADR    BALLANGS        TO CONVERT ANGLES TO FDAI
 0159   REF   1             26,2140   3 2254 0  TOBALLA    CAF     V06N18
 0160   REF  94  LAST  473  26,2141   0 4616 1             TC      BANKCALL
 0161   REF   1             26,2142    20710 0             CADR    GOPERF2R        DISPLAY PLEASE PERFORM AUTO MANEUVER
 0162   REF   1             26,2143   0 2242 1             TC      R61TEST
 0163   REF   1             26,2144   0 2150 1             TC      REDOMANC        PROCEED
 0164   REF   1             26,2145   0 2175 0             TC      ENDMANU1        ENTER I.E. FINISHED WITH R60
 0165   REF    1                26,2146   0 2201 0             TC      CHKLINUS          TO CHECK FOR PRIORITY DISPLAYS
 0166   REF   63   LAST   471   26,2147   0 5155 0             TC      ENDOFJOB

 0167   REF    2   LAST   473   26,2150   3 4746 0   REDOMANC  CAF     3AXISBIT
 0168   REF   14   LAST   473   26,2151   7 0101 0             MASK    FLAGWRD5          IS 3-AXIS FLAG SET
 0169   REF  154   LAST   473   26,2152  10 000 0              CCS     A
 0170   REF    1                26,2153   1 2161 1             TCF     TOBALLC           YES
 0171   REF   28   LAST   473   26,2154   0 6037 0             TC      INTPRET
 0172                           26,2155    77624 1             CALL
 0173   REF    3   LAST   473   26,2156    56040 0                     VECPOINT          TO COMPUTE FINAL ANGLES
 0174   REF    6   LAST   473   26,2157    00322 1             STORE   CPHI              STORE ANGLES
 0175                           26,2160    77776 1             EXIT

 0176   REF   95   LAST   473   26,2161   0 4616 1   TOBALLC   TC      BANKCALL
 01765  REF    3   LAST   473   26,2162    54266 1             CADR    BALLANGS          TO CONVERT ANGLES TO FDAI
 0177   REF    1                26,2163   0 2255 1             TC      G+N,AUTO          CHECK AUTO MODE
 0178   REF  155   LAST   474   26,2164  10 000 0              CCS     A
 0179   REF    1                26,2165   1 2140 1             TCF     TOBALLA           NOT AUTO, GO REREQUEST AUTO MANEUVER.

 0180   REF    2   LAST   473   26,2166   3 2254 0   AUTOMANV  CAF     V06N18            STATIC DISPLAY DURING AUTO MANEUVER
 0181   REF   96   LAST   474   26,2167   0 4616 1             TC      BANKCALL                                                -
 0182   REF    1                26,2170    20451 0             CADR    GODSPR                                                  -
 0183   REF    2   LAST   474   26,2171   0 2201 0             TC      CHKLINUS          TO CHECK FOR PRIORITY DISPLAYS

 0184   REF   97   LAST   474   26,2172   0 4616 1   STARTMNV  TC      BANKCALL          PERFORM MANEUVER VIA KALCMANU
 0185   REF    1                26,2173    17750 0             CADR    GOMANUR

 0186   REF    2   LAST   474   26,2174   1 2140 1   ENDMANUV  TCF     TOBALLA           FINISHED MANEUVER.
 0187   REF   29   LAST   388   26,2175   0 5516 0   ENDMANU1  TC      DOWNFLAG          RESET 3-AXIS FLAG
 0188   REF    3   LAST   340   26,2176    00124 0             ADRES   3AXISFLG
 0189   REF    3   LAST   473   26,2177  31'164 0              CAE     TEMPR60                                                 -
 0190   REF    6   LAST   445   26,2200   0 4640 1             TC      BANKJUMP                                                -

 0191   REF    3   LAST   263   26,2201   4 0100 1   CHKLINUS  CS      FLAGWRD4
 0192   REF    1                26,2202   7 4740 1             MASK    PDSPFBIT          IS PRIORITY DISPLAY FLAG SET?
 0193   REF  156   LAST   474   26,2203  10 000 0              CCS     A                                                       -
 0194   REF  143   LAST   465   26,2204   0 0002 0             TC      Q                 NO - EXIT
 0195   REF  144   LAST   474   26,2205   3 0002 0             CA      Q
 0196   REF  227   LAST   462   26,2206  54 156 1              TS      MPAC +2           SAVE RETURN
 0197   REF   16   LAST   442   26,2207   4 6245 0             CS      THREE             OBTAIN LOCATION FOR RESTART
 0198   REF    4   LAST   370   26,2210   6 0133 0             AD      BUF2              HOLDS Q OF LAST DISPLAY
 0199   REF    1                26,2211  55'055 1              TS      TBASE2

 0200   REF    3   LAST   288   26,2212   0 5353 1             TC      PHASCHNG
 0201                           26,2213    00132 1             OCT     00132

 0202   REF   22   LAST   461   26,2214   3 4745 0             CAF     BIT7
 0203   REF    1                26,2215   0 5464 1             TC      LINUS             GO SET BITS FOR PRIORITY DISPLAY      -
 0204   REF  228   LAST   474   26,2216   0 0156 0             TC      MPAC +2
 0205   REF    2  LAST  368   26,2217  3 7714 1  RELINUS   CAF     PRIO26          RESTORE ORIGINAL PRIORITY
 0206   REF    6  LAST  299   26,2220  0 5146 1            TC      PRIOCHNG

 0207   REF    3  LAST  287   26,2221  3 4747 1            CAF     TRACKBIT        DON'T CONTINUE R60 UNLESS TRACKFLAG ON.
 0208   REF   15  LAST  293   26,2222  7 0075 1            MASK    FLAGWRD1
 0209   REF  157  LAST  474   26,2223  10 000 0            CCS     A
 0210   REF    1              26,2224  1 2237 1            TCF     RER60

 0211   REF    5  LAST  280   26,2225  3 4745 0            CAF     RNDVZBIT        IS IT P20?
 0212   REF   21  LAST  287   26,2226  7 0074 0            MASK    FLAGWRD0
 0213   REF  158  LAST  475   26,2227  10 000 0            CCS     A
 0214                         26,2230  0 2234 0            TC      +4              YES
 0215   REF    4  LAST  474   26,2231  0 5353 1            TC      PHASCHNG        NO, MUST BE P25, SET 2.11 SPOT
 0216                         26,2232   40112 1            OCT     40112

 0217   REF   64  LAST  474   26,2233  0 5155 0            TC      ENDOFJOB

 0218   REF    5  LAST  475   26,2234  0 5353 1            TC      PHASCHNG        SET 2.7 SPOT FOR P20
 0219                         26,2235   40072 0            OCT     40072

 0220   REF   65  LAST  475   26,2236  0 5155 0            TC      ENDOFJOB

 0221   REF   12  LAST  298   26,2237  0 5504 0  RER60     TC      UPFLAG          SET PRIO DISPLAY FLAG AFTER RESTART
 0222   REF    1              26,2240   00077 1            ADRES   PDSPFLAG

 0223   REF    2  LAST  474   26,2241  0 1055 0            TC      TBASE2

 0224   REF    9  LAST  458   26,2242  3 1011 0  R61TEST   CA      MODREG          IF WE ARE IN P00 IT MUST BE V49 OR V89
 0225                         26,2243  0 0006 1            EXTEND
 0226   REF    2  LAST  473   26,2244  1 2175 1            BZF     ENDMANU1        THUS WE GO TO ENDEXT VIA USER

 0227   REF    4  LAST  474   26,2245  3 0100 0            CA      FLAGWRD4        ARE WE IN R61  (P20 OR P25)
 0228   REF    2  LAST  474   26,2246  7 4740 1            MASK    PDSPFBIT
 0229                         26,2247  0 0006 1            EXTEND
 0230   REF    3  LAST  246   26,2250  1 6001 1            BZF     GOTOPOOH        NO
 0231   REF    1              26,2251  0 6022 1            TC      GOTOV56         YES

 0232                         26,2252   20100 1  BIT14+7   OCT     20100
 0233                         26,2253   00203 0  OCT203    OCT     203
 0234                         26,2254   01422 1  V06N18    VN      0618
R0236                 SUBROUTINE TO CHECK FOR G+N CONTROL, AUTO STABILIZATION

R0237                 RETURNS WITH C(A) = +  IF NOT SET FOR G+N, AUTO
R0238                 RETURNS WITH C(A) = +0 IF SWITCHES ARE SET

 0239                         26,2255  0 0006 1  G+N,AUTO  EXTEND
 0240   REF    3  LAST  134   26,2256  00 030 1            READ    CHAN30
 0241   REF   27  LAST  470   26,2257  7 4742 0            MASK    BIT10
 0242   REF  159  LAST  475   26,2260  10 000 0            CCS     A
 0243   REF  145  LAST  474   26,2261  0 0002 0            TC      Q               NOT IN G+N  C(A) = +
 0244                              26,2262  0 0006 1  ISITAUTO EXTEND                    CHECK FOR AUTO MODE
 0245   REF   2  LAST  281         26,2263  00 031 0           READ     CHAN31
 0246   REF  46  LAST  464         26,2264  7 4736 0           MASK     BIT14
 0247   REF 146  LAST  475         26,2265  0 0002 0           TC       Q                 (+) = NOT IN AUTO,  (+0) = AOK
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L         R60,R62                                                                     USER'S PAGE NO.   6        E2 S3

R0248     PROGRAM DESCRIPTION BALLANGS
R0249     MOD NO.          LOG SECTION  R60,R62

R0250     WRITTEN BY RAMA M.AIYAWAR
R0251     FUNCTIONAL DESCRIPTION

R0252     COMPUTES LM FDAI BALL DISPLAY ANGLES
R0253     CALLING SEQUENCE

R0254               TC       BALLANGS
R0255     NORMAL EXIT MODE

R0256               TC       BALLEXIT          (SAVED Q)

R0257     ALARM OR EXIT MODE  NIL
R0258     SUBROUTINES CALLED
R0259               CD*TR*G
R0260               ARCTAN

R0261     INPUT

R0262     CPHI,CTHETA,CPSI  ARE  THE ANGLES CORRESPONDING TO AOG,AIG,AMG. THEY ARE
R0263     SP,2S COMPLIMENT SCALED TO HALF REVOLUTION.
R0264     OUTPUT

R0265     FDAIX,FDAIY,FDAIZ ARE THE REQUIRED BALL ANGLES SCALED TO HALF REVOLUTION
R0266     SP,2S COMPLIMENT.
R0267     THESE ANGLES WILL BE DISPLAYED AS DEGREES AND HUNDREDTHS, IN THE ORDER  ROLL, PITCH, YAW, USING NOUNS 18 & 19.

R0269     ERASABLE INITIALIZATION REQUIRED

R0270     CPHI,CTHETA,CPSI EACH A SP REGISTER
R0271     DEBRIS

R0272     A,L,Q,MPAC,SINCDU,COSCDU,PUSHLIST,BALLEXIT

R0273     NOMENCLATURE:  CPHI, CTHETA, & CPSI REPRESENT THE OUTER, INNER, & MIDDLE GIMBAL ANGLES, RESPECTIVELY; OR
R0275     EQUIVALENTLY, CDUX, CDUY, & CDUZ.

R0276     NOTE:  ARCTAN CHECKS FOR OVERFLOW AND SHOULD BE ABLE TO HANDLE ANY SINGULARITIES.

 0278     REF    2  LAST  339    26,2000                             SETLOC BAWLANGS
 0279                            26,2266                             BANK

 0280     REF    1                                                   COUNT* $$/BALL
 0281     REF    3  LAST  473    26,2266  0 4645 1  BALLANGS TC      MAKECADR
 0282     REF    1               26,2267  55'342 1           TS      BALLEXIT
 0283     REF    7  LAST  474    26,2270  3 0321 1           CA      CPHI
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L        R60,R62

 0284    REF    7  LAST  253    26,2271  54 772 1            TS      CDUSPOT +4
 0285    REF    2  LAST  369    26,2272  3 0322 1            CA      CTHETA
 0286    REF    8  LAST  478    26,2273  54 766 1            TS      CDUSPOT
 0287    REF    3  LAST  369    26,2274  3 0323 0            CA      CPSI
 0288    REF    9  LAST  478    26,2275  54 770 0            TS      CDUSPOT +2

 0289    REF   29  LAST  474    26,2276  0 6037 0            TC      INTPRET
 0290                           26,2277   45001 1            SETPD   CALL
 0291                           26,2300   00001 0                    0D
 0292    REF    1               26,2301   47543 0                    CD*TR*G

 0293                           26,2302   41345 0            DLOAD   DMP
 0294    REF    1               26,2303   00743 1                    SINCDUX          SIN (OGA)
 0295    REF    1               26,2304   00747 0                    COSCDUZ          COS (MGA)

 0296                           26,2305   57552 1            SL1     DCOMP            SCALE
 0297                           26,2306   65336 1            ARCSIN  PDDL             YAW = ARCSIN(-SXCZ) INTO 0 PD
 0298    REF    1               26,2307   00741 0                    SINCDUZ
 0299    REF    4  LAST  322    26,2310   14023 0            STODL   SINTH            (SINTH = 18D IN PD)
 0300    REF    2  LAST  478    26,2311   00747 0                    COSCDUZ
 0301                           26,2312   72405 0            DMP     SL1              RESCALE
 0302    REF    1               26,2313   00751 1                    COSCDUX
 0303    REF    4  LAST  322    26,2314   34021 0            STCALL  COSTH            (COSTH= 16D IN PD)
 0304    REF    1               26,2315   26510 1                    ARCTAN
 0305                           26,2316   41325 0            PDDL    DMP              ROLL = ARCTAN(SZ/CZCX) INTO 2 PD
 0306    REF    2  LAST  478    26,2317   00741 0                    SINCDUZ
 0307    REF    2  LAST  478    26,2320   00743 1                    SINCDUX
 0308                           26,2321   +1512 1            SL2     PUSH             SXSZ INTO 4 PD
 0309                           26,2322   65205 0            DMP     PDDL             SXSZCY INTO 4 PD
 0310    REF    1               26,2323   00745 1                    COSCDUY
 0311                           26,2324   65205 0            DMP     PDDL             SXSZSY INTO 6 PD
 0312    REF    1               26,2325   00737 1                    SINCDUY
 0313    REF    2  LAST  478    26,2326   00751 1                    COSCDUX
 0314                           26,2327   72405 0            DMP     SL1              CXCY
 0315    REF    2  LAST  478    26,2330   00745 1                    COSCDUY
 0316                           26,2331   45425 0            DSU     STADR            PULL UP FROM 6 PD
 0317    REF    5  LAST  478    26,2332   63756 0            STODL   COSTH            COSTH = CXCY - SXSZSY
 0318    REF    2  LAST  478    26,2333   00737 1                    SINCDUY
 0319                           26,2334   72405 0            DMP     SL1
 0320    REF    3  LAST  478    26,2335   00751 1                    COSCDUX          CXSY
 0321                           26,2336   45415 0            DAD     STADR            PULL UP FROM 4 PD
 0322    REF    5  LAST  478    26,2337   43754 0            STCALL  SINTH            SINTH = CXSY + SXSZCY
 0323    REF    2  LAST  478    26,2340   26510 1                    ARCTAN           RETURNS WITH D(MPAC) = PITCH
 0324                           26,2341   55525 0            PDDL    VDEF             PITCH INTO 2 PD, ROLL INTO MPAC FROM 2PD
 0325                           26,2342   77634 0            RTB                      VDEF MAKES V(MPAC) = ROLL, PITCH, YAW
 0326    REF    2  LAST  365    26,2343   21620 0                    V1STO2S
 0327    REF    2  LAST  305    26,2344   02345 1            STORE   FDAIX            MODE IS TP
 0328                           26,2345   77776 1            EXIT

 0329    REF    2  LAST  477    26,2346  3 1342 0  ENDBALL   CA      BALLEXIT
 03295 REF   7  LAST  474   26,2347  0 4640 1            TC       BANKJUMP
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P0330    PROGRAM DESCRIPTION - VECPOINT

R0331              THIS INTERPRETIVE SUBROUTINE MAY BE USED TO POINT A SPACECRAFT AXIS IN A DESIRED DIRECTION.  THE AXIS
R0333    TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN SUCCESSIVE LOCATIONS OF ERASABLE MEMORY
R0335    BEGINNING WITH THE LOCATION CALLED SCAXIS.  THE COMPONENTS OF THIS VECTOR ARE GIVEN IN SPACECRAFT COORDINATES.
R0337    THE DIRECTION IN WHICH THIS AXIS IS TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN
R0339    SUCCESSIVE LOCATIONS OF ERASABLE MEMORY BEGINNING WITH THE ADDRESS CALLED POINTVSM.  THE COMPONENTS OF THIS
R0341    VECTOR ARE GIVEN IN STABLE MEMBER COORDINATES.  WITH THIS INFORMATION VECPOINT COMPUTES A SET OF THREE GIMBAL
R0343    ANGLES (2S COMPLEMENT) CORRESPONDING TO THE CROSS-PRODUCT ROTATION BETWE EN SCAXIS AND POINTVSM AND STORES THEM
R0345    IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R0346              THIS ROTATION, HOWEVER, MAY BRING THE S/C INTO GIMBAL LOCK.  WHEN POINTING A VECTOR IN THE Y-Z PLANE,
R0348    THE TRANSPONDER AXIS, OR THE AOT FOR THE LEM, THE PROGRAM WILL CORRECT THIS PROBLEM BY ROTATING THE CROSS-
R0350    PRODUCT ATTITUDE ABOUT POINTVSM BY A FIXED AMOUNT SUFFICIENT TO ROTATE THE DESIRED S/C ATTITUDE OUT OF GIMBAL
R0352    LOCK.  IF THE AXIS TO BE POINTED IS MORE THAN 40.6 DEGREES BUT LESS THAN 60.5 DEG FROM THE +X (OR-X) AXIS,
R0354    THE ADDITIONAL ROTATION TO AVOID GIMAL LOCK IS 35 DEGREES.  IF THE AXIS IS MORE THAN 60.5 DEGEES FROM +X (OR -X)
R0356    THE ADDITIONAL ROTATION IS 35 DEGREES.  THE GIMBAL ANGLES CORRESPONDING TO THIS ATTITUDE ARE THEN COMPUTED AND
R0358    STORED AS 2S COMPLIMENT ANGLES IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R0360              WHEN POINTING THE X-AXIS, OR THE THRUST VECTOR, OR ANY VECTOR WITHIN 40.6 DEG OF THE X-AXIS, VECPOINT
R0362    CANNOT CORRECT FOR A CROSS-PRODUCT ROTATION INTO GIMBAL LOCK.  IN THIS CASE A PLATFORM REALIGNMENT WOULD BE
R0364    REQUIRED TO POINT THE VECTOR IN THE DESIRED DIRECTION.  AT PRESENT NO INDICATION IS GIVEN FOR THIS SITUATION
R0366    EXCEPT THAT THE FINAL MIDDLE GIMBAL ANGLE IN MPAC +2 IS GREATER THAN 59 DEGREES.

R0368              CALLING SEQUENCE -
R0369                  1) LOAD SCAXIS, POINTVSM
R0370                  2) CALL
R0371                          VECPOINT

R0372              RETURNS WITH

R0373                  1) DESIRED OUTER  GIMBAL ANGLE IN MPAC
R0374                  2) DESIRED INNER  GIMBAL ANGLE IN MPAC +1
R0375                  3) DESIRED MIDDLE GIMBAL ANGLE IN MPAC +2


R0376              ERASABLES USED -

R0377                  1) SCAXIS             6
R0378                  2) POINTVSM           6
R0379                  3) MIS               18
R0380                  4) DEL               18
R0381                  5) COF                6
R0382                  6) VECQTEMP           1
R0383                  7) ALL OF VAC AREA   43

R0384                          TOTAL        99

 0385    REF    1            27,2000                        SETLOC VECPT
 0386                        27,2032                        BANK
 0387    REF    1                                             COUNT* $$/VECPT

 0388    REF   11  LAST  366   E6,1676                        EBANK= BCDU

 038805                        27,2032  40020 1  VECPNT1  STQ      BOV             THIS ENTRY USES DESIRED CDUS
 03881   REF    1              27,2033  03325 0                    VECQTEMP        NOT PRESENT-ENTER WITH CDUD'S IN MPAC
 038815  REF    1              27,2034  56035 1                    VECPNT2
 03882                         27,2035  52164 0  VECPNT2  AXC,2    GOTO
 038825  REF   10  LAST  365   27,2036  03246 1                    MIS
 038865  REF    1              27,2037  56046 0                    STORANG
 0389                          27,2040  40020 1  VECPOINT STQ      BOV             SAVE RETURN ADDRESS
 0390    REF    2  LAST  481   27,2041  03325 0                    VECQTEMP
 0391    REF    1              27,2042  56043 0                    VECLEAR         AND CLEAR OVFIND
 0392                          27,2043  47164 1  VECLEAR  AXC,2    RTB
 0393    REF   11  LAST  481   27,2044  03246 1                    MIS             READ THE PRESENT CDU ANGLES AND
 0394    REF    2  LAST  351   27,2045  44403 0                    READCDUK        STORE THEM IN PD25, 26, 27
 0395                          27,2046  34032 1  STORANG  STCALL   25D
 0396    REF    3  LAST  351   27,2047  44410 1                    CDUTODCM        S/C AXES TO STABLE MEMBER AXES (MIS)
 0397                          27,2050  61375 1           VLOAD    VXM
 0398    REF    3  LAST  339   27,2051  03773 1                    POINTVSM        RESOLVE THE POINTING DIRECTION VF INTO
 0399    REF   12  LAST  481   27,2052  03247 0                    MIS             INITIAL S/C AXES ( VF = POINTVSM)
 0400                          27,2053  77656 1           UNIT
 0401                          27,2054  00035 1           STORE    28D
A0402                                                                              PD 28 29 30 31 32 33
 0403                          27,2055  53435 0           VXV      UNIT            TAKE THE CROSS PRODUCT VF X VI
 0404    REF   12  LAST  340   27,2056  03765 0                    SCAXIS          WHERE VI = SCAXIS
 0405                          27,2057  57400 1           BOV      VCOMP
 0406    REF    1              27,2060  56170 1                    PICKAXIS
 0407    REF   40  LAST  364   27,2061  17271 0           STODL    COF             CHECK MAGNITUDE
 0408                          27,2062  00045 0                    36D             OF CROSS PRODUCT
 0409                          27,2063  50025 0           DSU      BMN             VECTOR, IF LESS
 0410    REF    1              27,2064  14411 0                    DPB-14          THAN B-14 ASSUME
 0411    REF    2  LAST  481   27,2065  56170 1                    PICKAXIS        UNIT OPERATION
 0412                          27,2066  50375 0           VLOAD    DOT                       INVALID.
 0413    REF   13  LAST  481   27,2067  03765 0                    SCAXIS
 0414                          27,2070  00035 1                    28D
 0415                          27,2071  65552 0           SL1      ARCCOS
 0416                          27,2072  77624 1  COMPMATX CALL                     NOW COMPUTE THE TRANSFORMATION FROM
 0417    REF    2  LAST  364   27,2073  44527 1                    DELCOMP         FINAL S/C AXES TO INITIAL S/C AXES  MFI
 0418                          27,2074  75160 1           AXC,1    AXC,2
 0419    REF   13  LAST  481   27,2075  03246 1                    MIS             COMPUTE THE TRANSFORMATION FROM FINAL
 0420    REF   11  LAST  365   27,2076  02230 1                    KEL             S/C AXES TO STABLE MEMBER AXES
 0421                          27,2077  77624 1           CALL                     MFS = MIS MFI
 0422    REF    3  LAST  365   27,2100  44312 1                    MXM3            (IN PD LIST)

 0423                          27,2101  51545 1           DLOAD    ABS
 0424                          27,2102  00007 0                    6               MFS6 = SIN(CPSI)                          $2
 0425                          27,2103  50025 0           DSU      BMN
 0426    REF    1              27,2104  14376 0                    SINGIMLC        = SIN(59 DEGS)                            $2
 0427    REF    1              27,2105  56160 0                    FINDGIMB        /CPSI/ LESS THAN 59 DEGS
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A0428                                                                                   I.E. DESIRED ATTITUDE NOT IN GIMBAL LOCK

 0429                          27,2106   51545 1            DLOAD   ABS                 CHECK TO SEE IF WE ARE POINTING
 0430   REF  14  LAST  481     27,2107   03765 0                    SCAXIS              THE THRUST AXIS
 0431                          27,2110   51025 1            DSU     BPL
 0432   REF   1                27,2111   14400 0                    SINVEC1             SIN 49.4 DEGS                              $2
 0433   REF   2  LAST  481     27,2112   56160 0                    FINDGIMB            IF SO, WE ARE TRYING TO POINT IT INTO
 0434                          27,2113   77775 1            VLOAD                       GIMBAL LOCK, ABORT COULD GO HERE
 0435                          27,2114   77626 0            STADR
 0436   REF  14  LAST  481     27,2115   50514 1            STOVL   MIS +12D
 0437                          27,2116   77626 0            STADR                       STORE MFS (IN PD LIST) IN MIS
 0438   REF  15  LAST  482     27,2117   50522 1            STOVL   MIS +6
 0439                          27,2120   77626 0            STADR
 0440   REF  16  LAST  482     27,2121   50530 1            STOVL   MIS
 0441   REF  17  LAST  482     27,2122   03255 0                    MIS +6              INNER GIMBAL AXIS IN FINAL S/C AXES
 0442                          27,2123   57444 1            BPL     VCOMP               LOCATE THE IG AXIS DIRECTION CLOSEST TO
 0443   REF   1                27,2124   56125 1                    IGSAMEX             FINAL X S/C AXIS

 0444                          27,2125   50035 1  IGSAMEX   VXV     BMN                 FIND THE SHORTEST WAY OF ROTATING THE
 0445   REF  15  LAST  482     27,2126   03765 0                    SCAXIS              S/C OUT OF GIMBAL LOCK BY A ROTATION
 0446   REF   1                27,2127   56134 1                    U=SCAXIS            ABOUT +- SCAXIS, I.E. IF (IG (SGN MFS3)
A0447                                                                                   X SCAXIS . XF) LESS THAN 0, U = SCAXIS
A0448                                                                                   OTHERWISE U = -SCAXIS

 0449                          27,2130   57575 1            VLOAD   VCOMP
 0450   REF  16  LAST  482     27,2131   03765 0                    SCAXIS
 0451   REF  41  LAST  481     27,2132   37271 1            STCALL  CCF                 ROTATE ABOUT -SCAXIS
 0452   REF   1                27,2133   56137 1                    CHEKAXIS
 0453                          27,2134   77775 1  U=SCAXIS  VLOAD
 0454   REF  17  LAST  482     27,2135   03765 0                    SCAXIS
 0455   REF  42  LAST  482     27,2136   03271 0            STORE   CCF                 ROTATE ABOUT + SCAXIS
 0456                          27,2137   51545 1  CHEKAXIS  DLOAD   ABS
 0457   REF  18  LAST  482     27,2140   03765 0                    SCAXIS              SEE IF WE ARE POINTING THE AOT
 0458                          27,2141   51025 1            DSU     BPL
 0459   REF   1                27,2142   14402 1                    SINVEC2             SIN 29.5 DEGS                              $2
 0460   REF   1                27,2143   56147 0                    PICKANG1            IF SO, ROTATE 50 DEGS ABOUT +- SCAXIS
 0461                          27,2144   52145 0            DLOAD   GOTO                IF NOT, MUST BE POINTING THE TRANSPONDER
 0462   REF   1                27,2145   14406 0                    VECANG2             OR SOME VECTOR IN THE Y, OR Z PLANE
 0463   REF   1                27,2146   56151 1                    COMPMFSN            IN THIS CASE ROTATE 35 DEGS TO GET OUT
A0464                                                                                   OF GIMBAL LOCK (VECANG2  $360)
 0465                          27,2147   77745 1  PICKANG1  DLOAD
 0466   REF   1                27,2150   14404 1                    VECANG1             = 50 DEGS                                $ 360
 0467                          27,2151   77624 1  COMPMFSN  CALL
 0468   REF   3  LAST  481     27,2152   44527 1                    DELCOMP             COMPUTE THE ROTATION ABOUT SCAXIS TO
 0469                          27,2153   75160 1            AXC,1   AXC,2               BRING MFS OUT OF GIMBAL LOCK
 0470   REF  18  LAST  482     27,2154   03246 1                    MIS
 0471   REF  12  LAST  481     27,2155   02230 1                    KEL
 0472                          27,2156   77624 1            CALL                        COMPUTE THE NEW TRANSFORMATION FROM
 0473   REF   4  LAST  481     27,2157   44312 1                    MXM3                DESIRED S/C AXES TO STABLE MEMBER AXES
A0474                                                                                   WHICH WILL ALIGN VI WITH VF AND AVOID
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A0475                                                                                   GIMBAL LOCK
 0476                          27,2160   45160 1  FINDGIMB AXC,1  CALI
 0477                          27,2161   00000 1                  0                    EXTRACT THE COMMANDED CDU ANGLES FROM
 0478  REF   2  LAST  365      27,2162   44654 0                  DCMTOCDU             THIS MATRIX
 0479                          27,2163   40234 0           RTB    SETPD
 0480  REF   3  LAST  478      27,2164   21620 0                  V1STO2S              CONVERT TO 2:S COMPLEMENT
 0481                          27,2165   00001 0                  0
 0482                          27,2166   77650 1           GOTO
 0483  REF   3  LAST  481      27,2167   03325 0                  VECQTEMP             RETURN TO CALLER

 0484                          27,2170   50375 0  PICKAXIS VLOAD  DOT                  IF VF X VI = 0,  FIND VF . VI
 0485                          27,2171   00035 1                  28D
 0486  REF  19  LAST  482      27,2172   03765 0                  SCAXIS
 0487                          27,2173   72240 1           BMN    TLOAD
 0488  REF   1                 27,2174   54350 0                  ROT180
 0489                          27,2175   00032 0                  25D
 0490                          27,2176   77650 1           GOTO                        IF VF = VI, CDU DESIRED = PRESENT CDU
 0491  REF   4  LAST  483      27,2177   03325 0                  VECQTEMP             PRESENT CDU ANGLES

 0492                          35,2000                     BANK   35
 0493  REF   1                 26,2000                     SETLOC MANUVER1
 0494                          26,2350                     BANK
 0495                          26,2350   47375 0  ROT180   VLOAD  VXV                  IF VF, VI ANTIPARALLEL, 108 DEG ROTATION
 0496  REF  19  LAST  482      26,2351   03255 0                  MIS +6               IS REQUIRED. Y STABLE MEMBER AXIS IN
 0497  REF   1                 26,2352   06520 0                  HIDPHALF             INITIAL S/C AXES.
 0498                          26,2353   47256 0           UNIT   VXV                  FIND Y(SM) X X(I)
 0499  REF  20  LAST  483      26,2354   03765 0                  SCAXIS               FIND UNIT(VI X UNIT(Y(SM) X X(I)))
 0500                          26,2355   40056 0           UNIT   BOV                  I.E. PICK A VECTOR IN THE PLANE OF X(I),
 0501  REF   1                 26,2356   54372 0                  PICKX                Y(SM) PERPENDICULAR TO VI
 0502  REF  43  LAST  482      26,2357   17271 0           STODL  COF
 0503                          26,2360   00045 0                  36D                  CHECK MAGNITUDE
 0504                          26,2361   50025 0           DSU    BMN                  OF THIS VECTOR.
 0505  REF   2  LAST  481      26,2362   14411 0                  DPB-14               IF LESS THAN B-14,
 0506  REF   2  LAST  483      26,2363   54372 0                  PICKX                PICK X-AXIS.
 0507                          26,2364   77775 1           VLOAD
 0508  REF  44  LAST  483      26,2365   03271 0                  COF
 0509  REF  45  LAST  483      26,2366   17271 0  XROT     STODL  COF
 0510  REF   2  LAST  483      26,2367   06520 0                  HIDPHALF
 0511                          26,2370   77650 1           GOTO
 0512  REF   1                 26,2371   56072 1                  COMPMATX
 0513                          26,2372   52175 0  PICKX    VLOAD  GOTO                 PICK THE XAXIS IN THIS CASE
 0514  REF   3  LAST  483      26,2373   06520 0                  HIDPHALF
 0515  REF   1                 26,2374   54366 0                  XROT
 0516                          26,2375   15555 0  SINGIMLC 2DEC   .4285836003          =SIN(59)                  $2
 0516                          26,2376   35172 0
 0517                          26,2377   14113 1  SINVEC1  2DEC   .3796356537          =SIN(49.4)                $2
 0517                          26,2400   36326 0
 0518                          26,2401   07701 0  SINVEC2  2DEC   .2462117800          =SIN(29.5)                $2
 0518                          26,2402   35703 0
 0519                          26,2403   04343 1  VECANG1  2DEC   .1388888889          = 50 DEGREES                          $360
 0519                          26,2404   21616 0
```

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L        R60,R62                                                                    USER'S PAGE NO.  13      E6 S3

 0520                        26,2405   03070 0  VECANG2   2DEC    .09722222222    = 35 DEGREES                   $360
 0520                        26,2406   34344 0
 0521                        26,2407   00000 1  1BITDP    OCT     0               KEEP THIS BEFORE DPB(-14)     *********
 0522                        26,2410   00001 0  DPB-14    OCT     00001
 0523                        26,2411   00000 1            OCT     00000
```

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P0524    ROUTINE FOR INITIATING AUTOMATIC MANEUVER VIA KEYBOARD (V49)

 0525                            34,2000                           BANK    34
 0526    REF   1                 23,2000                           SETLOC  R62
 0527                            23,2103                           BANK
 0528    REF  12  LAST  481      E6,1676                           EBANK=  BCDU

 0529    REF   1                                                   COUNT*  $$/R62

 0530    REF   1                 23,2103                R62DISP    EQUALS  R62FLASH

 0531    REF   1                 23,2103  3 5010 0      R62FLASH   CAF     V06N22         FLASH V06N22 AND
 0532    REF  98  LAST  474      23,2104  0 4616 1                 TC      BANKCALL       ICDU ANGLES
 0533    REF   6  LAST  381      23,2105   20476 0                 CADR    GOFLASH
 0534    REF  30  LAST  377      23,2106  1 5472 1                 TCF     ENDEXT         TERMINATE
 0535    REF   1                 23,2107  1 2111 0                 TCF     GOMOVE         PROCEED
 0536    REF   2  LAST  485      23,2110  1 2103 0                 TCF     R62FLASH       ENTER

A0537                                                                                     ASTRONAUT MAY LOAD NEW ICDUS AT THIS
A0538                                                                                     POINT
 0539    REF  13  LAST  475      23,2111  0 5504 0      GOMOVE     TC      UPFLAG         SET FOR 3-AXIS MANEUVER
 0540    REF   4  LAST  474      23,2112   00124 0                 ADRES   3AXISFLG

 0541    REF  99  LAST  485      23,2113  0 4616 1                 TC      BANKCALL
 0542    REF   2  LAST  340      23,2114   54123 0                 CADR    R60LEM
 0543    REF  31  LAST  485      23,2115  1 5472 1                 TCF     ENDEXT         END R62
```

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L        S-BAND ANTENNA FOR LM                                              USER'S PAGE NO.   1      EO S3

R2000    SUBROUTINE NAME: R05 - S-BAND ANTENNA FOR LM

R2001    MOD0 BY T. JAMES
R2002    MOD1 BY P. SHAKIR

R2003    FUNCTIONAL DESCRIPTION

R2004         THE S-BAND ANTENNA ROUTINE, R05, COMPUTES AND DISPLAYS THE PITCH AND
R2005    YAW ANTENNA GIMBAL ANGLES REQUIRED TO POINT THE LM STEERABLE ANTENNA
R2006    TOWARD THE CENTER OF THE EARTH. THIS ROUTINE IS SELECTED BY THE ASTRO-
R2007    NAUT VIA DSKY ENTRY DURING COASTING FLIGHT OR WHEN THE LM IS ON THE MOON
R2008    SURFACE. THE EARTH OR MOON REFERENCE COORDINATE SYSTEM IS USED DEPENDING
R2009    ON WHETHER THE LM IS ABOUT TO ENTER OR HAS ALREADY ENTERED THE MOON
R2010    SPHERE OF INFLUENCE, RESPECTIVELY

R2011    TO CALL SUBROUTINE, ASTRONAUT KEYS IN V 64 E

R2012    SUBROUTINES CALLED-

R2013         R02BOTH
R2014         INTPRET
R2015         LOADTIME
R2016         LEMCONIC
R2017         LUNPOS
R2018         CDUTRIG
R2019         *SMNB*
R2020         BANKCALL
R2021         B50FF
R2022         ENDOFJOB
R2023         BLANKET

R2024    RETURNS WITH

R2025         PITCH ANGLE IN PITCHANG  REV. B0
R2026         YAW ANGLE IN YAWANG  REV. B0

R2027    ERASABLES USED

R2028         PITCHANG
R2029         YAWANG
R2030         RLM
R2031         VAC AREA

 2032                              41,3731                          BANK    41
 2033    REF   4  LAST  287        42,2000                          SETLOC  SBAND
 2034                              42,3606                          BANK

 2035    REF   1                   E7,1471                          EBANK=  WHOCARES
 2036    REF   2 LAST   46 TO    47:       2       2*               COUNT*  $$/R05
 2037    REF 100  LAST  485        42,3606  0 4616 1  SBANDANT      TC      BANKCALL
```

```
2038  REF  2  LAST 339   42,3607  11254 1           CADR   FO2BOTH      CHECK IF IMU IS ON AND ALIGNED
2039  REF 30  LAST 478   42,3610  06037 0           TC     INTPRET
2040                     42,3611  47001 0           SETPD  RTB
2041                     42,3612  00001 0                  0D
2042  REF  5  LAST 380   42,3613  21573 0                  LOADTIME     PICK UP CURRENT TIME
2043  REF  6  LAST 339   42,3614  34041 0           STCALL TDEC1        ADVANCE INTEGRATION TO TIME IN TDEC1
2044  REF  2  LAST 339   42,3615  27100 0                  LEMCONIC     USING CONIC INTEGRATION
2045                     42,3616  46135 1           SLOAD  BHIZ
2046  REF  1             42,3617  00050 1                  X2           X2 =0 EARTH SPHERE, X2 =2 MOON SPHERE
2047  REF  1             42,3620  65636 1                  CONV4
2048                     42,3621  77775 1           VLOAD
2049  REF  3  LAST 339   42,3622  00001 0                  RATT
2050  REF  1             42,3623  16205 1           STODL  RLM
2051  REF  3  LAST 208   42,3624  00015 0                  TAT
2052                     42,3625  77624 1  CONV3    CALL
2053  REF  1             42,3626  33664 0                  LUNPOS       UNIT POSITION VECTOR FROM EARTH TO MOON
2054                     42,3627  74375 0           VLOAD  VXSC
2055  REF  2  LAST 123   42,3630  02723 0                  VMOON
2056  REF  1             42,3631  24001 0                  REMDIST      MEAN DISTANCE FROM EARTH TO MOON
2057                     42,3632  53372 1           VSL1   VAD
2058  REF  2  LAST 487   42,3633  02205 1                  RLM
2059                     42,3634  77650 1           GOTO
2060  REF  1             42,3635  65640 0                  CONV5
2061                     42,3636  77775 1  CONV4    VLOAD
2062  REF  4  LAST 487   42,3637  00001 0                  RATT         UE = -UNIT(RATT)  EARTH SPHERE
2063                     42,3640  53401 1  CONV5    SETPD  UNIT         UE = -UNIT((REM)(UEM) + RL)  MOON SPHERE
2064                     42,3641  00001 0                  0D           SET PL POINTER TO 0
2065                     42,3642  45076 1           VCOMP  CALL
2066  REF  1             42,3643  47537 0                  CDUTRIG      COMPUTE SINES AND COSINES OF CDU ANGLES
2067                     42,3644  76521 0           MXV    VSL1         TRANSFORM REF. COORDINATE SYSTEM TO
2068  REF  7  LAST 339   42,3645  01734 0                  REFSMMAT     STABLE MEMBER  B-1 X B-1 X B+1 = B-1
2069                     42,3646  71206 0           PUSH   DLOAD        8D
2070  REF  2  LAST 299   42,3647  06522 1                  HI6ZEROS
2071  REF  2  LAST 118   42,3650  02201 0           STORE  PITCHANG
2072  REF  1             42,3651  26203 1           STOVL  YAWANG       ZERO OUT ANGLES
2073                     42,3652  77624 1           CALL
2074  REF  1             42,3653  47671 1                  *SMNB*
2075  REF  3  LAST 487   42,3654  16205 1           STODL  RLM          PRE-MULTIPLY RLM BY (NBSA) MATRIX(BO)
2076  REF  4  LAST 487   42,3655  02207 0                  RLM +2
2077                     42,3656  45206 1           PUSH   DSU
2078  REF  5  LAST 487   42,3657  02205 1                  RLM
2079                     42,3660  77605 1           DMP
2080  REF  1             42,3661  25771 1                  1CVSQRT2
2081  REF  6  LAST 487   42,3662  16207 0           STODL  RLM +2
2082                     42,3663  41215 1           DAD    DMP
2083  REF  7  LAST 487   42,3664  02205 1                  RLM
2084  REF  2  LAST 487   42,3665  25771 1                  1OVSQRT2
2085  REF  8  LAST 487   42,3666  26205 1           STOVL  RLM          R   B-1
2086  REF  9  LAST 487   42,3667  02205 1                  RLM
2087                     42,3670  63256 0           UNIT   PDVL
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 2088   REF  10  LAST  487   42,3671   02205 1                     RLM
 2089                        42,3672   72431 1            VPROJ    VSL2          PROJECTION OF R ONTO LM XZ PLANE
 2090   REF   1              42,3673   06516 0                     HIUNITY
 2091                        42,3674   40045 1            BVSU     BOV           CLEAR OVERFLOW INDICATOR IF ON
 2092   REF  11  LAST  488   42,3675   02205 1                     RLM
 2093   REF   1              42,3676   65677 1                     COVCNV
 2094                        42,3677   40056 0  COVCNV    UNIT     BOV           EXIT ON OVERFLOW
 2095   REF   1              42,3700   65745 1                     SBANDEX
 2096                        42,3701   47206 0            PUSH     VXV           URP VECTOR  B-1
 2097   REF   1              42,3702   06514 1                     HIUNITZ
 2098                        42,3703   57572 0            VSL1     VCOMP         UZ X URP = -(URP X UZ)
 2099   REF  12  LAST  488   42,3704   02205 1            STORE    RLM           X VEC  B-1
 2100                        42,3705   63241 0            DOT      PDVL          SGN(X.UY) UNSCALED
 2101   REF   2  LAST  488   42,3706   06516 0                     HIUNITY
 2102   REF  13  LAST  488   42,3707   02205 1                     RLM
 2103                        42,3710   75246 0            ABVAL    SIGN
 2104                        42,3711   77736 0            ASIN                   ASIN((SGN(X.UY))ABV(X)) REV BO
 2105   REF   3  LAST  487   42,3712   26201 0            STOVL    PITCHANG
 2106   REF   1              42,3713   00007 0                     URP
 2107                        42,3714   51041 0            DOT      BPL
 2108   REF   2  LAST  488   42,3715   06514 1                     HIUNITZ
 2109   REF   1              42,3716   65723 1                     NOADJUST      YES, -90 TO +90
 2110                        42,3717   45345 1            DLOAD    DSU
 2111   REF   4  LAST  483   42,3720   06520 0                     HIDPHALF
 2112   REF   4  LAST  488   42,3721   02201 0                     PITCHANG
 2113   REF   5  LAST  488   42,3722   02201 0            STORE    PITCHANG
 2114                        42,3723   47375 0  NOADJUST  VLOAD    VXV
 2115   REF   1              42,3724   00001 0                     UR            Z = (UR X URP)
 2116   REF   2  LAST  488   42,3725   00007 0                     URP
 2117                        42,3726   77772 0            VSL1
 2118   REF  14  LAST  488   42,3727   16205 1            STODL    RLM           Z VEC  B-1
 2119   REF   6  LAST  488   42,3730   02201 0                     PITCHANG
 2120                        42,3731   74356 1            SIN      VXSC
 2121   REF   3  LAST  488   42,3732   06514 1                     HIUNITZ
 2122                        42,3733   71525 0            PDDL     COS
 2123   REF   7  LAST  488   42,3734   02201 0                     PITCHANG
 2124                        42,3735   52361 1            VXSC     VSU
 2125   REF   1              42,3736   06520 0                     HIUNITX       (UX COS ALPHA) - (UZ SIN ALPHA)
 2126                        42,3737   63241 0            DOT      PDVL          YAW.Z
 2127   REF  15  LAST  488   42,3740   02205 1                     RLM
 2128   REF  16  LAST  488   42,3741   02205 1                     RLM
 2129                        42,3742   75246 0            ABVAL    SIGN
 2130                        42,3743   77736 0            ASIN
 2131   REF   2  LAST  487   42,3744   02203 1            STORE    YAWANG
 2132                        42,3745   77776 1  SBANDEX   EXIT
 2133   REF   8  LAST  300   42,3746  3 1044 0            CA       EXTVBACT
 2134   REF  24  LAST  465   42,3747  7 4747 0            MASK     BIT5          IS BIT5 STILL ON
 2135                        42,3750  0 0006 1            EXTEND
 2136   REF  32  LAST  485   42,3751  1 5472 1            BZF      ENDEXT        NO
 21362  REF   4  LAST  299   42,3752  3 5017 1            CAF      PRIO5
 21364  REF   7  LAST  475   42,3753  0 5146 1            TC        PRIOCHNG
 2137   REF   1              42,3754  3 3767 1            CAF       V06N51             DISPLAY ANGLES
 2138   REF 101  LAST  486   42,3755  0 4616 1            TC        BANKCALL
 2139   REF   4  LAST  299   42,3756   20353 0            CADR      GOMARKER
 2140   REF   4  LAST  299   42,3757  0 5563 1            TC        B5OFF              TERMINATE
 2141   REF   5  LAST  489   42,3760  0 5563 1            TC        B5OFF              PROCEED
 2142   REF  66  LAST  475   42,3761  0 5155 0            TC        ENDOFJOB           RECYCLE
 2143   REF  23  LAST  457   42,3762  3 4751 0            CAF       BIT3               IMMEDIATE RETURN
 2144   REF   8  LAST  299   42,3763  0 5464 1            TC        BLANKET            BLANK R3
 2145   REF   4  LAST  299   42,3764  3 4740 0            CAF       PRIO4
 2146   REF   8  LAST  475   42,3765  0 5146 1            TC        PRIOCHNG
 2148   REF   2  LAST  280   42,3766  0 3610 0            TC        SBANDANT +2        YES, CONTINUE DISPLAYING ANGLES
 2150                        42,3767   01463 1  V06N51    VN        0651
 2151                        42,3770   26501 1  1OVSQRT2  2DEC      .7071067815        1/SQRT(2)
 2151                        42,3771   07463 1
 2152                           0000            UR        EQUALS    0D
 2153                           0006            URP       EQUALS    6D
 2154   REF   6  LAST  471   30,2000                      SBANK=    LOWSUPER

*** END OF AP11AID .001 ***
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L         RADAR LEADIN ROUTINES                                                                       USER'S PAGE NO.   1       EO 5?

 0001                          25,2003                          BANK    25
 0002     REF    1             25,2000                          SETLOC  RRLEADIN
 0003                          25,2003                          BANK

 0004     REF    9  LAST  316  E4,1600                          EBANK=  RSTACK

R0005     RADAR SAMPLING LOOP.

 0006     REF    1                                              COUNT*  $$/SLEAD
 0007     REF    7  LAST  279  25,2003  11'755 0  RADSAMP       CCS     RSAMPDT         TIMES NORMAL ONCE-PER-SECOND SAMPLING.
 0008                          25,2004  1 2006 1                TCF     +2
 0009     REF   15  LAST  468  25,2005  1 5261 0                TCF     TASKOVER        +0 INSERTED MANUALLY TERMINATES TEST.

 0010     REF   19  LAST  467  25,2006  0 5203 0                TC      WAITLIST
 0011     REF   10  LAST  490  E4,1600                          EBANK=  RSTACK
 0012     REF    2  LAST  277  25,2007   02003 0                2CADR   RADSAMP
 0012                          25,2010   52064 1
 0013     REF    1             25,2011  3 7713 0                CAF     PRIO25
 0014     REF    9  LAST  468  25,2012  0 5072 1                TC      NOVAC
 0015     REF   11  LAST  490  E4,1600                          EBANK=  RSTACK
 0016     REF    1             25,2013   02023 1                2CADR   DOPSAMP
 0016     REF    1             25,2014   52064 1
 0017     REF   47  LAST  476  25,2015  3 4736 1                CAF     BIT14           FOR CYCLIC SAMPLING, RTSTDEX =
 0018                          25,2016  0 0006 1                EXTEND                  RTSTLOC/2 + RTSTBASE
 0019     REF    4  LAST  278  25,2017  7 1754 1                MP      RTSTLOC
 0020     REF    3  LAST  279  25,2020  6 1753 1                AD      RTSTBASE        0 FOR RR, 2 FOR LR.
 0021     REF    6  LAST  278  25,2021  55'751 1                TS      RTSTDEX
 0022     REF   16  LAST  490  25,2022  1 5261 0                TCF     TASKOVER

R0023     DO THE ACTUAL RADAR SAMPLE.

 0024     REF    1             25,2023  0 2047 0  DOPSAMP       TC      VARADAR         SELECTS VARIABLE RADAR CHANNEL.
 0025     REF  102  LAST  489  25,2024  0 4616 1                TC      BANKCALL
 0026     REF    4  LAST  269  25,2025   17714 0                CADR    RADSTALL

 0027     REF    2  LAST  276  25,2026  25'756 1                INCR    RFAILCNT        ADVANCE FAIL COUNTER BUT ACCEPT BAD DATA

 0028                          25,2027  0 0004 0  DOPSAMP2      INHINT
 00281    REF   15  LAST  474  25,2030  3 0101 1                CA      FLAGWRD5        DON'T UPDATE RSTACK IF IN R77.
 00282    REF    3  LAST  280  25,2031  7 4741 0                MASK    R77FLBIT
 00283    REF  160  LAST  475  25,2032  10 000 0                CCS     A
 00284                         25,2033  1 2037 0                TCF     +4

 0029     REF    2  LAST  103  25,2034  53'102 1                DXCH    SAMPLSUM
 0030     REF    5  LAST  490  25,2035  51'754 0                INDEX   RTSTLOC
 0031     REF   12  LAST  490  25,2036  53'601 0                DXCH    RSTACK

 0038     REF    6  LAST  490  25,2037  4 1754 1                CS      RTSTLOC         CYCLE RTSTLOC.
 0039     REF    2  LAST  277  25,2040  6 1752 0                AD      RTSTMAX
 0040                          25,2041  0 0006 1                EXTEND
 0041                         25,2042  1 2045 0            BZF     +3
 0042  REF   7  LAST  490     25,2043  3 1754 0            CA      RTSTLOC
 0043  REF  32  LAST  458     25,2044  6 4752 0            AD      TWO                 STORAGE IS DP
 0044  REF   8  LAST  491     25,2045  55'754 1            TS      RTSTLOC
 0045  REF  67  LAST  489     25,2046  1 5155 1            TCF     ENDOFJOB            CONTINUOUS SAMPLING AND 2N TRIES - GONE.

R0056  VARIABLE RADAR DATA CALLER FOR ONE MEASUREMENT ONLY.

 0057  REF  60  LAST  470     25,2047  3 4753 1  VARADAR   CAF     ONE                 WILL BE SENT TO RADAR ROUTINE IN A BY
 0058  REF   5  LAST  474     25,2050  54  133 1           TS      BUF2                SWCALL.
 0059  REF   7  LAST  490     25,2051  51'751 0            INDEX   RTSTDEX
 0060  REF   1                25,2052  3 2054 1            CAF     RDRLOCS
 0061  REF   3  LAST  370     25,2053  1 4622 1            TCF     SWCALL              NOT TOUCHING Q.

 0062  REF   1                25,2054   53105 0  RDRLOCS   CADR    RRRANGE             =0
 0063  REF   1                25,2055   53103 0            CADR    RRRDOT              =1
 0064  REF   1                25,2056   53101 1            CADR    LRVELX              =2
 0065  REF   1                25,2057   53077 1            CADR    LRVELY              =3
 0066  REF   1                25,2060   53075 0            CADR    LRVELZ              =4
 0067  REF   1                25,2061   53073 0            CADR    LRALT               =5
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R0001   RENDEZVOUS NAVIGATION PROGRAM 20
R0002   PROGRAM DESCRIPTION
R0003   MOD NO - 2
R0004   BY  P. VOLANTE
R0005   FUNCTIONAL DESCRIPTION
R0006
R0007     THE PURPOSE OF THIS PROGRAM IS TO CONTROL THE RENDEZVOUS RADAR FROM
R0008   STARTUP THROUGH ACQUISITION AND LOCKON TO THE CSM AND TO UPDATE EITHER
R0009   THE LM OR CSM STATE VECTOR (AS SPECIFIED BY THE ASTRONAUT BY DSKY ENTRY)
R0010   ON THE BASIS OF THE RR TRACKING DATA.
R0011   CALLING SEQUENCE -
R0012
R0013   ASTRONAUT REQUEST THROUGH DSKY V37E20E
R0014   SUBROUTINES CALLED
R0015     RC2BOTH (IMU STATUS CHECK)               FLAGUP
R0016     GOFLASH (PINBALL-DISPLAY)                FLAGDOWN
R0017     R23LEM  (MANUAL ACQUISITION)             BANKCALL
R0018     LS201   (LOS DETERMINATION)              TASKOVER
R0019     LS202   (RANGE LIMIT TEST)
R0020     R61LEM  (PREFERRED TRACKING ATTITUDE)
R0021     R21LEM  (RR DESIGNATE)                   ENDOFJOB
R0022     R22LEM  (DATA READ)                      GOPERF1
R0023     R31LEM  (RENDEZVOUS PARAMETER DISPLAY)
R0024     PRIOLARM (PRIORITY DISPLAY)
R0025   NORMAL EXIT MODES-
R0026     P20 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0027   PROGRAM (P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0028   ALARM OR ABORT EXIT MODES-
R0029     RANGE GREATER THAN 400 NM DISPLAY
R0030   OUTPUT
R0031     TRKMKCNT = NO OF RENDEZVOUS TRACKING MARKS TAKEN (COUNTER)
R0032   ERASABLE INITIALIZATION REQUIRED
R0033   FLAGS SET + RESET
R0034     RRCHOPT,RNDVZFLG,ACMODFLG,VEHUPFLG,UPDATFLG,TRACKFLG,
R0035   DEBRIS
R0036     CENTRALS-A,Q,L
 0037   REF    7  LAST  489   30,2000                     SBANK= LOWSUPER         FOR LOW 2CADR'S.

 0038                         33,2045                     BANK   33
 0039   REF    1              24,2000                     SETLOC P20S
 0040                         24,2000                     BANK

 0041   REF    7  LAST  269   E7,1456                     EBANK= LOSCOUNT
 0042   REF    1                                          COUNT* $$/P20
 00421  REF    2  LAST  234   24,2000            PROG22   =      PROG20
 0043   REF    1              24,2000  0 5327 1  PROG20   TC     2PHSCHNG
 0044                         24,2001   00004 0           OCT    4
 0045                         24,2002   05022 1           OCT    05022
 0046                         24,2003   26000 0           OCT    26000            PRIORITY 26
 0047   REF    1              24,2004  0 2667 1           TC     LUNSFCHK         CHECK IF ON LUNAR SURFACE
 0048   REF   1               24,2005  0 2007 1           TC      ORBCHGO         YES
 0049   REF   1               24,2006  0 2036 0           TC      PROG20A -2      NO - CONTINUE WITH P20
 0050   REF  14  LAST  485    24,2007  0 5504 0  ORBCHGO  TC      UPFLAG          SET VEHUPFLG - CSM STATE
 0051   REF   3  LAST  289    24,2010   00026 0           ADRES   VEHUPFLG        VECTOR TO BE UPDATED
 0052   REF  61  LAST  491    24,2011  3 4753 1           CAF     ONE             SET R2 FOR OPTION CSM WILL NOT
 0053   REF   1               24,2012  55'145 1           TS      OPTION2         CHANGE PRESENT ORBIT
 0054   REF   1               24,2013  3 2311 0           CAF     OCT00012
 0055   REF 103  LAST  490    24,2014  0 4616 1           TC      BANKCALL        DISPLAY ASSUMED CSM ORBIT OPTION
 0056   REF   1               24,2015   20633 0           CADR    GOPERF4
 0057   REF   4  LAST  475    24,2016  0 6001 0           TC      GOTOPOOH        TERMINATE
 0058   REF   1               24,2017  0 2021 0           TC      ORBCHG1         PROCEED VALUE OF ASSUMED OPTION OK
 0059                         24,2020  0 2013 1           TC      -5              R2 LOADED THRU DSKY
 0060   REF   1               24,2021  4 2312 1  ORBCHG1  CS      P22ONE
 0061   REF   2  LAST  493    24,2022  6 1145 0           AD      OPTION2
 0062                         24,2023  0 0006 1           EXTEND
 0063   REF   2  LAST  493    24,2024  1 2040 0           BZF     PROG20A
 0064   REF   1               24,2025  3 2315 1           CAF     V06N33*
 0065   REF 104  LAST  493    24,2026  0 4616 1           TC      BANKCALL        FLASH VERB-NOUN TO REQUEST ESTIMATED
 0066   REF   7  LAST  485    24,2027   20476 0           CADR    GOFLASH         TIME OF LAUNCH
 0067   REF   5  LAST  493    24,2030  0 6001 0           TC      GOTOPOOH        TERMINATE
 0068   REF   1               24,2031  0 2033 0           TC      ORBCHG2         PROCEED VALUES OK
 0069                         24,2032  0 2025 1           TC      -5              TIME LOADED THRU DSKY
 0070   REF  31  LAST  487    24,2033  0 6037 0  ORBCHG2  TC      INTPRET
 0071                         24,2034   77650 1           GOTO
 0072   REF   1               24,2035   64217 1                   ORBCHG3
 0073                         32,2217                     BANK    32
 0074   REF   1               32,2000                     SETLOC  P20S4
 0075                         32,2217                     BANK
 0076   REF   1                                           COUNT*  $$/P20

 0077                         32,2217   77624 1  ORBCHG3  CALL
 0078   REF   5  LAST  297    32,2220   27414 0                   INTSTALL
 0079                         32,2221   77745 1           DLOAD
 0080   REF   8  LAST  306    32,2222   03442 0                   TIG
 00801  REF   2  LAST  148    32,2223   03661 0           STORE   LNCHTM
 0081   REF   7  LAST  487    32,2224   00041 1           STORE   TDEC1           ESTIMATED LAUNCH TIME
 0082                         32,2225   43014 0           CLEAR   CLEAR
 0083   REF   4  LAST  237    32,2226   01674 0                   VINTFLAG        LM INTEGRATION
 0084   REF   1               32,2227   01673 1                   INTYPFLG        PRECISION - ENCKE
 0085                         32,2230   43014 0           CLEAR   CLEAR
 0086   REF   3  LAST  236    32,2231   01676 1                   DIMOFLAG        NO W-MATRIX
 0087   REF   2  LAST  236    32,2232   01675 1                   D6OR9FLG
 0088                         32,2233   77624 1           CALL
 0089   REF   3  LAST  236    32,2234   27134 1                   INTEGRV         PLANETARY INERTIAL ORIENTATION
 0090                         32,2235   77624 1           CALL
 0091   REF   1               32,2236   11244 0                   GRP2PC
 0092                         32,2237   77775 1           VLOAD
 0093   REF   2  LAST  2[illegible] 32,2240   00017 1                   RATT1
 0094   REF   2  LAST  148    32,2241   17631 0           STODL   RSUBL           SAVE LM POSITION
 0095   REF   4  LAST  487    32,2242   00015 0                   TAT
 0096   REF   8  LAST  493   32,2243   34041 0            STCALL TDEC1
 0097   REF   6  LAST  493   32,2244   27414 0                   INTSTALL
 0098                        32,2245   43014 0            SET    CLEAR
 0099   REF   5  LAST  493   32,2246   01474 1                   VINTFLAG       CSM INTEGRATION
 0100   REF   2  LAST  493   32,2247   01673 1                   INTYPFLG
 0101                        32,2250   43014 0            CLEAR  BOFF
 0102   REF   4  LAST  493   32,2251   01676 1                   DIMOFLAG
 0103   REF   3  LAST  236   32,2252   02756 1                   RENDWFLG       W MATRIX VALID
 0104   REF   1              32,2253   64257 0                   NOWMATX        NO
 0105                        32,2254   43014 0            SET    SET            YES - SET FOR W MATRIX
 0106   REF   5  LAST  494   32,2255   01476 0                   DIMOFLAG
 0107   REF   3  LAST  493   32,2256   01475 0                   D6OR9FLG
 0108                        32,2257   77624 1  NOWMATX   CALL
 0109   REF   4  LAST  493   32,2260   27134 1                   INTEGRV        CSM INTEGRATION
 0110                        32,2261   77624 1            CALL
 0111   REF   2  LAST  493   32,2262   11244 0                   GRP2PC
 0112                        32,2263   77775 1            VLOAD
 0113   REF   6  LAST  209   32,2264   00025 0                   VATT1
 0114   REF   1              32,2265   25761 0            STOVL  VSUBC          SAVE CSM VELOCITY
 0115   REF   3  LAST  493   32,2266   00017 1                   RATT1
 0116   REF   1              32,2267   01102 0            STORE  RSUBC          SAVE CSM POSITION
 0117                        32,2270   53435 0            VXV    UNIT           COMPUTE NORMAL TO CSM ORBITAL PLANE
 0118   REF   2  LAST  494   32,2271   01761 0                   VSUBC          NSUB1=UNIT(R(CM) CROSS V(CM)
 0119                        32,2272   24025 0            STOVL  20D            SAVE NSUB1
 0120   REF   3  LAST  493   32,2273   03631 0                   RSUBL          COMPUTE ESTIMATED ORBITAL
 0121                        32,2274   53435 0            VXV    UNIT           PLANE CHANGE
 0122                        32,2275   00025 0                   20D            UCSM = UNIT(R(LM) CROSS NSUB1)
 0123   REF   2  LAST  148   32,2276   27637 0            STOVL  UCSM
 0124   REF   2  LAST  494   32,2277   01102 0                   RSUBC          COMPUTE ANGLE BETWEEN UCSM
 0125                        32,2300   50256 0            UNIT   DOT            AND RSUBC
 0126   REF   3  LAST  494   32,2301   03637 0                   UCSM           COS A = UCSM DOT UNIT (R(CM))
 0127                        32,2302   77752 1            SL1
 0128   REF   2  LAST  125   32,2303   02732 0            STORE  CSTH           SAVE DOE TIME-THETA SUBROUTINE
 0129                        32,2304   44316 0            DSQ    BDSU           COMPUTE SINE A
 0130   REF   1              32,2305   10314 0                   ONEB-2
 0131                        32,2306   77766 0            SQRT
 0132   REF   2  LAST  125   32,2307   26730 1            STOVL  SNTH           SAVE FOR TIME-THETA SUBROUTINE
 0133   REF   3  LAST  494   32,2310   01102 0                   RSUBC          POSITION OF CSM AT EST. LAUNCH
 0134   REF   1              32,2311   26655 0            STOVL  RVEC           TIME FOR TIME-THETA   B-27
 0135   REF   3  LAST  494   32,2312   01761 0                   VSUBC          VELOCITY OF CSM AT EST. LAUNCH
 01351                       32,2313   77676 0            VCOMP
 0136   REF   2  LAST  125   32,2314   02744 1            STORE  VVEC           TIME FOR TIME THETA   B-5
 0137                        32,2315   45014 0            CLEAR  CALL
 0138   REF   1              32,2316   03666 1                   RVSW
 0139   REF   1              32,2317   24732 1                   TIMETHET
 01391                       32,2320   77676 0            VCOMP
 0140   REF   2  LAST  148   32,2321   03645 0            STORE  NEWVEL         TERMINAL VELOCITY OF CSM
 01401                       32,2322   77745 1            DLOAD
 01402  REF   1              32,2323   00037 0                   T
 01403  REF   2  LAST  148   32,2324   27663 1            STOVL  TRANSTM        TRANSFER TIME
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01404  REF   3  LAST  494    32,2325   03645 0                     NEWVEL
0141                         32,2326   77646 0            ABVAL
01411                        32,2327   24025 0            STOVL    20D
0142                         32,2330   00001 0                     0D
0143   REF   2  LAST  148    32,2331   03653 1            STORE    NEWPOS          TERMINAL POSITION OF CSM
0144                         32,2332   53435 0            VXV      UNIT            COMPUTE NORMAL TO CSM ORBITAL PLANE
0145   REF   4  LAST  494    32,2333   03631 0                     RSUBL           NSUB2 = UNIT(NEWPOS CROSS R(LM))
0146                         32,2334   53435 0            VXV      UNIT            ROTATE TERMINAL VEL INTO DESIRED
0147   REF   3  LAST  495    32,2335   03653 1                     NEWPOS          ORBITAL PLANE
0148                         32,2336   76561 1            VXSC     VSL1            VSUBC = ABVAL(NEWVEL) $ UNIT( NSUB2
0149                         32,2337   00025 0                     20D
0150   REF   1               32,2340   37665 0            STCALL   NCSMVEL         NEW CSM VELOCITY
0151   REF   3  LAST  494    32,2341   11244 0                     GRP2PC
0152                         32,2342   77624 1            CALL
0153   REF   4  LAST  494    32,2343   27414 0                     INTSTALL
0154                         32,2344   44345 0            DLOAD    BDSU
0155   REF   3  LAST  494    32,2345   03663 1                     TRANSTM         LAUNCH TIME - TRANSFER TIME
01551  REF   2  LAST  493    32,2346   03661 0                     LNCHTM
0156   REF   4  LAST  320    32,2347   25517 0            STOVL    TET
0157   REF   4  LAST  495    32,2350   03653 1                     NEWPOS
0158   REF   4  LAST  321    32,2351   01535 0            STORE    RCV
0159   REF   2  LAST  110    32,2352   25503 0            STOVL    RRECT
0160   REF   2  LAST  495    32,2353   03665 1                     NCSMVEL
0161   REF   2  LAST  110    32,2354   35511 1            STCALL   VRECT
0162   REF   1               32,2355   23455 1                     MINIRECT
01621                        32,2356   45174 1            AXT,2    CALL
01622                        32,2357   00002 0                     2
0163   REF   2  LAST   37    32,2360   26661 1                     ATOPCSM
0164                         32,2361   77624 1            CALL
0165   REF   1               32,2362   27423 1                     INTWAKE0
0166                         32,2363   77776 1            EXIT
0167   REF 105  LAST  493    32,2364  0 4616 1            TC       BANKCALL
0168   REF   3  LAST  493    32,2365   50040 0            CADR     PROG20A
0169                         24,2036                      BANK     24
0170   REF   2  LAST  492    24,2000                      SETLOC   P20S
0171                         24,2036                      BANK
0172   REF   2 LAST  492 TO  493:     30      30*         COUNT*   $$/P20

0173   REF  30  LAST  474    24,2036  0 5516 0            TC       DOWNFLAG        RESET VEHUPFLG- LM STATE VECTOR
0174   REF   4  LAST  493    24,2037   00026 0            ADRES    VEHUPFLG        TO BE UPDATED
0175   REF 106  LAST  495    24,2040  0 4616 1   PROG20A  TC       BANKCALL
0176   REF   3  LAST  487    24,2041   11254 1            CADR     R02BOTH
0177   REF  15  LAST  493    24,2042  0 5504 0            TC       UPFLAG
0178   REF   2  LAST  287    24,2043   00027 1            ADRES    UPDATFLG        SET UPDATE FLAG
0179   REF  16  LAST  495    24,2044  0 5504 0            TC       UPFLAG
0180   REF   2  LAST  287    24,2045   00031 0            ADRES    TRACKFLG        SET TRACK FLAG
0181   REF  17  LAST  495    24,2046  0 5504 0            TC       UPFLAG
0182   REF   2  LAST  287    24,2047   00010 0            ADRES    RNDVZFLG        SET RENDEZVOUS FLAG
0183   REF  31  LAST  495    24,2050  0 5516 0            TC       DOWNFLAG
0184   REF   2  LAST  287    24,2051   00037 0            ADRES    SRCHOPTN        INSURE SEARCH OPTION OFF
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L        P20-P25                                                                            USER'S PAGE NO.  5      E7 S3

 0185   REF  32  LAST  495   24,2052  0 5516 0              TC      DOWNFLAG       ALSO MANUAL ACQUISITION FLAG RESET
 0186   REF   1              24,2053   00040 0              ADRES   ACMODFLG
 0187   REF  33  LAST  496   24,2054  0 5516 0              TC      DOWNFLAG       TURN OFF R04FLAG TO ENSURE GETTING
 0188   REF   5  LAST  279   24,2055   00063 1              ADRES   R04FLAG        ALARM 521 IF CANT READ RADAR
 0189   REF  34  LAST  496   24,2056  0 5516 0              TC      DOWNFLAG       ENSURE R25 GIMBAL MONITOR IS ENABLED
 0190   REF   3  LAST  271   24,2057   00126 1              ADRES   NORRMON        (RESET NORRMON FLAG)
 0191   REF  35  LAST  496   24,2060  0 5516 0              TC      DOWNFLAG       RESET LOS BEING COMPUTED FLAG
 0192   REF   1              24,2061   00041 1              ADRES   LOSCMFLG
 0193   REF   5  LAST  288   24,2062  0 6011 1              TC      CLRADMOD
 0195   REF   6  LAST  475   24,2063  0 5353 1  P20LEM1     TC      PHASCHNG
 0196                        24,2064   04022 0              OCT     04022
 0197   REF 107  LAST  471   24,2065  3 4755 1              CAF     ZERO           ZERO MARK COUNTER
 0198   REF   1              24,2066   55462 1              TS      MARKCTR
 0199   REF  32  LAST  493   24,2067  0 6037 0              TC      INTPRET        LOS DETERMINATION ROUTINE
 0200                        24,2070   77634 0              RTB
 0201   REF   6  LAST  487   24,2071   21573 0                      LOADTIME
 0202   REF   9  LAST  494   24,2072   34041 0              STCALL  TDEC1
 0203   REF   1              24,2073   51255 1                      LPS20.1
 0204                        24,2074   77624 1              CALL
 0205   REF   1              24,2075   53565 1                      LPS20.2        TEST RANGE R/UTINE
 0206                        24,2076   77776 1              EXIT
 0207   REF 229  LAST  474   24,2077  50 154 1              INDEX   MPAC
 0208                        24,2100  0 2101 0              TC      +1
 0209   REF   1              24,2101  0 2111 1              TC      P20LEMA        NORMAL RETURN WITHIN 400 N M
 0210   REF   1              24,2102  3 2305 0  526ALARM    CAF     ALRM526        ERROR EXIT - RANGE > 400 N. MI.
 0211   REF 107  LAST  495   24,2103  0 4616 1              TC      BANKCALL
 0212   REF   1              24,2104   21562 0              CADR    PRIOLARM
 0213   REF   2  LAST  475   24,2105  0 6022 1              TC      GOTOV56        TERMINATE EXITS P20 VIA V56 CODING
 0214                        24,2106  0 2102 0              TC      -4             PROC (ILLEGAL
 0215   REF   1              24,2107  0 2063 0              TC      P20LEM1        ENTER RECYCLE
 0216   REF  68  LAST  491   24,2110  0 5155 0              TC      ENDOFJOB


 0217   REF   7  LAST  496   24,2111  0 5353 1  P20LEMA     TC      PHASCHNG
 0218                        24,2112   04022 0              OCT     04022
 0219   REF   2  LAST  492   24,2113  0 2667 1              TC      LUNSFCHK       CHECK LUNAR SURFACE FLAG (P22 FLAG)
 0220   REF   1              24,2114  0 2117 1              TC      P20LEMB
 0221   REF 108  LAST  496   24,2115  0 4616 1              TC      BANKCALL
 0222   REF   1              24,2116   46116 0              CADR    R61LEM         PREFERRED TRACKING ATTITUDE ROUTINE
 0223   REF   8  LAST  496   24,2117  0 5353 1  P20LEMB     TC      PHASCHNG
 0224                        24,2120   05022 1              OCT     05022          RESTART AT PRIORITY 10 TO ALLOW V37
 0225                        24,2121   10000 0              OCT     10000          REQUESTED PROGRAM TO RUN FIRST
 0226   REF   3  LAST  475   24,2122  3 7714 1              CAF     PRIO26         RESTORE PRIORITY 26
 0227   REF   9  LAST  489   24,2123  0 5146 1              TC      PRIOCHNG
 02272  REF  16  LAST  475   24,2124  3 0075 0              CA      FLAGWRD1       IS THE TRACK FLAG SET
 02274  REF   4  LAST  475   24,2125  7 4747 0              MASK    TRACKBIT
 02276                       24,2126  0 0006 1              EXTEND
 02278  REF   1              24,2127  1 2232 1              BZF     P20LEMWT        BRANCH - NO - WAIT FOR IT TO BE SET
 0228   REF  26  LAST  457   24,2130  3 4752 0  P20LEMB7    CAF     BIT2           IS RR AUTO MODE DISCRETE PRESENT
 0229                        24,2131  0 0006 1              EXTEND
 0230   REF    7  LAST  418    24,2132  02 033 0              RAND     CHAN33
 0231                          24,2133  0 0006 1              EXTEND
 0232   REF    1               24,2134  1 2170 1              BZF      P20LEMB3          YES - DO AUTOMATIC ACQUISITION (R21)


 0233   REF    5  LAST  295    24,2135  4 6007 1  P20LEMB5    CS       OCT24             RADAR NOT IN AUTO CHECK IF
 0234   REF   10  LAST  475    24,2136  6 1011 0              AD       MODREG            MAJOR MODE IS 20
 0235                          24,2137  0 0006 1              EXTEND
 0236   REF    1               24,2140  1 2153 0              BZF      P20LEMB6          BRANCH - YES-OK TO DO PLEASE PERFORM


 02363  REF    3  LAST  404    24,2141  6 7746 0              AD       NEG2              ALSO CHECK FOR P22
 02366                         24,2142  0 0006 1              EXTEND
 02369  REF    2  LAST  497    24,2143  1 2153 0              BZF      P20LEMB6          BRANCH - YES OK TO DO PLEASE PERFORM
 0241   REF    1               24,2144  3 2307 1              CAF      ALRM514           TRACK FLAG SET-FLASH PRIORITY ALARM 514-
 0242   REF  109  LAST  496    24,2145  0 4616 1              TC       BANKCALL          RADAR GOES OUT OF AUTO MODE WHILE IN USE
 0243   REF    2  LAST  496    24,2146   21562 0              CADR     PRIOLARM
 0244   REF    3  LAST  496    24,2147  0 6022 1              TC       GOTOV56           TERMINATE EXITS VIA V56
 0245   REF    2  LAST  496    24,2150  0 2117 1              TC       P20LEMB           PROCEED AND ENTER BOTH GO BACK
 0246   REF    3  LAST  497    24,2151  0 2117 1              TC       P20LEMB           TO CHECK AUTO MODE AGAIN
 0247   REF   69  LAST  496    24,2152  0 5155 0              TC       ENDOFJOB
 0248   REF    1               24,2153  3 2306 0  P20LEMB6    CAF      OCT201            REQUEST RR AUTO MODE SELECTION
 0249   REF  110  LAST  497    24,2154  0 4616 1              TC       BANKCALL
 0250   REF    1               24,2155   20623 1              CADR     GOPERF1
 0251   REF    4  LAST  497    24,2156  0 6022 1              TC       GOTOV56           TERMINATE EXITS P20 VIA V56 CODING
 0252   REF    4  LAST  497    24,2157  0 2117 1              TC       P20LEMB           PROCEED CHECKS AUTO MODE DISCRETE AGAIN
 0253   REF    3  LAST  496    24,2160  0 2667 1              TC       LUNSFCHK          ENTER INDICATES MANUAL ACQUISITION (R23)
 0254   REF    1               24,2161  0 2166 1              TC       P20LEMB2          YES - R23 NOT ALLOWED-TURN ON OPR ERROR
 0255   REF    1               24,2162  0 3135 0              TC       R23LEM            NO - DO MANUAL ACQUISITION


 0256   REF   18  LAST  495    24,2163  0 5504 0  P20LEMB1    TC       UPFLAG            RETURN FROM R23 - LOCKON ACHIEVED
 0257   REF    2  LAST  496    24,2164   00040 0              ADRES    ACMODFLG          SET MANUAL FLAG AND GO BACK TO CHECK
 0258   REF    5  LAST  497    24,2165  0 2117 1              TC       P20LEMB           RR AUTO MODE


 0259   REF    7  LAST  446    24,2166  0 4364 1  P20LEMB2    TC       FALTON            TURNS ON OPERATOR ERROR LIGHT ON DSKY
 0260   REF    6  LAST  497    24,2167  0 2117 1              TC       P20LEMB           AND GOES BACK TO CHECK AUTO MODE


 0261   REF   31  LAST  470    24,2170  4 0110 0  P20LEMB3    CS       RADMODES          ARE RR CDUS BEING ZEROED
 0262   REF    1               24,2171  7 4737 1              MASK     RCDU0BIT
 0263                          24,2172  0 0006 1              EXTEND
 0264   REF    1               24,2173  1 2205 0              BZF      P20LEMB4          BRANCH - YES - WAIT
 0265   REF    5  LAST  293    24,2174  3 4355 0              CAF      BIT13-14          IS SEARCH OR MANUAL ACQUISITION FLAG SET
 0266   REF    7  LAST  334    24,2175  7 0076 1              MASK     FLAGWRD2
 0267                          24,2176  0 0006 1              EXTEND
 0268   REF    1               24,2177  1 2211 0              BZF      P20LEMC3          ZERO MEANS AUTOMATIC RR ACQUISTION
 0269   REF   36  LAST  496    24,2200  0 5516 0              TC       DOWNFLAG          RESET TO AUTO MODE
 0270   REF    3  LAST  495    24,2201   00037 0              ADRES    SRCHOPTN
 0271    REF  37  LAST  497    24,2202  0 5516 0               TC      DOWNFLAG
 0272    REF   3  LAST  497    24,2203   00040 0               ADRES   ACMODFLG
 0273    REF   2  LAST  496    24,2204  0 2232 0               TC      P20LEMWT          WAIT 2.5 SECONDS THEN GO TO RR DATA READ


 0274    REF   1               24,2205  3 2304 1    P20LEMB4   CAF     250DEC
 0275    REF 111  LAST  497    24,2206  0 4016 1               TC      BANKCALL          WAIT 2.5 SECONDS WHILE RR CDUS ARE BEING
 0276    REF   8  LAST  300    24,2207   01735 1               CADR    DELAYJOB          ZEROED-THEN GO BACK AND CHECK AGAIN
 0277    REF   2  LAST  497    24,2210  0 2170 0               TC      P20LEMB3


 027705  REF  33  LAST  496    24,2211  0 6037 0    P20LEMC3   TC      INTPRET
 02771                         24,2212   77634 0               RTB
 027715  REF   7  LAST  496    24,2213   21573 0                       LOADTIME
 02772   REF  10  LAST  496    24,2214   34041 0               STCALL  TDEC1
 027725  REF   1               24,2215   50316 0                       UPPSV
 02779                         24,2216   77776 1    P20LEMC4   EXIT
 0278    REF   9  LAST  496    24,2217  0 5353 1    P20LEMC    TC      PHASCHNG
 0279                          24,2220   04022 0               OCT     04022
 0280    REF  22  LAST  475    24,2221  30 074 1               CAE     FLAGWRD0          IS THE RENDEZVOUS FLAG SET
 0281    REF   6  LAST  475    24,2222  7 4745 1               MASK    RNDVZBIT
 0282                          24,2223  0 0006 1               EXTEND
 0283    REF  70  LAST  497    24,2224  1 5155 1               BZF     ENDOFJOB          NO - EXIT P20
 0284    REF  17  LAST  496    24,2225  30 075 0               CAE     FLAGWRD1          IS TRACK FLAG SET  (BIT 5 FLAGWORD 1)
 0285    REF   5  LAST  496    24,2226  7 4747 0               MASK    TRACKBIT
 0286                          24,2227  0 0006 1               EXTEND
 0287    REF   1               24,2230  1 2264 1               BZF     P20LEMD           BRANCH-TRACK FLAG NOT ON-WAIT 15 SECONDS
 0288    REF   1               24,2231  0 2674 0    P20LEMF    TC      R21LEM


 0291    REF   2  LAST  498    24,2232  3 2304 1    P20LEMWT   CAF     250DEC
 0293    REF   5  LAST  384    24,2233  0 5173 1               TC      TWIDDLE           USE INSTEAD OF WAITLIST SINCE SAME BANK
 0294    REF   2  LAST  240    24,2234   02244 1               ADRES   P20LEMC1          WAIT 2.5 SECONDS
 0295    REF  18  LAST  498    24,2235  30 075 0               CAE     FLAGWRD1          IS TRACK FLAG SET
 0296    REF   6  LAST  498    24,2236  7 4747 0               MASK    TRACKBIT
 0297                          24,2237  0 0006 1               EXTEND
 0298    REF  71  LAST  498    24,2240  1 5155 1               BZF     ENDOFJOB          NO-EXIT WITHOUT DOING 2.7 PHASE CHANGE
 0299    REF  10  LAST  498    24,2241  0 5353 1    P20LMWT1   TC      PHASCHNG
 0300                          24,2242   40072 0               OCT     40072
 0301    REF  72  LAST  498    24,2243  0 5155 0               TC      ENDOFJOB


 0302    REF  23  LAST  498    24,2244  30 074 1    P20LEMC1   CAE     FLAGWRD0          IS RENDEZVOUS FLAG SET
 0303    REF   7  LAST  498    24,2245  7 4745 1               MASK    RNDVZBIT
 0304                          24,2246  0 0006 1               EXTEND
 0305    REF  17  LAST  490    24,2247  1 5261 0               BZF     TASKOVER          NO - EXIT P20/R22
 0306    REF  19  LAST  498    24,2250  30 075 0               CAE     FLAGWRD1          IS TRACK FLAG SET
 0307    REF   7  LAST  498    24,2251  7 4747 0               MASK    TRACKBIT
 0308                          24,2252  0 0006 1               EXTEND
 0309    REF   1               24,2253  1 2261 1               BZF     P20LEMC2          NO-DONT SCHEDULE P22 JOB
 0310   REF   4  LAST  496   24,2254  3 7714 1            CAF      PRIO26          YES-SCHEDULE R22 JOB (RR DATA READ)
 0311   REF  17  LAST  461   24,2255  0 5105 0            TC       FINDVAC
 0312   REF   8  LAST  492   E7,1456                      EBANK=   LOSCOUNT
 0313   REF   1              24,2256   02627 0            2CADR    R22LEM42
 0313   REF   1              24,2257   50067 0
 0314   REF  18  LAST  498   24,2260  0 5261 1            TC       TASKOVER


 0315   REF   1              24,2261  0 5221 0  P20LEMC2  TC       FIXDELAY        TRACK FLAG NOT SET ,WAIT 15 SECONDS
 0316                        24,2262   02734 0            DEC      1500            AND CHECK AGAIN

 0317   REF   3  LAST  498   24,2263  0 2244 1            TC       P20LEMC1

 0318   REF   1              24,2264  3 2666 0  P20LEMD   CAF      1500DEC
 0319   REF   6  LAST  498   24,2265  0 5173 1            TC       TWIDDLE         WAITLIST FOR 15 SECONDS
 0320   REF   1              24,2266   02270 0            ADRES    P20LEMD1
 0321   REF  73  LAST  498   24,2267  0 5155 0            TC       ENDOFJOB


 0322   REF  20  LAST  498   24,2270  30 0075 0 P20LEMD1  CAE      FLAGWRD1        IS TRACK FLAG SET
 0323   REF   8  LAST  498   24,2271  7 4747 0            MASK     TRACKBIT
 0324   REF 151  LAST  490   24,2272  10 0000 0           CCS      A
 0325   REF   1              24,2273  1 2277 0            TCF      P20LEMD2        YES-SCHEDULE DESIGNATE JOB
 0326   REF   2  LAST  499   24,2274  0 5221 0            TC       FIXDELAY        NO-WAIT 15 SECONDS
 0327                        24,2275   02734 0            DEC      1500
 0328   REF   2  LAST  499   24,2276  0 2270 0            TC       P20LEMD1


 0329   REF   5  LAST  499   24,2277  3 7714 1  P20LEMD2  CAF      PRIO26          SCHEDULE JOB TO DO R21
 0330   REF  18  LAST  499   24,2300  0 5105 0            TC       FINDVAC
 0331   REF   9  LAST  499   E7,1456                      EBANK=   LOSCOUNT
 0332   REF   2  LAST  497   24,2301   02211 1            2CADR    P20LEMC3        START AT PERM. MEMORY INTEGRATION
 0332                        24,2302   50067 0
 0333   REF   1  LAST  499   24,2303  0 5261 1            TC       TASKOVER


 0334                        24,2304   00372 1  250DEC    DEC      250
 0335                        24,2305   00526 0  ALRM526   OCT      00526
 0336                        24,2306   00201 1  OCT201    OCT      00201
 0337                        24,2307   00514 1  ALRM514   OCT      514
 0338                        24,2310   00074 1  MAXTRIES  DEC      60
 0339                        24,2311   00012 1  OCT00012  OCT      00012
 0340                        24,2312   00001 0  P22ONE    OCT      00001
 0341                        24,2313   10000 0  ONEB-2    2DEC     1.0 B-2
 0341                        24,2314   00000 1
 03415                       24,2315   01441 1  V06N33*   VN       0633
 0342                        24,2316   45020 1  UPPSV     STQ      CALL            UPDATES PERMANENT STATE VECTORS
 0343   REF   1              24,2317   01757 0                     LS21X            TO PRESENT TIME
 0344   REF   8  LAST  495   24,2320   27414 0                     INTSTALL
 0345                        24,2321   77624 1            CALL
 0346   REF    2  LAST  236   24,2322   26644 0                     SETIFLGS
 0347                         24,2323   43014 0             BCF     SET               IF W-MATRIX INVALID,DONT INTEGRATE IT
 0348   REF    4  LAST  494   24,2324   02756 1                     RENDWFLG
 0349   REF    1              24,2325   50336 1                     UPPSV1
 0350   REF    6  LAST  494   24,2326   01476 0                     DIMOFLAG          SET DIMOFLAG TO INTEGRATE W-MATRIX
 0351                         24,2327   43014 0             BON     SET
 0352   REF    4  LAST  253   24,2330   04307 1                     SURFFLAG          IF ON LUNAR SURFACE W IS 6X6
 0353   REF    1              24,2331   50333 1                     UPPSV5
 0354   REF    4  LAST  4     24,2332   01475 0                     D6OR9FLG          OTHERWISE 9X9
 0355                         24,2333   77614 1  UPPSV5     BCF
 0356   REF    5  LAST  495   24,2334   00747 0                     VEHUPFLG
 0357   REF    1              24,2335   50370 0                     UPPSV3
 0356                         24,2336   77614 1  UPPSV1     SET
 0359   REF    6  LAST  494   24,2337   01474 1                     VINTFLAG
 0361                         24,2340   77624 1             CALL
 0362   REF    5  LAST  494   24,2341   27134 1                     INTEGRV
 0363                         24,2342   77624 1             CALL                      GROUP 2 PHASE CHANGE
 0364   REF    4  LAST  495   24,2343   11244 0                     GRP2PC            TO PROTECT INTEGRATION
 0365                         24,2344   77624 1             CALL
 0366   REF    9  LAST  499   24,2345   27414 0                     INTSTALL
 0367                         24,2346   43145 0             DLOAD   CLEAR             GET TETCSM TO STORE IN TDEC FOR LM INT.
 0368   REF    4  LAST  236   24,2347   01571 0                     TETCSM
 0369   REF    7  LAST  500   24,2350   01674 0                     VINTFLAG
 0370                         24,2351   77624 1  UPPSV4     CALL                      INTEGRATE OTHER VEHICLE
 0371   REF    3  LAST  500   24,2352   26644 0                     SETIFLGS           WITHOUT W-MATRIX
 0372   REF   11  LAST  498   24,2353   34041 0             STCALL  TDEC1
 0373   REF    6  LAST  500   24,2354   27134 1                     INTEGRV
 0374                         24,2355   77214 0             BOFF    VLOAD
 0375   REF    5  LAST  500   24,2356   04347 0                     SURFFLAG
 0376   REF    1              24,2357   50216 1                     P20LEMC4
 0377   REF    1              24,2360   01661 1                     RCVLEM
 0378                         24,2361   77742 0             VSR2
 0379   REF    2  LAST  119   24,2362   26352 1             STOVL   LMPOS
 0380   REF    1              24,2363   01667 1                     VCVLEM
 0381                         24,2364   77742 0             VSR2
 0382   REF    2  LAST  119   24,2365   02360 0             STORE   LMVEL
 0383                         24,2366   77650 1             GOTO
 0384   REF    2  LAST  499   24,2367   01757 0                     LS21X


 0385                         24,2370   45014 0  UPPSV3     CLEAR   CALL
 0386   REF    8  LAST  500   24,2371   01674 0                     VINTFLAG
 0387   REF    7  LAST  500   24,2372   27134 1                     INTEGRV
 0390                         24,2373   77624 1             CALL
 0391   REF    5  LAST  500   24,2374   11244 0                     GRP2PC
 0392                         24,2375   77624 1             CALL
 0393   REF   10  LAST  500   24,2376   27414 0                     INTSTALL
 0394                         24,2377   71214 0             SET     DLOAD
 0395   REF    9  LAST  500   24,2400   01474 1                     VINTFLAG
 0396   REF    2  LAST  111   24,2401   01643 1                     TETLEM            GET TETLEM TO STORE IN TDEC FOR CSM INT.
 0397                          24,2402   77650 1            GOTO
 0398   REF    1               24,2403   50351 0                     UPPSV4

 0399   REF   10  LAST   499   E7,1456                      EBANK=  LOSCOUNT
 0400   REF    1                                            COUNT*  $$/P22
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P0401    PROGRAM DESCRIPTION
R0402    PREFERRED TRACKING ATTITUDE PROGRAM P25
R0403    MOD NO - 3
R0404    BY   P. VOLANTE
R0405    FUNCTIONAL DESCRIPTION
R0406
R0407      THE PURPOSE OF THIS PROGRAM IS TO COMPUTE THE PREFERRED TRACKING
R0408    ATTITUDE OF THE LM TO CONTINUOUSLY POINT THE LM TRACKING BEACON AT THE
R0409    CSM AND TO PERFORM THE MANEUVER TO THE PREFERRED TRACKING ATTITUDE AND
R0410    CONTINUOUSLY MAINTAIN THIS ATTITUDE WITHIN PRESCRIBED LIMITS
R0411    CALLING SEQUENCE -
R0412      ASTRONAUT REQUEST THROUGH DSKY V37E25E
R0413    SUBROUTINES CALLED -
R0414      BANKCALL                        FLAGUP
R0415      R02BOTH  (IMU STATUS CHECK)     ENDOFJOB
R0416      R61LEM   (PREF TPK ATT ROUT)    WAITLIST
R0417      TASKOVER                        FINDVAC
R0418    NORMAL EXIT MODES   -
R0419      P25 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0420    PROGRAM(P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0421    ALARM OR ABORT EXIT MODES -
R0422      NONE
R0423    OUTPUT
R0424    ERASABLE INITIALIZATION REQUIRED
R0425    FLAGS SET + RESET
R0426      TRACKFLG,P25FLAG
R0427    DEBRIS
R0428      NONE
 0429    REF  11  LAST  501    E7,1456                            EBANK=  LOSCOUNT
 0430    REF   1                                                  COUNT*  $$/P25
 0431    REF   2  LAST  492    24,2404  0 5327 1   PROG25         TC      2PHSCHNG
 0432                          24,2405   00004 0                  OCT     4                 MAKE GROUP 4 INACTIVE (VERB 37)
 0433                          24,2406   05022 1                  OCT     05022
 0434                          24,2407   26000 0                  OCT     26000             PRIORITY 26

 0435    REF 112  LAST  499    24,2410  0 4616 1                  TC      BANKCALL
 0436    REF   4  LAST  495    24,2411   11254 1                  CADR    R02BOTH           IMU STATUS CHECK
 0437    REF  19  LAST  497    24,2412  0 5504 0                  TC      UPFLAG
 0438    REF   3  LAST  495    24,2413   00031 0                  ADRES   TRACKFLG          SET TRACK FLAG
 0439    REF  20  LAST  502    24,2414  0 5504 0                  TC      UPFLAG
 0440    REF   2  LAST  287    24,2415   00006 1                  ADRES   P25FLAG           SET P25FLAG
 0441    REF  11  LAST  498    24,2416  0 5353 1   P25LEM1        TC      PHASCHNG
 0442                          24,2417   04022 0                  OCT     04022
 0443    REF   2  LAST  228    24,2420  3 4743 0                  CAF     P25FLBIT
 0444    REF  31  LAST  239    24,2421  7 0074 0                  MASK    STATE             IS P25FLAG SET
 0445                          24,2422  0 0006 1                  EXTEND
 0446    REF  74  LAST  499    24,2423  1 5155 1                  BZF     ENDOFJOB
 0447    REF   9  LAST  499    24,2424  3 4747 1                  CAF     TRACKBIT          IS TRACKFLAG SET?
 0448    REF  32  LAST  502    24,2425  7 0075 1                  MASK    STATE +1
 0449                          24,2426  0 0006 1                  EXTEND
 0450   REF   1                 24,2427   1 2437 1              BZF      P25LMWT1        NO-SKIP PHASE CHANGE AND WAIT 1 MINUTE
 0451   REF   7   LAST   456    24,2430   3 4757 0              CAF      SEVEN           CALL R65 - FINE PREFERRED
 0452   REF   2   LAST   146    24,2431   55745 1               TS       R65CNTR
 0453   REF 113   LAST   502    24,2432   0 4616 1              TC       BANKCALL        TRACKING ATTITUDE ROUTINE
 0454   REF   1                 24,2433    46123 0              CADR     R65LEM
 0455   REF   2   LAST   240    24,2434   0 2416 0              TC       P25LEM1         THEN GO CHECK FLAGS
 0456   REF  12   LAST   502    24,2435   0 5353 1   P25LEMWT   TC       PHASCHNG
 0457                           24,2436    00112 0              OCT      00112
 0458   REF   1                 24,2437   3 2450 1   P25LMWT1   CAF      60SCNDS
 0460   REF   7   LAST   499    24,2440   0 5173 1              TC       TWIDDLE         WAIT ONE MINUTE THEN CHECK AGAIN
 0461   REF   1                 24,2441    02443 0              ADRES    P25LEM2
 0462   REF  75   LAST   502    24,2442   0 5155 0              TC       ENDOFJOB
 0463   REF   1                 24,2443   3 5024 1   P25LEM2    CAF      PRIO14
 0464   REF  19   LAST   499    24,2444   0 5105 0              TC       FINDVAC
 0465   REF  12   LAST   502    E7,1456                         EBANK=   LOSCOUNT
 0466   REF   3   LAST   503    24,2445    02416 0              2CADR    P25LEM1
 0466                           24,2446    50067 0
 0467   REF  20   LAST   499    24,2447   0 5261 1              TC       TASKOVER
 0468                           24,2450    13560 0   60SCNDS    DEC      6000
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R0471    DATA READ ROUTINE 22 (LEM)
R0472    PROGRAM DESCRIPTION
R0473    MOD NO - 2
R0474    BY P VOLANTE
R0475    FUNCTIONAL DESCRIPTION
R0476
R0477      TO PROCESS AUTOMATIC RR MARK DATA TO UPDATE THE STATE VECTOR OF EITHER
R0478    LM OR CSM AS DEFINED IN THE RENDEZVOUS NAVIGATION PROGRAM (P20)
R0479    CALLING SEQUENCE -
R0480             TC       BANKCALL
R0481             CADR     R22LEM
R0482    SUBROUTINES CALLED -
R0483      LSR22.1              GOFLASH          WAITLIST
R0484      LSR22.2              PRIOLARM         BANKCALL
R0485      LSR22.3              R61LEM
R0486    NORMAL EXIT MODES-
R0487      R22 WILL CONTINUE TO RECYCLE,UPDATING STATE VECTORS WITH RADAR DATA
R0488    UNTIL P20 CEASES TO OPERATE (RENDEZVOUS FLAG SET TO ZERO) AT WHICH TIME
R0489    R22 WILL TERMINATE SELF.
R0490    ALARM OR ABORT EXIT MODES-
R0491      PRIORITY ALARM
R0492    PRIORITY ALARM 525 LOS NOT WITHIN 3 DEGREE LIMIT
R0493    OUTPUT
R0494      SEE OUTPUT FROM LSR22.3
R0495    ERASABLE INITIALIZATION REQUIRED
R0496      SEE LSR22.1,LSR22.2,LSR22.3
R0497    FLAGS SET + RESET
R0498      NOANGFLG
R0499    DEBRIS
R0500      SEE LSR22.1,LSR22.2,LSR22.3
 0501    REF   2  LAST  176    E7,1737                         EBANK= LRS22.1X
 0502    REF   1                                               COUNT* $$/R22
 0503    REF  13  LAST  503    24,2451  0 5353 1  R22LEM       TC     PHASCHNG
 0504                          24,2452   04022 0               OCT    04022
 0505    REF   8  LAST  498    24,2453  3 4745 0               CAF    RNDVZBIT          IS RENDESVOUS FLAG SET?
 0506    REF  33  LAST  502    24,2454  7 0074 0               MASK   STATE
 0507                          24,2455  0 0006 1               EXTEND
 0508    REF  76  LAST  503    24,2456  1 5155 1               BZF    ENDOFJOB          NO-EXIT R22 AND P20
 0509    REF  10  LAST  502    24,2457  3 4747 1               CAF    TRACKBIT          IS TRACKFLAG SET?
 0510    REF  34  LAST  504    24,2460  7 0075 1               MASK   STATE +1
 0511                          24,2461  0 0006 1               EXTEND
 0512    REF   1               24,2462  1 2636 1               BZF    R22WAIT           NO WAIT
 0513    REF  48  LAST  490    24,2463  3 4736 1  R22LEM12     CAF    BIT14             IS RR AUTO TRACK ENABLE DISCRETE STILL
 0514                          24,2464  0 0006 1               EXTEND                   ON (A MONITOR REPOSITION BY R25 CLEARSIT
 0515    REF  23  LAST  468    24,2465  02 012 0               RAND   CHAN12
 0516                          24,2466  0 0006 1               EXTEND
 0517    REF   2  LAST  496    24,2467  1 2111 0               BZF    P20LEMA           NO - RETURN TO P20
 0518    REF  27  LAST  496    24,2470  3 4752 0               CAF    BIT2              YES
 0519                          24,2471  0 0006 1               EXTEND                   IS RR AUTO MODE DISCRETE PRESENT
 0520    REF   8  LAST  497    24,2472  02 033 0               RAND   CHAN33
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0521                          24,2473  0 0006 1            EXTEND
0522                          24,2474  1 2476 1            BZF      +2              YES CONTINUE
0523  REF   1                 24,2475  0 2135 1            TC       P20LEMB5        NO - SET IT
0524  REF  32  LAST  497      24,2476  4 0110 0            CS       RADMODES        ARE RR CDUS BEING ZEROED
0525  REF   2  LAST  497      24,2477  7 4737 1            MASK     RCDUOBIT
0526                          24,2500  0 0006 1            EXTEND
0527  REF   2  LAST  499      24,2501  1 2627 1            BZF      R22LEM42        CDUS BEING ZEROED
0528  REF  14  LAST  504      24,2502  0 5353 1            TC       PHASCHNG        IF A RESTART OCCURS,AN EXTRA RADAR
0529                          24,2503   00152 1            OCT      00152           READING IS TAKEN,SO BAD DATA ISN'T USED
0530  REF 114  LAST  503      24,2504  0 4616 1            TC       BANKCALL        YES READ DATA + CALCULATE LOS
0531  REF   1                 24,2505   64366 0            CADR     LRS22.1         DATA READ SUBROUTINE
0532  REF 230  LAST  496      24,2506  50 154 1            INDEX    MPAC
0533                          24,2507  0 2510 1            TC       +1
0534  REF   1                 24,2510  0 2531 1            TC       R22LEM2         NORMAL RETURN (GOOD DATA)
0535  REF   1                 24,2511  0 2217 1            TC       P20LEMC         COULD NOT READ RADAR-TRY TO REDESIGNATE
0536  REF   1                 24,2512  3 2663 0            CAF      ALRM525         RR LOS NOT WITHIN 3 DEGREES (ALARM)
0537  REF 115  LAST  505      24,2513  0 4616 1            TC       BANKCALL
0538  REF   3  LAST  497      24,2514   21562 0            CADR     PRIOLARM
0539  REF   5  LAST  497      24,2515  0 6022 1            TC       GOTOV56         TERMINATE EXITS P20 VIA V56 CODING
0540  REF   1                 24,2516  0 2521 0            TC       R22LEM1         PROC (DISPLAY DELTA THETA)
0541                          24,2517  0 2512 0            TC       -5              ENTER(ILLEGAL OPTION)
0542  REF  77  LAST  504      24,2520  0 5155 0            TC       ENDOFJOB


0543  REF  15  LAST  505      24,2521  0 5353 1  R22LEM1   TC       PHASCHNG
0544                          24,2522   04022 0            OCT      04022
0545  REF   1                 24,2523  3 2664 1            CAF      V06N05          DISPLAY DELTA THETA
0546  REF 116  LAST  505      24,2524  0 4616 1            TC       BANKCALL
0547  REF   1                 24,2525   20507 1            CADR     PRIODSP
0548  REF   6  LAST  505      24,2526  0 6022 1            TC       GOTOV56         TERMINATE EXITS P20 VIA V56 CODING
0549  REF   2  LAST  505      24,2527  0 2531 1            TC       R22LEM2         PROC (OK CONTINUE)
0550  REF   2  LAST  505      24,2530  0 2217 1            TC       P20LEMC         ENTER(RECYCLE)
0551  REF  16  LAST  505      24,2531  0 5353 1  R22LEM2   TC       PHASCHNG
0552                          24,2532   04022 0            OCT      04022
0553  REF   4  LAST  497      24,2533  0 2667 1            TC       LUNSFCHK        CHECK IF ON LUNAR SURFACE (P22FLAG SET)
0554  REF   1                 24,2534  0 2551 1            TC       R22LEM3         YES-BYPASS FLAG CHECKS AND LRS22.2
0555  REF  21  LAST  499      24,2535  3 0075 0            CA       FLAGWRD1        IS TRACK FLAG SET
0556  REF  11  LAST  504      24,2536  7 4747 0            MASK     TRACKBIT
0557                          24,2537  0 0006 1            EXTEND
0558  REF   2  LAST  504      24,2540  1 2636 1            BZF      R22WAIT         NO - WAIT
0559  REF 117  LAST  505      24,2541  0 4616 1            TC       BANKCALL        YES
0560  REF   1                 24,2542   51333 0            CADR     LRS22.2         CHECKS RR BORESIGHT WITHIN 30 DEG OF +Z
0561  REF 231  LAST  505      24,2543  50 154 1            INDEX    MPAC
0562                          24,2544  0 2545 1            TC       +1
0563  REF   2  LAST  505      24,2545  0 2551 1            TC       R22LEM3         NORMAL RETURN(LOS WITHIN 30  OF Z-AXIS)
0564  REF 118  LAST  505      24,2546  0 4616 1            TC       BANKCALL
0565  REF   2  LAST  496      24,2547   46116 0            CADR     R61LEM
0566  REF   3  LAST  505      24,2550  0 2636 0            TC       R22WAIT         NOT WITHIN 30 DEG OF Z-AXIS
0567  REF  22  LAST  505      24,2551  4 0075 1  R22LEM3   CS       FLAGWRD1        SHOULD WE BYPASS STATE VECTOR UPDATE
0568  REF   1                 24,2552  7 4746 1            MASK     NOUPFBIT        (IS NOUPDATE FLAG SET?)
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 0569                       24,2553  0 0006 1            EXTEND
 0570   REF   3  LAST  505  24,2554  1 2627 1            BZF      R22LEM42           BRANCH-YES
 0571   REF  23  LAST  505  24,2555  3 0075 0            CA       FLAGWRD1           IS UPDATE FLAG SET
 0572   REF   1             24,2556  7 4745 1            MASK     UPDATBIT
 0573                       24,2557  0 0006 1            EXTEND
 0574   REF   4  LAST  506  24,2560  1 2627 1            BZF      R22LEM42           UPDATE FLAG NOT SET
 0575   REF   6  LAST  499  24,2561  3 7714 1            CAF      PRIO26             INSURE HIGH PRIO IN RESTART
 0576   REF   2  LAST  229  24,2562  55'056 1            TS       PHSPRDT2

 0577   REF  34  LAST  498  24,2563  0 6037 0            TC       INTPRET
 0578                       24,2564   77650 1            GOTO
 0579   REF   1             24,2565   54412 1                     LSR22.3
 0580                       24,2566   77776 1  R22LEM93  EXIT                        NORMAL EXIT FROM LSR22.3
 0581   REF  17  LAST  505  24,2567  0 5353 1            TC       PHASCHNG           PHASE CHANGE TO PROTECT AGAINST
 0582                       24,2570   04022 0            OCT      04022              CONFLICT WITH GRP2PC ERASEABLE
 0583   REF   1             24,2571  1 2622 1            TCF      R22LEM44
 0584                       24,2572   77776 1  R22LEM96  EXIT
 0585   REF 108  LAST  496  24,2573  3 4755 1            CAF      ZERO               SET N49FLAG = ZERO TO INDICATE
 0586   REF   2  LAST  152  24,2574  55'746 1            TS       N49FLAG            V06 N49 DISPLAY HASNT BEEN ANSWERED
 0587   REF  13  LAST  506  24,2575  0 5353 1            TC       PHASCHNG
 0588                       24,2576   04022 0            OCT      04022              TO PROTECT DISPLAY
 0589   REF   2  LAST  192  24,2577  3 7715 0            CAF      PRIO27             PROTECT DISPLAY
 0590   REF  10  LAST  490  24,2600  0 5072 1            TC       NOVAC
 0591   REF   3  LAST  506  E7,1746                      EBANK=   N49FLAG
 0592   REF   1             24,2601   02644 0            2CADR    N49DSP
 0592   REF   1             24,2602   50067 0
 0593   REF  35  LAST  506  24,2603  0 6037 0            TC       INTPRET
 0594                       24,2604   77735 0            SLOAD
 0595   REF   4  LAST  506  24,2605   03747 0                     N49FLAG
 0596                       24,2606   50054 0            BZE      BMN                LOOP TO CHECK IF FLAG
 0597                       24,2607   50604 0                     -3                 SETTING CHANGED-BRANCH - NO
 0598   REF   1             24,2610   50616 0                     R22LEM7            PROCEED
 0599                       24,2611   77776 1            EXIT                        DISPLAY ANSWERED BY RECYCLE
 0600   REF   5  LAST  505  24,2612  0 2667 1            TC       LUNSFCHK           ARE WE ON LUNAR SURFACE
 0601   REF   4  LAST  505  24,2613  0 2636 0            TC       R22WAIT            YES - 15 SECOND DELAY
 0602   REF 109  LAST  506  24,2614  3 4755 1            CA       ZERO               NO - SET R65COUNTER = 0, DO FINE
 0603   REF   1             24,2615  0 2632 1            TC       R22LEM45           TRACKING TAKE ANOTHER RADAR READING
 0604                       24,2616   77624 1  R22LEM7   CALL                        PROCEED
 0605   REF   6  LAST  500  24,2617   11244 0                     GRP2PC             PHASE CHANGE AND
 0606                       24,2620   77650 1            GOTO                        GO TO INCORPORATE DATA.
 0607   REF   1             24,2621   55431 1                     ASTOK
 0608   REF   2  LAST  496  24,2622  25'462 0  R22LEM44  INCR     MARKCTR            INCREMENT COUNT OF MARKS INCORPORATED.
 0609   REF   6  LAST  506  24,2623  0 2667 1            TC       LUNSFCHK           ARE WE ON LUNAR SURFACE
 0610   REF   1             24,2624  0 2640 1            TC       R22LEM46           YES - WAIT 2 SECONDS
 0611   REF  1[illegible] LAST  426  24,2625  3 4756 1            CA       FIVE               NOT ON LUNAR SURFACE
 0612   REF   2  LAST  506  24,2626  0 2632 1            TC       R22LEM45           R65COUNTER = 5
 0613   REF   7  LAST  506  24,2627  0 2667 1  R22LEM42  TC       LUNSFCHK           CHECK IF ON LUNAR SURFACE (P22FLAG SET)
 0614   REF   2  LAST  506  24,2630  0 2640 1            TC       R22LEM46           YES - WAIT 2 SECONDS
 0615   REF  33  LAST  [illegible]  24,2631  3 4752 0            CA       TWO                NO-SET R65COUNTER = 2
 0616   REF   3  LAST  503  24,2632  55'745 1  R22LEM45  TS       R65CNTR
 0617   REF 119  LAST  505    24,2633  0 4616 1            TC       BANKCALL
 0618   REF   2  LAST  503    24,2634   46123 0            CADR     R65LEM          FINE PREFERRED TRACKING ATTITUDE
 0619   REF   1               24,2635  0 2451 0            TC       R22LEM
 0620   REF   2  LAST  499    24,2636  3 2666 0  R22WAIT   CAF      1500DEC
 0621   REF   3  LAST  498    24,2637  0 2233 1            TC       P20LEMWT +1


 0622   REF   2  LAST  278    24,2640  3 5000 1  R22LEM46  CAF      2SECS
 06223 *REF 120  LAST  507    24,2641  0 4616 1            TC       BANKCALL         WAIT 2 SECONDS AND TAKE ANOTHER MARK
 06226 *REF   9  LAST  498    24,2642   01735 1            CADR     DELAYJOB
 0623  *REF   2  LAST  507    24,2643  0 2451 0            TC       R22LEM

 0624   REF   1               24,2644  3 2665 0  N49DSP    CAF      V06N49NB
 0625   REF 121  LAST  507    24,2645  0 4616 1            TC       BANKCALL        EXCESSIVE STATE VECTOR UPDATE - FLASH
 0626   REF   2  LAST  505    24,2646   20507 1            CADR     PRIODSP         VERB 06 NOUN 49 R1=DELTA R, R2=DELTA V
 0627   REF   7  LAST  505    24,2647  0 6022 1            TC       GOTOV56         TERMINATE - EXIT R22 AND P20
 0628   REF  62  LAST  493    24,2650  4 4753 0            CS       ONE             PROCEED - N49FLAG = -1
 0629   REF [illegible]  LAST  506    24,2651  55 746 1            TS       N49FLAG         RECYCLE - N49FLAG = + VALUE
 0630   REF  78  LAST  505    24,2652  0 5155 0            TC       ENDOFJOB
 0631   REF  19  LAST  506    24,2653  0 5353 1  R22RSTRT  TC       PHASCHNG        IF A RESTART OCCURS WHILE READING RADAR
 0632                         24,2654   00152 1            OCT      00152           COME HERE TO TAKE A RANGE-RATE READING
 0633   REF 122  LAST  507    24,2655  0 4616 1            TC       BANKCALL        WHICH ISNT USED TO PREVENT TAKING A BAD
 0634   REF   2  LAST  491    24,2656   53103 0            CADR     RRRDOT          READING AND TRYING TO INCORPORATE THE
 0635   REF 123  LAST  507    24,2657  0 4616 1            TC       BANKCALL        BAD DATA
 0636   REF   5  LAST  490    24,2660   17714 0            CADR     RADSTALL        WAIT FOR READ COMPLETE
 0637   REF   3  LAST  505    24,2661  0 2217 1            TC       P20LEMC         COULD NOT READ RADAR-TRY TO REDESIGNATE
 0638   REF   3  LAST  507    24,2662  0 2451 0            TC       R22LEM          READ SUCCESSFUL-CONTINUE AT R22


 0639                         24,2663   00525 0  ALPM525   OCT      00525
 0640                         24,2664   01405 1  V06N05    VN       00605
 0641                         24,2665   01461 0  V06N49NB  VN       00649
 0642                         24,2666   02734 0  1500DEC   DEC      1500
R0644   LUNSFCHK-CLOSED SUBROUTINE TO CHECK IF ON LUNAR SURFACE (P22FLAG)
R0645             RETURNS TO CALLER +1 IF P22FLAG SET
R0646                  TO CALLER +2 IF P22FLAG NOT SET


 0647   REF   2 LAST  501 TO  502:      0      0*           COUNT*   $$/P22
 0648   REF   4  LAST  336    24,2667  4 0104 0  LUNSFCHK  CS       FLAGWRD8        CHECK IF ON LUNAR SURFACE
 0649   REF   3  LAST  336    24,2670  7 4744 0            MASK     SURFFBIT        IS SURFFLAG SET?
 0650   REF 162  LAST  499    24,2671  10 000 0            CCS      A               BRANCH - P22FLAG SET
 0651   REF 147  LAST  476    24,2672  24 C02 0            INCR     Q               NOT SET
 0652   REF 148  LAST  507    24,2673  0 0002 0            TC       Q               RETURN
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R0653    RR DESIGNATE ROUTINE (R21LEM)
R0654    PROGRAM DESCRIPTION
R0655    MOD NO - 2
R0656    BY P VOLANTE
R0657    FUNCTIONAL DESCRIPTION
R0658
R0659      TO POINT THE RENDEZVOUS RADAR AT THE CSM UNTIL AUTOMATIC ACQUISITION
R0660    OF THE CSM IS ACCOMPLISHED BY THE RADAR. ROUTINE IS CALLED BY P20.
R0661    CALLING SEQUENCE -
R0662              TC       BANKCALL
R0663              CADR     R21LEM
R0664    SUBROUTINES CALLED -
R0665      FINDVAC         FLAGUP             ENDOFJOB         PRIOLARM
R0666      NOVAC           INTPRET            LPS20.1          PHASCHNG
R0667      WAITLIST        JOBSLEEP           JOBWAKE          FLAGDOWN
R0668      TASKOVER        BANKCALL           RADSTALL         RRDESSM
R0669    NORMAL EXIT MODES
R0670      WHEN LOCK-ON IS ACHIEVED,BRANCH WILL BE TO P20 WHERE R22 (DATA READ
R0671    WILL BE SELECTED OR A NEED FOR A MANEUVER(BRANCH TO P20LEMA)
R0672    ALARM OR ABORT EXIT MODES-
R0673      PRIORITY ALARM 503 WHEN LOCK-ON HASN:T BEEN ACHIEVED AFTER 30SECS -
R0674    THIS REQUIRES ASTRONAUT INTERFACE- SELECTION OF SEARCH OPTION OF
R0675    ACQUISITION
R0676    OUTPUT
R0677      SEE LPS20.1,RRDESSM
R0678    ERASABLE INITIALIZATION REQUIRED
R0679      RRTARGET,RADMODES ARE USED BY LPS20.1 AND RRDESSM
R0680    FLAGS SET + RESET
R0681      LOSCMFLG        LOKONSW
R0682    DEBRIS
R0683      SEE LPS20.1,RRDESSM
 0684    REF  13  LAST  503   E7,1456                           EBANK= LOSCOUNT
 0685    REF   1                                                COUNT* $$/R21
 0686    REF  49  LAST  504   24,2674  4 4736 0  R21LEM         CS      BIT14              REMOVE RR SELF TRACK ENABLE
 0687                         24,2675  0 0006 1                 EXTEND
 0688    REF  24  LAST  504   24,2676  03 012 1                 WAND    CHAN12
 0689    REF   8  LAST  506   24,2677  0 2667 1                 TC      LUNSFCHK
 0690    REF   1              24,2700  0 2705 1                 TC      R21LEM5
 0691    REF 110  LAST  506   24,2701  3 4755 1                 CAF     ZERO                   COMMAND ANTENNA TO MODE CENTER
 0692    REF   4  LAST  316   24,2702  55'107 1                 TS      TANG               IF NOT ON SURFACE-MODE 1-(T=0,S=0)
 0693    REF   5  LAST  508   24,2703  55'110 1                 TS      TANG +1
 0694    REF   1              24,2704  0 2715 0                 TC      R21LEM6
 0695    REF  22  LAST  453   24,2705  3 4740 0  R21LEM5        CAF     BIT12
 0696    REF  33  LAST  505   24,2706  7 0110 0                 MASK    RADMODES
 0697    REF 163  LAST  507   24,2707  10 000 0                 CCS     A
 0698    REF   1              24,2710  0 2725 0                 TC      R21LEM10
 0699    REF  27  LAST  470   24,2711  3 4735 1                 CAF     BIT15
 0700    REF   6  LAST  508   24,2712  55'107 1                 TS      TANG
 0701    REF   4  LAST  373   24,2713  4 4736 0                 CS      HALF
 0702    REF   7  LAST  508   24,2714  55'110 1                 TS      TANG +1
 0703  REF  38  LAST  498  24,2715  0 5516 0  R21LEM6   TC      DOWNFLAG
 0704  REF   3  LAST  271  24,2716   00012 1            ADRES   LOKONSW
 0705  REF 124  LAST  507  24,2717  0 4616 1            TC      BANKCALL
 0706  REF   2  LAST  269  24,2720   52475 0            CADR    RRDESNB
 0707                      24,2721  0 2722 1            TC      +1
 0708  REF 125  LAST  509  24,2722  0 4616 1            TC      BANKCALL
 0709  REF   6  LAST  507  24,2723   17714 0            CADR    RADSTALL
 0710  REF   1             24,2724  0 2760 1            TC      R21-503       BAD RETURN FROM DESIGNATE -ISSUE ALARM
 0711  REF  21  LAST  502  24,2725  0 5504 0  R21LEM10  TC      UPFLAG
 0712  REF   2  LAST  496  24,2726   00041 1            ADRES   LOSCMFLG      EVERY FOURTH PASS THRU DODES
 0713  REF   1             24,2727  3 2310 1            CAF     MAXTRIES      ALLOW 60 PASSES (APPROX 45 SECONDS)
 0714  REF   1             24,2730  55'114 0            TS      DESCOUNT      TO DESIGNATE AND LOCK ON
 0715  REF  17  LAST  474  24,2731  3 6245 1  R21LEM2   CAF     THREE
 0716  REF  14  LAST  508  24,2732  55'456 0            TS      LOSCOUNT
 0717  REF  36  LAST  506  24,2733  0 6037 0  R21LEM1   TC      INTPRET
 0718                      24,2734   43234 0            RTB     DAD
 0719  REF   8  LAST  498  24,2735   21573 0                    LOADTIME
 0720  REF   1             24,2736   11120 1                    HALFSEC       EXTRAPOLATE TO PRESENT TIME + .5 SEC.
 0721  REF  12  LAST  500  24,2737   34041 0            STCALL  TDEC1         LOS DETERMINATION ROUTINE
 0722  REF   2  LAST  496  24,2740   51255 1                    LPS20.1
 0723                      24,2741   77776 1            EXIT
 0724  REF  22  LAST  509  24,2742  0 5504 0  R21LEM3   TC      UPFLAG        SET LOKONSW TO RADAR-ON DESIRED
 0725  REF   4  LAST  509  24,2743   00012 1            ADRES   LOKONSW
 0726  REF  39  LAST  509  24,2744  0 5516 0            TC      DOWNFLAG
 0727  REF   4  LAST  496  24,2745   00126 1            ADRES   NORRMON
 0728  REF  37  LAST  509  24,2746  0 6037 0            TC      INTPRET
 0729                      24,2747   77624 1            CALL                  INPUT (RETARGET UPDATED BY LPS20.1)
 0730  REF   1             24,2750   52373 1                    RRDESSM       DESIGNATE ROUTINE
 0731                      24,2751   77776 1            EXIT
 0732  REF   1             24,2752  0 2777 1            TC      R21LEM4       LOS NOT IN MODE 2 COVERAGE
A0733                                                                         ON LUNAR SURFACE
 0734  REF   3  LAST  504  24,2753  0 2111 1            TC      P20LEMA       VEHICLE MANEUVER REQUIRED.
 0735  REF 126  LAST  509  24,2754  0 4616 1            TC      BANKCALL      NO VEHICLE MANEUVER REQUIRED
 0736  REF   7  LAST  509  24,2755   17714 0            CADR    RADSTALL      WAIT FOR DESIGNATE COMPLETE - LOCKON OR
 0737                      24,2756  0 2760 1            TC      +2            BADEND-LOCKON NOT ACHIEVED IN 60 TRIES
 0738  REF   1             24,2757  0 2767 0            TC      R21END        EXIT ROUTINE RETURN TO P20 (LOCK-ON)
 0739  REF   1             24,2760  3 2775 0  R21-503   CAF     ALRM503       ISSUE ALARM 503
 0740  REF 127  LAST  509  24,2761  0 4616 1            TC      BANKCALL
 0741  REF   4  LAST  505  24,2762   21562 0            CADR    PRIOLARM
 0742  REF   8  LAST  507  24,2763  0 6022 1            TC      GOTOV56       TERMINATE EXITS P20 VIA V56 CODING
 0743  REF   1             24,2764  0 2772 1            TC      R21SRCH       PROC
 0744  REF   3  LAST  509  24,2765  0 2211 1            TC      P20LEMC3
 0745  REF  79  LAST  507  24,2766  0 5155 0            TC      ENDOFJOB
 0746  REF  40  LAST  509  24,2767  0 5516 0  R21END    TC      DOWNFLAG
 0747  REF   3  LAST  509  24,2770   00041 1            ADRES   LOSCMFLG      RESET LOSCMFLG
 0748  REF   1             24,2771  0 3121 0            TC      R21DISP       PUT UP VERIFY MAIN LOBE LOCKON DISPLAY
 0749  REF  20  LAST  507  24,2772  0 5353 1  R21SRCH   TC      PHASCHNG
 0750                      24,2773   04022 0            OCT     04022
 0751  REF   1             24,2774  0 3206 0            TC      P24LEM        SEARCH ROUTINE
 0752                      24,2775   00503 1  ALRM503   OCT     00503
 0753                          24,2776   00527 1  ALRM527  OCT     527


 0754    REF    2  LAST  509   24,2777  3 2310 1  R21LEM4  CAF     MAXTRIES           SET UP COUNTER FOR
 0755    REF    2  LAST  139   24,3000  55'423 1           TS      REPOSCNT           60 PASSES (APPROX 600 SECS.)
 0756    REF   23  LAST  509   24,3001  0 5504 0           TC      UPFLAG
 0757    REF    1              24,3002   00005 1           ADRES   FSPASFLG           SET FIRST PASS FLAG
 0758    REF   41  LAST  509   24,3003  0 5516 0           TC      DOWNFLAG           RESET LOS BEING
 0759    REF    4  LAST  509   24,3004   00041 1           ADRES   LOSCMFLG           COMPUTED FLAG
 0760    REF   38  LAST  509   24,3005  0 6037 0           TC      INTPRET
 0761                          24,3006   77634 0  R21LEM12 RTB
 0762    REF    9  LAST  509   24,3007   21573 0                   LOADTIME
 07621                         24,3010   77615 0           DAD
 0763    REF    1              24,3011   11116 1                   TENSEC             TIME T = T + 10 SECS.
 0764    REF    2  LAST  139   24,3012   03425 1           STORE   REPOSTM            SAVE FOR LONGCALL AND UPPSV
 0765    REF   13  LAST  509   24,3013   34041 0           STCALL  TDEC1
 0766    REF    3  LAST  509   24,3014   51255 1                   LPS20.1            COMPUTE LOS AT TIME T
 0767                          24,3015   77624 1           CALL
 0768    REF    2  LAST  509   24,3016   52373 1                   RRDESSM
 0769                          24,3017   77776 1           EXIT
 0770    REF    1              24,3020  0 3033 1           TC      R21LEM13           LOS NOT IN MODE 2 COVERAGE
 0771    REF   80  LAST  509   24,3021  0 5155 0           TC      ENDOFJOB           VEHICLE MANEUVER REQUIRED
 07721   REF    1              24,3022  0 6027 1           TC      KILLTASK
 07722   REF    1              24,3023   52573 1           CADR    BEGDES
 07724   REF   39  LAST  510   24,3024  0 6037 0           TC      INTPRET
 0773                          24,3025   77614 1           BOF
 0774    REF    2  LAST  510   24,3026   00345 0                   FSPASFLG           FIRST PASS THRU REPOSITION
 0775    REF    1              24,3027   51043 1                   R21LEM8            NO-GO TO CONTINUOUS DESIGNATE
 0776                          24,3030   77614 1           CLRGO
 0777    REF    3  LAST  510   24,3031   00225 1                   FSPASFLG           YES-RESET FIRST PASS FLAG
 0778    REF    1              24,3032   51037 1                   R21LEM7 +1
 0779    REF    3  LAST  510   24,3033  11'423 1  R21LEM13 CCS     REPOSCNT           HAVE WE TRIED 60 TIMES?
 0780    REF    2  LAST  510   24,3034  0 3036 1           TC      R21LEM7            NO-ADD 10 SECS. RECOMPUTE LOS
 0781    REF    1              24,3035  0 3105 0           TC      R21LEM11           YES-PUT OUT ALARM 530
 0782    REF    4  LAST  510   24,3036  55'423 1  R21LEM7  TS      REPOSCNT
 07821   REF   40  LAST  510   24,3037  0 6037 0           TC      INTPRET
 07822                         24,3040   52145 0           DLOAD   GOTO
 07823   REF    3  LAST  510   24,3041   03425 1                   REPOSTM
 07824   REF    1              24,3042   51010 1                   R21LEM12 +2
 0784                          24,3043   77745 1  R21LEM8  DLOAD
 0785    REF    4  LAST  510   24,3044   03425 1                   REPOSTM
 0786    REF   14  LAST  510   24,3045   34041 0           STCALL  TDEC1
 0787    REF    2  LAST  498   24,3046   50316 0                   UPPSV
 0788                          24,3047   77776 1           EXIT
 0789    REF   24  LAST  510   24,3050  0 5504 0           TC      UPFLAG             SET RADMODES BIT 15 FOR
 0790    REF    2  LAST  271   24,3051   00264 1           ADRES   CDESFLAG           CONTINUOUS DESIGNATION
 0791    REF   42  LAST  510   24,3052  0 5516 0           TC      DOWNFLAG
 0792    REF    5  LAST  509   24,3053   00012 1           ADRES   LOKONSW
 0793    REF   25  LAST  510   24,3054  0 5504 0           TC      UPFLAG
 0794    REF    5  LAST  509   24,3055   00126 1           ADRES   NORRMON
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0795   REF 128  LAST  509   24,3056  0 4616 1             TC      BANKCALL
0796   REF   3  LAST  509   24,3057   52475 0             CADR    RRDESNB
0797                        24,3060  0 3061 0             TC      +1
07971  REF  41  LAST  510   24,3061  0 6037 0             TC      INTPRET
0798                        24,3062   47234 1             RTB     BDSU
0799   REF  10  LAST  510   24,3063   21573 0                     LOADTIME       COMPUTE DELTA TIME
0800   REF   5  LAST  510   24,3064   03425 1                     REPOSTM        FOR LONGCALL
0801   REF   1              24,3065   03427 0             STORE   DELTATM
0802                        24,3066   77776 1             EXIT
08021                       24,3067   00006 1             EXTEND
0803   REF   2  LAST  511   24,3070  3 1427 1             DCA     DELTATM
0804   REF   2  LAST  374   24,3071  0 5277 0             TC      LONGCALL
0805   REF  15  LAST  509   E7,1456                       EBANK=  LOSCOUNT
0806   REF   1              24,3072   03075 0             2CADR   R21LEM9
0806   REF   1              24,3073   50067 0
0807   REF  81  LAST  510   24,3074  0 5155 0             TC      ENDOFJOB
0808   REF   2  LAST  510   24,3075  0 6027 1  R21LEM9    TC      KILLTASK
0809   REF   1              24,3076   52602 1             CADR    STDESIG
0810   REF   6  LAST  496   24,3077  0 6011 1             TC      CLRADMOD
0811   REF   7  LAST  506   24,3100  3 7714 1             CAF     PRIO26
0812   REF  20  LAST  503   24,3101  0 5105 0             TC      FINDVAC
0813   REF  16  LAST  511   E7,1456                       EBANK=  LOSCOUNT
0814   REF   2  LAST  508   24,3102   02725 0             2CADR   R21LEM10
0814                        24,3103   50067 0
0815   REF  21  LAST  503   24,3104  0 5261 1             TC      TASKOVER
0816   REF   1              24,3105  3 3114 0  R21LEM11   CAF     ALRM530        ALARM 530-LOS NOT IN COVERAGE
0817   REF 129  LAST  511   24,3106  0 4616 1             TC      BANKCALL       AFTER TRYING TO DESIGNATE FOR
0818   REF   5  LAST  509   24,3107   21562 0             CADR    PRIOLARM       600 SECS.
0819   REF   9  LAST  509   24,3110  0 6022 1             TC      GOTOV56
0820   REF  10  LAST  511   24,3111  0 6022 1             TC      GOTOV56
0821   REF  11  LAST  511   24,3112  0 6022 1             TC      GOTOV56
0822   REF  82  LAST  511   24,3113  0 5155 0             TC      ENDOFJOB
0824                        24,3114   00530 1  ALRM530    OCT     00530
0825                        24,3115   00000 1  TENSEC     2DEC    1000 B-28
0825                        24,3116   01750 1
0826                        24,3117   00000 1  HALFSEC    2DEC    50
0826                        24,3120   00062 0
0827   REF  21  LAST  509   24,3121  0 5353 1  R21DISP    TC      PHASCHNG
0828                        24,3122   04022 0             OCT     04022
0829   REF   1              24,3123  3 3134 1             CAF     V06N72PV       FLASH V 50 N 72 - PLEASE PERFORM RR
0830   REF 130  LAST  511   24,3124  0 4616 1             TC      BANKCALL       MAIN LOBE LOCKON VERIFICATION
0831   REF   2  LAST  473   24,3125   20710 0             CADR    GOPERF2R
0832   REF  12  LAST  511   24,3126  0 6022 1             TC      GOTOV56        TERMINATE EXITS VIA V 56
0833   REF   4  LAST  507   24,3127  0 2232 0             TC      P20LEMWT       PROCEED CONTINUES TO R22
0834                        24,3130  0 3123 1             TC      -5             ENTER ILLEGAL
0835   REF  23  LAST  474   24,3131  3 4745 0             CAF     BIT7
0836   REF   2  LAST  474   24,3132  0 5464 1             TC      LINUS          SET BITS TO MAKE THIS A PRIORITY DISPLAY
0837   REF  83  LAST  511   24,3133  0 5155 0             TC      ENDOFJOB
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 0838                        24,3134   01510 1  V06N72PV VN      00672
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R0839   MANUAL ACQUISITION ROUTINE R23LEM
R0840   PROGRAM DESCRIPTION
R0841   MOD NO - 2
R0842   BY P VOLANTE
R0843   FUNCTIONAL DESCRIPTION
R0844
R0845     TO ACQUIRE THE CSM BY MANUAL OPERATION OF THE RENDEZVOUS RADAR
R0846   CALLING SEQUENCE -
R0847             TC        R23LEM
R0848   SUBROUTINES CALLED
R0849     BANKCALL            R61LEM
R0850     SETMINDB            GOPERF1
R0851   NORMAL EXIT MODES -
R0852     IN RESPONSE TO THE GOPERF1 ,SELECTION OF ENTER WILL RECYCLE R23
R0853                                ,SELECTION OF PROC  WILL CONTINUE R23
R0854                                ,SELECTION OF TERM  WILL TERMINATE R23 +P20
R0855   ALARM OR ABORT EXIT MODES -
R0856     SEE NORMAL EXIT MODES ABOVE
R0857   OUTPUT
R0858     N.A.
R0859   ERASABLE INITIALIZATION REQUIRED-
R0860     ACMODFLG MUST BE SET TO 1 (MANUAL MODE)
 0861   REF   1                 1143                      EBANK= GENRET
 0862   REF   1                                           COUNT* $$/R23
 0863   REF  26  LAST  510   24,3135  0 5504 0  R23LEM    TC     UPFLAG          SET NO ANGLE MONITOR FLAG
 0864   REF   6  LAST  510   24,3136   00126 1            ADRES  NORRMON
 0865                         24,3137  0 0004 0            INHINT
 0866   REF  17  LAST  334   24,3140  0 4674 0            TC     IBNKCALL        SELECT MINIMUM DEADBAND
 0867   REF   1              24,3141   40140 0            CADR   SETMINDB
 0868                         24,3142  0 0003 1            RELINT
 0869   REF  50  LAST  508   24,3143  3 4736 1  R23LEM1   CAF    BIT14           ENABLE TRACKER
 0870                         24,3144  0 0006 1            EXTEND
 0871   REF  23  LAST  506   24,3145  05 012 1            WOR    CHAN12
 0872   REF   1              24,3146  3 3205 0            CAF    OCT205
 0873   REF 131  LAST  511   24,3147  0 4616 1            TC     BANKCALL
 0874   REF   2  LAST  497   24,3150   20623 1            CADR   GOPERF1
 0875   REF   1              24,3151  0 3176 1            TC     R23LEM2         TERMINATE
 0876   REF   1              24,3152  0 3154 1            TC     R23LEM11        PROCEDE
 0877   REF   1              24,3153  0 3201 1            TC     R23LEM3         ENTER- DO ANOTHER MANUVER
 0878                         24,3154  0 0004 0  R23LEM11  INHINT
 0879   REF   2  LAST  187   24,3155  0 4523 1            TC     RRLIMCHK        YES - CHECK IF ANTENNA IS WITHIN LIMITS
 0880   REF   4  LAST  316   24,3156   00035 1            ADRES  CDUT
 0881   REF   1              24,3157  0 3166 0            TC     OUTOFLIM        NOT WITHIN LIMITS
 0882   REF  18  LAST  513   24,3160  0 4674 0            TC     IBNKCALL        RESTORE DEADBAND TO
 0883   REF   4  LAST  295   24,3161   40123 0            CADR   RESTORDB        ASTRONAUT SELECTED VALUE
 0884                         24,3162  0 0003 1            RELINT
 0885   REF  43  LAST  510   24,3163  0 5516 0            TC     DOWNFLAG        CLEAR NO ANGLE MONITOR FLAG
 0886   REF   7  LAST  513   24,3164   00126 1            ADRES  NORRMON
 0887   REF   1              24,3165  0 2163 1            TC     P20LEMB1        RADAR IS LOCKED ON CONTINUE IN P20
 0888                         24,3166  0 0003 1  OUTOFLIM  RELINT
 0889    REF   1                  24,3167  3 3204 1               CAF     OCT501PV
 0890    REF 132  LAST   513      24,3170  0 4616 1               TC      BANKCALL         ISSUE ALARM - RR ANTENNA NOT WITHIN
 0891    REF   6  LAST   511      24,3171   21562 0               CADR    PRIOLARM         LIMITS
 0892    REF   2  LAST   513      24,3172  0 3176 1               TC      R23LEM2          TERMINATE - EXIT R23 TO R00 (GO TO POOH)
 0893    REF   2  LAST   513      24,3173  0 3167 1               TC      OUTOFLIM +1      PROCEED ILLEGAL
 0894    REF   2  LAST   513      24,3174  0 3201 1               TC      R23LEM3          RECYCLE- DO ANOTHER MANUVER
 0895    REF  84  LAST   511      24,3175  0 5155 0               TC      ENDOFJOB
 0896    REF  44  LAST   513      24,3176  0 5516 0  R23LEM2      TC      DOWNFLAG         CLEAR NO ANGLE MONITOR FLAG
 0897    REF   8  LAST   513      24,3177   00126 1               ADRES   NORRMON
 0898    REF  13  LAST   511      24,3200  0 6022 1               TC      GOTOV56          AND EXIT VIA V56
 0899    REF 133  LAST   514      24,3201  0 4616 1  R23LEM3      TC      BANKCALL
 0900    REF   3  LAST   505      24,3202   46116 0               CADR    R61LEM
 0901    REF   1                  24,3203  0 3143 1               TC      R23LEM1

 0902                             24,3204   00501 0  OCT501PV OCT     501
 0903                             24,3205   00205 0  OCT205   OCT     205
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R0904   SEARCH ROUTINE R24LEM
R0905   PROGRAM DESCRIPTION
R0906   MOD NO - 2
R0907   BY  P. VOLANTE
R0908   FUNCTIONAL DESCRIPTION
R0909
R0910     TO ACQUIRE THE CSM BY A SEARCH PATTERN WHEN THE RENDEZVOUS RADAR HAS
R0911   FAILED TO ACQUIRE THE CSM IN THE AUTOMATIC TRACKING MODE AND TO ALLOW
R0912   THE ASTRONAUT TO CONFIRM THAT REACQUISITION HAS NOT BEEN BY SIDELOBE.
R0913   CALLING SEQUENCE
R0914             CAF     PRIONN
R0915             TC      FINDVAC
R0916             EBANK=  DATAGOOD
R0917             2CADR   R24LEM
R0918   SUBROUTINES CALLED
R0919     FLAGUP         FLAGDOWN       BANKCALL
R0920     R61LEM         GOFLASHR       FINDVAC
R0921     ENDOFJOB       NOVAC          LSR24.1
R0922   NORMAL EXIT MODES-
R0923     ASTRONAUT RESPONSE TO DISPLAY OF OMEGA AND DATAGOOD.HE CAN EITHER
R0924    REJECT BY TERMINATING (SEARCH OPTION AND RESELECTING P20) OR ACCEPT BY
R0925   PROCEEDING (EXIT ROUTINE AND RETURN TO AUTO MODE IN P20)
R0926   ALARM OR ABORT EXIT MODES-
R0927     SEE NORMAL EXIT MODES ABOVE
R0928   OUTPUT -
R0929     SEE OUTPUT FROM LSR24.1 + R61LEM
R0930   ERASABLE INITIALIZATION REQUIRED
R0931     SEE INPUT FOR LSR24.1
R0932   FLAGS SET + RESET
R0933     SRCHOPT,ACMODFLG
 0934   REF   3  LAST  316   E7,1733                         EBANK=  DATAGOOD
 0935   REF   1                                              COUNT*  $$/R24
 0936   REF  27  LAST  513   24,3206  0 5504 0  R24LEM       TC      UPFLAG
 0937   REF   4  LAST  497   24,3207   00037 0               ADRES   SRCHOPTN          SET SRCHOPT FLAG
 0938   REF  45  LAST  514   24,3210  0 5516 0               TC      DOWNFLAG          RESET LOS BEING COMPUTED FLAG TO MAKE
 0939   REF   5  LAST  510   24,3211   00041 1               ADRES   LOSCMFLG          SURE DODES DOESN'T GO TO R21
 0940   REF 111  LAST  508   24,3212  3 4755 1  R24LEM1      CAF     ZERO
 0941   REF   4  LAST  515   24,3213  55'733 0               TS      DATAGOOD          ZERO OUT DATA INDICATOR
 0942   REF   2  LAST  316   24,3214  55'734 1               TS      OMEGAD            ZERO OMEGA DISPLAY REGS
 0943   REF   3  LAST  515   24,3215  55'735 0               TS      OMEGAD +1         ZERO OMEGA DISPLAY REGS
 0944   REF  22  LAST  511   24,3216  0 5353 1  R24LEM2      TC      PHASCHNG
 0945                        24,3217   04022 0               OCT     04022
 0946   REF   1              24,3220  3 3254 1               CAF     V16N80
 0947   REF 134  LAST  514   24,3221  0 4616 1               TC      BANKCALL
 0948   REF   1              24,3222   20504 1               CADR    PRIODSPR
 0949   REF  14  LAST  514   24,3223  0 6022 1               TC      GOTOV56
 0950   REF   1              24,3224  0 3230 0               TC      R24END            PROCEED EXIT R24 TO P20LEM1


 0951   REF   1              24,3225  0 3234 1               TC      R24LEM3           RECYCLE - CALL R61 TO MANEUVER S/C
 0952   REF 135  LAST  515   24,3226  0 4616 1            TC       BANKCALL
 0953   REF   1              24,3227   55442 0            CADR     LRS24.1
 0955   REF   3  LAST  511   24,3230  0 6027 1  R24END    TC       KILLTASK
 0956   REF   1              24,3231   55643 0            CADR     CALLDGCH
 0957   REF   7  LAST  511   24,3232  0 6011 1            TC       CLRADMOD         CLEAR BITS 10 & 15 OF RADMODES.
 0958   REF   2  LAST  496   24,3233  1 2063 1            TCF      P20LEM1          AND GO TO 400 MI. RANGE CHECK IN P20.

 0959                           6011                      BLOCK    3
 0960   REF   1                 6000                      SETLOC   FFTAG6
 0961                           6011                      BANK
 0962   REF   1                                           COUNT*   $$/P24

 0963   REF   1                 6011  4 6021 0  CLRADMOD  CS       BIT10+15
 0964                           6012  0 0004 0            INHINT
 0965   REF  34  LAST  508      6013  7 0110 0            MASK     RADMODES
 0966   REF  35  LAST  516      6014  54 110 0            TS       RADMODES
 0967   REF  28  LAST  504      6015  4 4752 1            CS       BIT2             DISABLE RR ERROR COUNTERS
 0968                           6016  0 0006 1            EXTEND
 0969   REF  26  LAST  513      6017  03 012 1            WAND     CHAN12           USER WILL RELINT

 0970   REF 149  LAST  507      6020  0 0002 0            TC       Q


 0971                           6021   41000 1  BIT10+15  OCT      41000
 0972                         24,3234                     BANK     24
 0973   REF   3  LAST  495    24,2000                     SETLOC   P20S
 0974                         24,3234                     BANK
 0975   REF   2 LAST  515 TO  516:    22     22*          COUNT*   $$/R24

 0976   REF  23  LAST  515   24,3234  0 5353 1  R24LEM3   TC       PHASCHNG
 0977                        24,3235   04022 0            OCT      04022
 0979   REF   4  LAST  516   24,3236  0 6027 1            TC       KILLTASK
 0980   REF   2  LAST  516   24,3237   55643 0            CADR     CALLDGCH         KILL WAITLIST FOR NEXT POINT IN PATTERN
 0981   REF   8  LAST  51    24,3240  0 6011 1            TC       CLRADMOD         CLEAR BITS 10 + 15 OF RADMODES TO KILL
 0982                        24,3241  0 0003 1            RELINT                    HALF SECOND DESIGNATE LOOP
 0983   REF   1              24,3242  3 4774 1            CAF      .5SEC
 0984   REF 136  LAST  516   24,3243  0 4616 1            TC       BANKCALL         WAIT FOR DESIGNATE LOOP TO DIE
 0985   REF  10  LAST  507   24,3244   01735 1            CADR     DELAYJOB
 0986   REF   9  LAST  508   24,3245  0 2667 1            TC       LUNSFCHK         CHECK IF ON LUNAR SURFACE
 0987   REF   1              24,3246  0 3251 1            TC       R24LEM4          YES-DONT DO ATTITUDE MANEUVER
 0988   REF 137  LAST  516   24,3247  0 4616 1            TC       BANKCALL         CALL R61 TO DO PREFERRED TRACKING
 0989   REF   4  LAST  514   24,3250   46116 0            CADR     R61LEM           ATTITUDE MANEUVER
 0990   REF 112  LAST  515   24,3251  3 4755 1  R24LEM4   CAF      ZERO             ZERO OUT RADCADR (WHICH WAS SET BY
 0991   REF   2  LAST  222   24,3252  55'306 1            TS       RADCADR          ENDRADAR WHEN DESIGNATE STOPPED) SO THAT
A0992                                                                               RRDESSM  WILL RETURN TO CALLER
 0993   REF   1              24,3253  0 3216 1            TC       R24LEM2          AND GO BACK TO PUT UP V16 N80 DISPLAY


 0994                        24,3254   04120 0  V16N80    VN       01680
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R0995    PREFERRED TRACKING ATTITUDE ROUTINE R61LEM
R0996    PROGRAM DESCRIPTION
R0997    MOD NO : 3                      DATE : 4-11-67
R0998    MOD BY : P VOLANTE   SDC


R0999    FUNCTIONAL DESCRIPTION-
R1000      TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE LM TO ENABLE RR
R1001    TRACKING OF THE CSM AND TO PERFORM THE MANEUVER TO THE PREFERRED
R1002    ATTITUDE.
R1003    CALLING SEQUENCE-
R1004              TC      BANKCALL
R1005              CADR    R61LEM
R1006    SUBROUTINES CALLED
R1007        LPS20.1          VECPOINT
R1008        KALCMAN3


R1009    NORMAL EXIT MODES-
R1010      NORMAL RETURN IS TO CALLER + 1
R1011    ALARM OR ABORT EXIT MODES-
R1012      TERMINATE P20 + R61 BY BRANCHING TO P20END IF BOTH TRACKFLAG +
R1013    RENDEZVOUS FLAG ARE NOT SET.
R1014    OUTPUT -
R1015      SEE OUTPUT FOR LPS20.1 + ATTITUDE MANEUVER ROUTINE (R60)
R1016    ERASABLE INITIALIZATION REQUIRED
R1017      GENRET USED TO SAVE Q FOR RETURN
R1018    FLAGS SET + RESET
R1019      3AXISFLG
R1020    DEBRIS
R1021      SEE SUBROUTINES
 1022    REF   1                 23,2000                        SETLOC R61
 1023                            23,2116                        BANK
 1024    REF  17  LAST  511      E7,1456                        EBANK= LOSCOUNT
 1025    REF   1                                                COUNT* $$/R61
 1026    REF   4  LAST  477      23,2116   0 4645 1  R61LEM     TC     MAKECADR
 1027    REF   2  LAST  513      23,2117  55'143 1              TS     GENRET
 1028    REF  28  LAST  515      23,2120   0 5504 0             TC     UPFLAG            SET R61 FLAG
 1029    REF   1                 23,2121    00024 1             ADRES  R61FLAG
 1030    REF   1                 23,2122   0 2127 1             TC     R61C+L01
 1031    REF   5  LAST  517      23,2123   0 4645 1  R65LEM     TC     MAKECADR
 1032    REF   3  LAST  517      23,2124  55'143 1              TS     GENRET
 1033    REF  46  LAST  515      23,2125   0 5516 0             TC     DOWNFLAG          RESET R61 FLAG
 1034    REF   2  LAST  517      23,2126    00024 1             ADRES  R61FLAG
 1035    REF  12  LAST  505      23,2127   3 4747 1  R61C+L01   CAF    TRACKBIT          TRACKFLAG
 1036    REF  35  LAST  504      23,2130   7 0075 1             MASK   STATE +1
 1037                            23,2131   0 0006 1             EXTEND
 1038    REF   1                 23,2132   1 2271 0             BZF    R65WAIT           NOT SET
 1039    REF  42  LAST  511      23,2133   0 6037 0  R61C+L03   TC     INTPRET
 1040                            23,2134    77775 1             VLOAD
 1041    REF   4  LAST  488    23,2135    06514 1                     HIUNITZ
 1042    REF  21  LAST  483    23,2136    03765 0             STORE   SCAXIS              TRACK AXIS UNIT VECTOR
 1043                          23,2137    43234 0  R61LEM1    RTB     DAD
 1044    REF  11  LAST  511    23,2140    21573 0                     LOADTIME            EXTRAPOLATE FORWARD TO CENTER
 1046    REF   1               23,2141    15712 1                     3SECONDS            SIX SECOND PERIOD.
 1047    REF  15  LAST  510    23,2142    34041 0             STCALL  TDEC1
 1048    REF   4  LAST  510    23,2143    51255 1                     LPS20.1             LOS DETERMINATION + VEH ATTITUDE
 1049                          23,2144    77775 1             VLOAD
 1050    REF   2  LAST  103    23,2145    01102 0                     RRTARGET
 1051    REF   4  LAST  431    23,2146    03773 1             STORE   POINTVSM
 1052                          23,2147    45034 1             RTB     CALL                   GET DESIRED CDU'S FOR VECPNT1
 10525   REF   1               23,2150    46277 1                     READCDUD
 1053    REF   1               23,2151    56032 0                     VECPNT1             COMPUTES FINAL ANGLES FROM PRESENT CDUDS
 1054    REF   8  LAST  477    23,2152    00322 1             STORE   CPHI                STORE FINAL ANGLES - CPHI,CTHETA,CPSI
 1055                          23,2153    77776 1             EXIT
 1056    REF  24  LAST  516    23,2154  0 5353 1             TC      PHASCHNG
 1057                          23,2155    04022 0             OCT     04022
 1058    REF  13  LAST  517    23,2156  3 4747 1             CAF     TRACKBIT              IS TRACK FLAG SET
 1059    REF  24  LAST  506    23,2157  7 0075 1             MASK    FLAGWRD1
 1060                          23,2160  0 0006 1             EXTEND
 1061    REF   2  LAST  517    23,2161  1 2271 0             BZF     R65WAIT
 1062    REF 138  LAST  516    23,2162  0 4615 1             TC      BANKCALL
 1063    REF   2  LAST  474    23,2163    54255 1             CADR    G+N,AUTO            CHECK FOR AUTO MODE
 1064    REF 164  LAST  508    23,2164 10 000 0             CCS     A
 1065    REF   1               23,2165  0 2257 0             TC      R61C+L04            NOT IN AUTO
 1072    REF  43  LAST  517    23,2166  0 6037 0             TC      INTPRET
 1073                          23,2167    45175 0             VLOAD   CALL
 1074    REF   3  LAST  518    23,2170    01102 0                     RRTARGET
 1075    REF   1               23,2171    47646 0                     CDU*SMNB
 1076                          23,2172    45345 1             DLOAD   DSU                 GET PHI - ARCCOS OF Z-COMPONENT OF LOS
 1077    REF 232  LAST  505    23,2173    00162 1                     MPAC +5
 1078    REF   1               23,2174    06275 1                     COS15DEG
 1080                          23,2175    77440 1  R61LEM2    BMN     EXIT                BRANCH - PHI > 15 DEGREES
 1082    REF   1               23,2176    46213 0                     R61C+L05            PHI GRE 10DEG
 1083    REF   9  LAST  369    E6,1635                        EBANK=  CDUXD
 1085    REF   4  LAST  293    23,2177  3 5015 0             CAF     EBANK6
 1086    REF  15  LAST  460    23,2200 54 003 0             TS      EBANK
 1087                          23,2201  0 0004 0             INHINT
 1088                          23,2202  0 0006 1             EXTEND
 1089    REF   9  LAST  518    23,2203  3 0322 1             DCA     CPHI
 1090    REF  10  LAST  518    23,2204 53'636 1             DXCH    CDUXD
 1091    REF   4  LAST  478    23,2205  3 0323 0             CA      CPSI
 1092    REF   2  LAST  369    23,2206 55'637 0             TS      CDUZD
 1093                          23,2207  0 0003 1             RELINT
 1094    REF  18  LAST  517    E7,1456                        EBANK=  LOSCOUNT
 1095    REF   2  LAST  387    23,2210  3 5016 0             CAF     EBANK7
 1096    REF  16  LAST  518    23,2211 54 003 0             TS      EBANK
 1097    REF   1               23,2212  0 2236 1             TC      R61C+L06
 1098                          23,2213    77776 1  R61C+L05   EXIT
 1099                          23,2214  0 0004 0             INHINT
 1100   REF  19  LAST  513   23,2215  0 4674 0             TC       IBNKCALL
 1101   REF   3  LAST  363   23,2216   40153 1             FCADR    ZATTEFOR
 1102   REF  20  LAST  519   23,2217  0 4674 0             TC       IBNKCALL
 1103   REF   2  LAST  513   23,2220   40140 0             FCADR    SETMINDB          REDUCE ATTITUDE ERROR
 1104   REF  47  LAST  517   23,2221  0 5516 0             TC       DOWNFLAG
 1105   REF   5  LAST  485   23,2222   00124 0             ADRES    3AXISFLG
 1106   REF  29  LAST  517   23,2223  0 5504 0             TC       UPFLAG
 1107   REF   2  LAST  475   23,2224   00077 1             ADRES    PDSPFLAG          SET PRIORITY DISPLAY FLAG
 1108   REF 139  LAST  518   23,2225  0 4616 1             TC       BANKCALL
 1109   REF   3  LAST  485   23,2226   54123 0             CADR     R60LEM
 1110                        23,2227  0 0004 0             INHINT
 1111   REF  21  LAST  519   23,2230  0 4674 0             TC       IBNKCALL
 1112   REF   5  LAST  513   23,2231   40123 0             FCADR    RESTORDB
 1113   REF  25  LAST  518   23,2232  0 5353 1             TC       PHASCHNG
 1114                        23,2233   04022 0             OCT      04022
 1115   REF  48  LAST  519   23,2234  0 5516 0             TC       DOWNFLAG
 1116   REF   3  LAST  519   23,2235   00077 1             ADRES    PDSPFLAG          RESET PRIORITY DISPLAY FLAG
 1117   REF  25  LAST  518   23,2236  3 0075 0  R61C+L06   CA       FLAGWRD1
 1118   REF   1              23,2237  7 4742 0             MASK     R61FLBIT
 1119   REF 165  LAST  518   23,2240 10 000  0             CCS      A
 1120   REF   1              23,2241  0 2262 0             TC       R61C+L4
 1123   REF   4  LAST  506   23,2242 11'745  1             CCS      R65CNTR
 1124                        23,2243  0 2245 0             TC       +2
 1125   REF   2  LAST  519   23,2244  0 2262 0             TC       R61C+L4           R65CNTR = 0 - EXIT ROUTINE
 1126   REF   5  LAST  519   23,2245 55'745  1             TS       R65CNTR
 1127   REF   1              23,2246  3 2276 0             CAF      06SEC
 1129   REF   8  LAST  503   23,2247  0 5173 1             TC       TWIDDLE
 1130   REF   1              23,2250   02252 0             ADRES    R61C+L2
 1131   REF  85  LAST  514   23,2251  0 5155 0             TC       ENDOFJOB
 1132   REF   8  LAST  511   23,2252  3 7714 1  R61C+L2    CAF      PRIO26
 1133   REF  21  LAST  511   23,2253  0 5105 0             TC       FINDVAC
 1134   REF  19  LAST  518   E7,1456                       EBANK=   LOSCOUNT
 1135   REF   2  LAST  517   23,2254   02127 1             2CADR    R61C+L01
 1135                        23,2255   46067 1
 1136   REF  22  LAST  511   23,2256  0 5261 1             TC       TASKOVER
 1137   REF 140  LAST  519   23,2257  0 4616 1  R61C+L04   TC       BANKCALL          TO CONVERT ANGLES TO FDAI
 1138   REF   4  LAST  474   23,2260   54266 1             CADR     BALLANGS
 1139   REF   2  LAST  518   23,2261  0 2236 1             TC       R61C+L06
 1140   REF   4  LAST  517   23,2262 31'143  0  R61C+L4    CAE      GENRET
 1141   REF   8  LAST  479   23,2263  1 4640 0             TCF      BANKJUMP          EXIT R61
 1142   REF   1              23,2264  3 2273 0  R61C+L1    CAF      BIT7+9PV          IS RENDEZVOUS OR P25FLAG SET
 1143   REF  36  LAST  517   23,2265  7 0074 0             MASK     STATE
 1144                        23,2266  0 0006 1             EXTEND
 1145   REF  86  LAST  519   23,2267  1 5155 1             BZF      ENDOFJOB          NO-EXIT ROUTINE AND PROGRAM.
 1146   REF   3  LAST  519   23,2270  0 2236 1             TC       R61C+L06          YES EXIT ROUTINE
 11443  REF  36  LAST  468   23,2271  0 4635 0  R65WAIT    TC       POSTJUMP
 11466  REF   5  LAST  511   23,2272   50232 1             CADR     P20LEMWT


 1147                        23,2273   00500 1  BIT7+9PV   OCT      00500
 1148                                23,2274   17350 1  COS15DEG 2DEC    0.96593 B-1
 1148                                23,2275   34602 1
 1149                                23,2276   01130 1  06SEC    DEC     600
 1150                                   0024            PHI      EQUALS  20D
 1152                                23,2277  0 0004 0  READCDUD INHINT                     READS DESIRED CDU'S AND STORES IN
 11521  REF    5  LAST  518          23,2300  3 5015 0           CAF     EBANK6             MPAC TP EXITS WITH MODE SET TO TP
 11522  REF   17  LAST  518          23,2301  56 003 1           XCH     EBANK
 11523  REF   20  LAST  258          23,2302  54 070 1           TS      RUPTREG1
 11524  REF   11  LAST  518          E6,1635                     EBANK=  CDUXD
 11525  REF   12  LAST  520          23,2303  3 1635 0           CA      CDUXD
 11526  REF  233  LAST  518          23,2304  54 154 0           TS      MPAC
 11527                               23,2305  0 0006 1           EXTEND
 11528  REF    2  LAST  369          23,2306  3 1637 1           DCA     CDUYD
 11529  REF  234  LAST  520          23,2307  52 156 1           DXCH    MPAC +1
 1153   REF   21  LAST  520          23,2310  3 0070 0           CA      RUPTREG1
 11531  REF   13  LAST  520          23,2311  54 003 0           TS      EBANK
 11532                               23,2312  0 0003 1           RELINT
 11533  REF    1                     23,2313  1 6477 1           TCF     TMODE
 1155                                   4512                     BLOCK   02
 1156   REF    1                        4000                     SETLOC  RADARFF
 1157                                   4512                     BANK

 1158   REF   20  LAST  519          E7,1456                     EBANK=  LOSCOUNT
 1159   REF    1                                                 COUNT*  $$/RRSUB
```

```
P1160   THE FOLLOWING SUBROUTINE RETURNS TO CALLER + 2 IF THE ABSOLUTE VALUE OF VALUE OF C(A) IS GREATER THAN THE
R1162   NEGATIVE OF THE NUMBER AT CALLER +1. OTHERWISE IT RETURNS TO CALLER +3. MAY BE CALLED IN RUPT OR UNDER EXEC.

 1164                         4512  0 0006 1  MAGSUB   EXTEND
 1165                         4513  6 4515 1           BZMF    +2
 1166                         4514  1 4516 0           TCF     +2
 1167                         4515  4 0000 0           COM

 1168   REF 150  LAST  516    4516  50 002 0           INDEX   Q
 1169                         4517  6 0000 1           AD      0
 1170                         4520  0 0006 1           EXTEND
 1171   REF   1               4521  5 6741 0           BZMF    Q+2                ABS(A) <= CONST   GO TO L+3
 1172   REF   3  LAST  268    4522  1 6737 0           TCF     Q+1                ABS(A) >  CONST   GO TO L+2
```

```
P1173    PROGRAM NAME_  RRLIMCHK                                                   ARE IN THE LIMITS OF THE CURRENT MODE.

R1175    FUNCTIONAL DESCRIPTION_
R1176    RRLIMCHK CHECKS RR DESIRED GIMBAL ANGLES TO SEE IF THEY ARE WITHIN
R1177    THE LIMITS OF THE CURRENT MODE. INITIALLY THE DESIRED TRUNNION AND
R1178    SHAFT ANGLES ARE STORED IN ITEMP1 AND ITEMP2. THE CURRENT RR
R1179    ANTENNAE MODE (RADMODES BIT 12) IS CHECKED WHICH IS = 0 FOR
R1180    MODE 1 AND =1 FOR MODE 2.
R1181    MODE 1 - THE TRUNNION ANGLE IS CHECKED AT MAGSUB TO SEE IF IT IS
R1182    BETWEEN -55 AND +55 DEGREES. IF NOT, RETURN TO L +2. IF WITHIN LIMITS,
R1183    THE SHAFT ANGLE IS CHECKED TO SEE IF IT IS BETWEEN -70 AND +59 DEGREES.
R1184    IF NOT, RETURN TO L +2. IF IN LIMITS, RETURN TO L +3.
R1185    MODE 2 - THE SHAFT ANGLE IS CHECKED AT MAGSUB TO SEE IF IT IS
R1186    BETWEEN -139 AND -25 DEGREES. IF NOT, RETURN TO L +2. IF WITHIN
R1187    LIMITS, THE TRUNNION ANGLE IS CHECKED TO SEE IF IT IS BETWEEN +125
R1188    AND -125 (+235) DEGREES. IF NOT, RETURN TO L +2. IF IN LIMITS, RETURN
R1189    TO L +3.

R1190    CALLING SEQUENCE:
R1191    L  TC  RRLIMCHK (WITH INTERRUPT INHIBITED)
R1192    L +1  ADRES  T,S  (DESIRED TRUNNION ANGLE ADDRESS)

R1193    ERASABLE INITIALIZATION REQUIRED:
R1194    RADMODES, MODEA, MODEB (OR DESIRED TRUNNION AND SHAFT
R1195    ANGLES ELSEWHERE IN CONSECUTIVE LOCATIONS - UNSWITCHED ERASABLE OR
R1196    CURRENT EBANK).

R1197    SUBROUTINES CALLED_  MAGSUB

R1198    JOBS OR TASKS INITIATED_  NONE

R1199    ALARMS_  NONE

R1200    EXIT_  L + 2 (EITHER OR BOTH ANGLES NOT WITHIN LIMITS OF CURRENT MODE)
R1201    L + 3 (BOTH ANGLES WITHIN LIMITS OF CURRENT MODE)

 1202                             4523  0 0006 1  RRLIMCHK EXTEND
 1203    REF 151  LAST  521       4524  5 0002 0           INDEX   Q
 1204                             4525  5 0000 1           INDEX   0
 1205                             4526  3 0001 0           DCA     0
 1206    REF 152  LAST  522       4527  24 002 0           INCR    Q
 1207    REF   6  LAST  258       4530  52 062 1           DXCH    ITEMP1
 1208    REF 153  LAST  522       4531  22 002 0           LXCH    Q              L(CALLER +2) TO L.

 1209    REF   2  LAST  323       4532  3 4740 0           CAF     ANTENBIT       SEE WHICH MODE RR IS IN.
 1210    REF  36  LAST  516       4533  7 0110 0           MASK    RADMODES
 1211    REF 166  LAST  519       4534  10 000 0           CCS     A
 1212    REF   1                  4535  1 4550 1           TCF     MODE2CHK

 1213    REF   7  LAST  522       4536  3 0061 0           CA      ITEMP1         MODE 1 IS DEFINED AS
 1214  REF   1                  4537  0 4512 0            TC      MAGSUB           1. ABS(T) L 55 DEGS.
 1215                           4540   66161 1            DEC     -.30555          2. ABS(S + 5.5 DEGS) L 64.5 DEGS
 1216  REF  63  LAST  464       4541  0 0001 0            TC      L                    (SHAFT LIMITS AT +59, -70 DEGS)

 1217  REF   1                  4542  3 4562 1            CAF     5.5DEGS
 1218  REF   3  LAST   95       4543  6 0062 0            AD      ITEMP2        S
 1219  REF   2  LAST  523       4544  0 4512 0            TC      MAGSUB
 1220                           4545   64420 0            DEC     -.35833       64.5 DEGS
 1221  REF  64  LAST  523       4546  0 0001 0            TC      L
 1222  REF   1                  4547  0 4560 0            TC      RRLIMOK       IN LIMITS.

 1223  REF   1                  4550  3 4563 0  MODE2CHK  CAF     82DEGS        MODE 2 IS DEFINED AS
 1224  REF   4  LAST  523       4551  6 0062 0            AD      ITEMP2           1. ABS(T) G 125 DEGS.
 1225  REF   3  LAST  523       4552  0 4512 0            TC      MAGSUB           2. ABS(S + 82 DEGS) L 57 DEGS
 1226                           4553   65673 0            DEC     -.31667              (SHAFT LIMITS AT -25, -139 DEGS)
 1227  REF  65  LAST  523       4554  0 0001 0            TC      L

 1228  REF   9  LAST  522       4555  3 0061 0            CA      ITEMP1
 1229  REF      LAST  523       4556  0 4512 0            TC      MAGSUB
 1230                           4557   51615 1            DEC     -.69444       125 DEGS

 1231  REF  66  LAST  523       4560  50 0001 0 RRLIMOK   INDEX   L
 1232  REF  67  LAST  522       4561  0 0001 0            TC      L             ( = TC 1)

 1233                           4562   00765 0  5.5DEGS   DEC     .03056
 1234                           4563   16450 1  82DEGS    DEC     .45556
```

```
R1235   PROGRAM NAME_  SETTRKF                                                                  . IF EITHER:

R1237   FUNCTIONAL DESCRIPTION_
R1238   SETTRKF UPDATES THE TRACKER FAIL LAMP ON THE DSKY.                                       HER THE ALT OR VEL INFORMATION.
R1240   INITIALLY THE LAMP TEST FLAG (IMODES33 BIT 1) IS CHECKED.
R1241   IF A LAMP TEST IS IN PROGRESS, THE PROGRAM EXITS TO L +1.
R1242   IF NO LAMP TEST THE FOLLOWING IS CHECKED SEQUENTIALLY_
R1243   1) RR CDU:S BEING ZEROED, RR CDU OK, AND RR NOT IN
R1244   AUTO MODE (RADMODES BITS 13, 7, 2).
R1245   2) LR VEL DATA FAIL AND NO LR POS DATA (RADMODES BITS
R1246   8,5)
R1247   3) NO RR DATA (RADMODES BIT 4)
R1248   THE ABSENCE OF ALL THREE SIMULTANEOUSLY IN (1), THE PRESENCE OF BOTH
R1249   IN (2), AND THE PRESENCE OF (3) RESULTS IN EITHER THE TRACKER FAIL
R1250   LAMP (DSPTAB +11D BIT 8) BEING TURNED ON OR LEFT ON. OTHERWISE,
R1251   THE TRACKER FAIL LAMP IS TURNED OFF OR IS LEFT OFF. THEREFORE, THE
R1252   TRACKER FAIL LAMP IS TURNED ON IF_
R1253   A) RR CDU FAILED WITH RR IN AUTO MODE AND RR CDU:S NOT BEING ZEROED.
R1254   B) N SAMPLES OF LR DATA COULD NOT BE TAKEN IN 2N TRIES WITH
R1255   EITHER THE ALT OR VEL INFORMATION
R1256   C) N SAMPLES OF RR DATA COULD NOT BE OBTAINED FROM 2N TRIES
R1257   WITH EITHER THE AL

R1258   CALLING SEQUENCE:
R1259   L  TC  SETTRKF

R1260   ERASABLE INITIALIZATION REQUIRED: IMODES33, RADMODES, DSPTAB +11D
R1261   SUBROUTINES CALLED_  NONE

R1262   JOBS OR TASKS INITIATED_  NONE

R1263   ALARMS_  TRACKER FAIL LAMP

R1264   EXIT_  L +1 (ALWAYS)                                                                    ED.

  1266  REF  25  LAST  467      4564  3 4753 1  SETTRKF  CAF     BIT1         NO ACTION IF DURING LAMP TEST.
  1267  REF  25  LAST  470      4565  7 1303 1           MASK    IMODES33
  1268  REF 167  LAST  522      4566  10 0000 0          CCS     A
  1269  REF 154  LAST  522      4567  0 0002 0           TC      Q

  1270  REF  24  LAST  334      4570  3 4744 1  RRTRKF   CA      BIT8
  1271  REF  68  LAST  523      4571  54 0001 1          TS      L

  1272  REF   1                 4572  3 4615 1           CAF     13,7,2       SEE IF CDU FAILED.
  1273  REF  37  LAST  522      4573  7 0110 0           MASK    RADMODES
  1274                          4574  0 0006 1           EXTEND
  1275  REF   1                 4575  1 4601 0           BZF     TRKFLON      CONDITION 3 ABOVE.

  1276  REF   1                 4576  3 4750 1  RRCHECK  CAF     RRDATABT     SEE IF RR DATA FAILED.
  1277  REF  38  LAST  524      4577  7 0110 0           MASK    RADMODES
```

```
 1278    REF 168  LAST  524      4600  10 000 0               CCS     A
 1279    REF  69  LAST  524      4601  3 0001 0  TRKFLON      CA      L
 1280    REF  39  LAST  471      4602  6 1036 0               AD      DSPTAB +11D     HALF ADD DESIRED AND PRESENT STATES.
 1281    REF  70  LAST  525      4603  7 0001 1               MASK    L
 1282                            4604  0 0006 1               EXTEND
 1283    REF   4  LAST  274      4605  1 6742 1               BZF     TCQ             NO CHANGE.

 1284    REF  40  LAST  525      4606  3 1036 0  FLIP         CA      DSPTAB +11D     CANT USE LXCH DSPTAB +11D (RESTART PROB)
 1285                            4607  0 0006 1               EXTEND
 1286    REF  10  LAST  259      4610  06 0001 0              RXOR    LCHAN
 1287    REF   1  LAST  432      4611  7 4733 0               MASK    POSMAX
 1288    REF  28  LAST  5        4612    4735 1               AD      BIT15
 1289    REF  41  LAST  525      4613  5 1036 1                       DSPTAB +11D
 1290    REF 155  LAST  524      4614  0 0002 0               TC      Q

 1291                            4615   10102 0  13,7,2       OCT     10102
 1292                            4616            ENDFMODF     EQUALS
```

```
P1293    PROGRAM NAME_  RRTURNON

R1294    FUNCTI NAL DESCRIPTIO _

R1295    RRTURNON IS THE TURN-ON SEQUENCE WHICH, ALONG WITH
R1296    RRZEROSB, ZEROS THE CDU:S AND DETERMINES THE RR MODE.
R1297    INITIALLY, CONTROL IS TRANSFERRED TO RRZEROSB FOR THE
R1298    ACTUAL TURN-ON SEQUENCE. UPON RETURN THE PROGRAM
R1299    WAITS 1 SECOND BEFORE REMOVING THE TURN-ON FLAG
R1300    (RADMODES BIT1) SO THE REPOSITION ROUTINE WON:T
R1301    INITIATE PROGRAM ALARM C0501. A CHECK IS THEN MADE
R1302    TO SEE IF A PROGRAM IS USING THE RR (STATE BIT 7). IF
R1303    SO, THE PROGRAM EXITS TO ENDRADAR SO THAT THE RR CDU
R1304    FAIL FLAG (RADMODES BIT 7) CAN BE CHECKED BEFORE
R1305    RETURNING TO THE WAITING PROGRAM. IF NOT, THE PROGRAM EXITS
R1306    TO TASKOVER.

R1307    CALLING SEQUENCE: WAITLIST TASK FROM RRAUTCHK IF THE RR POWER ON AUTO
R1308    BIT (CHAN 33 BIT 2) CHANGES TO 0 AND NO PROGRAM WAS USING
R1309    THE RR (STATE BIT 7).

R1310    ERASABLE INITIALIZATION REQUIRED:
R1311    RADMODES, STATE

R1312    SUBROUTINES CALLED_  RRZEROSB, FIXDELAY, TASKOVER, ENDRADAR

R1313    JOBS OR TASKS INITIATED_
R1314    NONE

R1315    ALARMS_  NONE (SEE RRZEROSB)

R1316    EXIT_  TASKOVER, ENDRADAR (WAITING PROGRAM)

 1317                                24,3255                             BANK    24
 1318    REF   1                     25,2000                             SETLOC  P20S1
 1319                                25,2062                             BANK

 1320    REF  21  LAST  520          E7,1456                             EBANK=  LOSCOUNT
 1321    REF   1                                                         COUNT*  $$/RSUB
 1322    REF   1                     25,2062  0 2071 0  RRTURNON TC      RRZEROSB
 1323    REF   3  LAST  499          25,2063  0 5221 0           TC      FIXDELAY          WAIT 1 SEC BEFORE REMOVING TURN ON FLAG
 1324                                25,2064   00144 0           DEC     100               SO A MONITOR REPOSITION WONT ALARM.
 1325    REF   1                     25,2065  4 4753 0           CS      TURNONBT
 1326    REF  39  LAST  524          25,2066  7 0110 0           MASK    RADMODES
 1327    REF  40  LAST  526          25,2067  54 110 0           TS      RADMODES
 1328    REF  23  LAST  519          25,2070  1 5261 0           TCF     TASKOVER
```

```
R1329    PROGRAM NAME_  RRZEROSB

R1330    FUNCTIONAL DESCRIPTION_
R1331    RRZEROSB IS A CLOSED SUBROUTINE TO ZERO THE RR CDU:S,
R1332    DETERMINE THE RR MODE, AND TURNS ON THE TRACKER FAIL
R1333    LAMP IF REQUIRED. INITIALLY THE RR CDU ZERO BIT (CHAN 12
R1334    BIT 1) IS SET. FOLLOWING A 20 MILLISECOND WAIT, THE LGC
R1335    RR CDU COUNTERS (OPTY, OPTX) ARE SET = 0 AFTER
R1336    WHICH THE RR CDU ZERO DISCRETE (CHAN 12 BIT 1) IS
R1337    REMOVED. A 4 SECOND WAIT IS SET TO ALL THE RR CDU:S
R1338    TO REPEAT THE ACTUAL TRUNNION AND SHAFT ANGLES. THE
R1339    RR CDU ZERO FLAG (RADMODES BIT 13) IS REMOVED. THE
R1340    CONTENTS OF OPTY IS THEN CHECKED TO SEE IF THE TRUNNION
R1341    ANGLE IS LESS THAN 90 DEGREES. IF NOT, BIT 12 OF
R1342    RADMODES IS SET = 1 TO INDICATE RR ANTENNA MODE 2.
R1343    IF LESS THAN 90 DEGREES, BIT 12 OF RADMODES IS SET = 0 TO
R1344    INDICATE RR ANTENNA MODE 1. SETTRKF IS THEN CALLED TO
R1345    SEE IF THE TRACKER FAIL LAMP SHOULD BE TURNED ON.

R1346    CALLING SEQUENCE: L   TC   RRZEROSB (FROM RRTURNON AND RRZERO)
R1347    ERASABLE INITIALIZATION REQUIRED:
R1348    RADMODES (BIT 13 SET), DSPTAB +11D

R1349    SUBROUTINES CALLED_  FIXDELAY, MAGSUB, SETTRKF

R1350    JOBS OR TASKS INITIATED_
R1351    NONE

R1352    ALARMS_  TRACKER FAIL

R1353    EXIT_  L +1 (ALWAYS)

 1354                               25,2071   0 0006 1  RRZEROSB EXTEND
 1355    REF   2  LAST  106         25,2072  23 315 1            QXCH    RRRET
 1356    REF  26  LAST  524         25,2073   3 4753 1            CAF     BIT1            BIT 13 OF RADMODES MUST BE SET BEFORE
 1357                               25,2074   0 0006 1            EXTEND                  COMING HERE.
 1358    REF  27  LAST  516         25,2075  05 012 1             WOR     CHAN12          TURN ON ZERO RR CDU
 1359    REF   4  LAST  526         25,2076   0 5221 0            TC      FIXDELAY
 1360                               25,2077    00002 0            DEC     2

 1361    REF 113  LAST  514         25,2100   3 4755 1            CAF     ZERO
 1362    REF   5  LAST  513         25,2101  54 035 0             TS      COUT
 1363    REF   4  LAST  316         25,2102  54 036 0             TS      CDUS
 1364    REF  63  LAST  507         25,2103   4 4753 0            CS      ONE             REMOVE ZEROING BIT.
 1365                               25,2104   0 0006 1            EXTEND
 1366    REF  28  LAST  527         25,2105  03 012 1             WAND    CHAN12
 1367    REF   5  LAST  527         25,2106   0 5221 0            TC      FIXDELAY
 1368                               25,2107    01750 1            DEC     1000            RESET FAIL INHIBIT IN 10 SECS - D.281

 1369    REF   3  LAST  505         25,2110   4 4737 1            CS      RCDU0BIT        REMOVE ZEROING IN PROCESS BIT.
 1370   REF  41  LAST  526   25,2111  7 0110 0            MASK    RADMODES
 1371   REF  42  LAST  528   25,2112  54 110 0            TS      RADMODES

 1372   REF   6  LAST  527   25,2113  3 0035 1            CA      CDUT
 1373   REF   5  LAST  523   25,2114  0 4512 0            TC      MAGSUB
 1374                        25,2115   57777 1            DEC     -.5
 1375                        25,2116  1 2121 0            TCF     +3               IF MODE 2.

 1376   REF 114  LAST  527   25,2117  3 4755 1            CAF     ZERO
 1377                        25,2120  1 2122 0            TCF     +2
 1378   REF   3  LAST  522   25,2121  3 4740 0            CAF     ANTENBIT
 1379   REF  43  LAST  528   25,2122  56 110 1            XCH     RADMODES
 1380   REF   1              25,2123  7 7741 0            MASK    -BIT12
 1381   REF  44  LAST  528   25,2124  26 110 0            ADS     RADMODES

 1382   REF   2  LAST  185   25,2125  0 4564 1            TC      SETTRKF          TRACKER LAMP MIGHT GO ON NOW.

 1383   REF   3  LAST  527   25,2126  0 1315 1            TC      RRRET            DONE.

 1384   REF   1                 7741           -BIT12     EQUALS  -1/8             IN SPROOT
```

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R1385   PROGRAM NAME_  DORREPOS
R1386   FUNCTIONAL DESCRIPTION_
R1387   DORREPOS IS A SEQUENCE OF TASKS TO DRIVE THE RENDEZVOUS RADAR
R1388   TO A SAFE POSITION. INITIALLY SETRRECR IS CALLED WHERE THE RR
R1389   ERROR COUNTERS (CHAN 12 BIT 2) ARE ENABLED AND LASTYCMD
R1390   AND LASTXCMD SET = 0 TO INDICATE THE DIFFERENCE BETWEEN THE
R1391   DESIRED STATE AND PRESENT STATE OF THE COMMANDS. THE RR
R1392   TURN-ON FLAG (RADMODES BIT 1) IS CHECKED AND IF NOT PRESENT,
R1393   PROGRAM ALARM 00501 IS REQUESTED BEFORE CONTINUING. IN EITHER
R1394   CASE, FOLLOWING A 20 MILLISECOND WAIT THE PROGRAM CHECKS THE CURRENT
R1395   RR ANTENNA MODE (RADMODES BIT 12). RRTONLY IS THEN CALLED
R1396   TO DRIVE THE TRUNNION ANGLE TO 0 DEGREES IF IN MODE 1 AND TO 180
R1397   DEGREES IF IN MODE 2. UPON RETURN, THE CURRENT RR ANTENNA
R1398   MODE (RADMODES BIT 12) IS AGAIN CHECKED. RRSONLY IS THEN
R1399   CALLED TO DRIVE THE SHAFT ANGLE TO 0 DEGREES IF IN MODE 1 AND TO
R1400   -90 DEGREES IF IN MODE 2. IF DURING RRTONLY OR RRSONLY A
R1401   REMODE HAS BEEN REQUESTED (RADMODES BIT 14), AND ALWAYS
R1402   FOLLOWING COMPLETION OF RRSONLY, CONTROL IS TRANSFERRED TO
R1403   REPOSRPT. HERE THE REPOSITION FLAG (RADMODES BIT 11) IS
R1404   REMOVED. A CHECK IS THEN MADE ON THE DESIGNATE FLAG (RADMODES
R1405   BIT 10). IF PRESENT, CONTROL IS TRANSFERRED TO BEGDES. IF NOT PRESENT
R1406   INDICATING NO FURTHER ANTENNA CONTROL REQUIRED, THE RR ERROR
R1407   COUNTER BIT (CHAN 12 BIT 2) IS REMOVED AND THE ROUTINE EXITS TO
R1408   TASKOVER.

R1409   CALLING SEQUENCE:
R1410   WAITLIST CALL FROM RRGIMON IF TRUNNION AND SHAFT CDU ANGLES
R1411   NOT WITHIN LIMITS OF CURRENT MODE.

R1412   ERASABLE INITIALIZATION REQUIRED:
R1413   RADMODES

R1414   SUBROUTINES CALLED_
R1415   RRTONLY, RRSONLY, BEGDES (EXIT)

R1416   JOBS OR TASKS INITIATED_
R1417   NONE

R1418   ALARMS-  NONE

R1419   EXIT_  TASKOVER, BEGDES

 1420   REF   1               25,2127  0 2156 1  DORREPOS TC     SETRRECR        SET UP RR CDU ERROR COUNTERS.

R1421   ALARM 501 DELETED IN DANCE 279 PER PCR 97.

 1422   REF   6  LAST  527    25,2130  0 5221 0           TC     FIXDELAY
 1423                         25,2131   00002 0           DEC    2

 1424   REF   4  LAST  528    25,2132  3 4740 0           CAF    ANTENBIT        MANEUVER TRUNNION ANGLE TO NOMINAL POS.
 1425  REF  45  LAST  528   25,2133  7 0110 0            MASK    RADMODES
 1426  REF 169  LAST  525   25,2134  10 000 0            CCS     A
 1427  REF  29  LAST  525   25,2135  3 4735 1            CAF     BIT15       0 FOR MODE 1 AND 180 FOR MODE 2.
 1428  REF   1              25,2136  0 2241 1            TC      RRTONLY

 1429  REF   5  LAST  529   25,2137  3 4740 0            CAF     ANTENBIT    NOW PUT SHAFT IN RIGHT POSITION
 1430  REF  46  LAST  530   25,2140  7 0110 0            MASK    RADMODES
 1431  REF 170  LAST  530   25,2141  10 000 0            CCS     A
 1432  REF   5  LAST  508   25,2142  4 4736 0            CS      HALF        -90 FOR MODE 2.
 1433  REF   1              25,2143  0 2244 1            TC      RRSONLY

 1434  REF   2  LAST  187   25,2144  4 4741 0  REPOSRPT  CS      REPOSBIT    RETURNS HERE FROM RR1AXIS IF REMODE
A1435                                                                        REQUESTED DURING REPOSITION.
 1436  REF  47  LAST  530   25,2145  7 0110 0            MASK    RADMODES    REMOVE REPOSITION BIT.
 1437  REF  48  LAST  530   25,2146  54 110 0            TS      RADMODES
 1438  REF   1              25,2147  7 4742 0            MASK    DESIGBIT    SEE IF SOMEONE IS WAITING TO DESIGNATE.
 1439  REF 171  LAST  530   25,2150  10 000 0            CCS     A
 1440  REF   2  LAST  510   25,2151  1 2573 0            TCF     BEGDES
 1441  REF  29  LAST  516   25,2152  4 4752 1            CS      BIT2        IF NO FURTHER ANTENNA CONTROL REQUIRED,
 1442                       25,2153  0 0006 1            EXTEND              REMOVE ERROR COUNTER ENABLE.
 1443  REF  29  LAST  527   25,2154  03 012 1            WAND    CHAN12
 1444  REF  24  LAST  526   25,2155  1 5261 0            TCF     TASKOVER

 1445  REF  30  LAST  530   25,2156  3 4752 0  SETRRECR  CAF     BIT2        SET UP RR ERROR COUNTERS.
 1446                       25,2157  0 0006 1            EXTEND
 1447  REF  30  LAST  530   25,2160  02 012 0            RAND    CHAN12
 1448  REF 172  LAST  530   25,2161  10 000 0            CCS     A           DO NOT CLEAR LAST COMMAND IF
 1449  REF 156  LAST  525   25,2162  0 0002 0            TC      Q           ERROR COUNTERS ARE ENABLED.

 1450  REF   7  LAST  202   25,2163  54 112 1            TS      LASTYCMD
 1451  REF   1              25,2164  54 113 0            TS      LASTXCMD
 1452  REF  31  LAST  530   25,2165  3 4752 0            CAF     BIT2
 1453                       25,2166  0 0006 1            EXTEND
 1454  REF  31  LAST  530   25,2167  05 012 1            WOR     CHAN12      ENABLE RR CDU ERROR COUNTERS.
 1455  REF 157  LAST  530   25,2170  0 0002 0            TC      Q
```

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P1456    PROGRAM NAME_  REMODE                                                             IVES SHAFT TO -45, AND FINALLY DRIVES

R1458    FUNCTIONAL DESCRIPTION_                                                           S DONE WITH SINGLE AXIS ROTATIONS (SEE
R1460    REMODE IS THE GENERAL REMODING SUBROUTINE. IT DRIVES THE
R1461    TRUNNION ANGLE TO 0 DEGREES IF THE CURRENT MODE IS MODE 1,
R1462    180 DEGREES FOR MODE 2, THEN DRIVES THE SHAFT ANGLE TO -45
R1463    DEGREES, AND FINALLY DRIVES THE TRUNNION ANGLE TO -130 DEGREES,
R1464    TO PLACE THE RR IN MODE 2, -50 DEGREES FOR MODE 1, BEFORE
R1465    INITIATING 2-AXIS CONTROL. ALL REMODING IS DONE WITH SINGLE
R1466    AXIS ROTATIONS (RR1AXIS). INITIALLY THE RR ANTENNA MODE FLAG
R1467    (RADMODES BIT 12) IS CHECKED. CONTROL IS THEN TRANSFERRED TO
R1468    RRTONLY TO DRIVE THE TRUNNION ANGLE TO 0 DEGREES IF IN MODE 1
R1469    OR 180 DEGREES IF IN MODE 2. RRSONLY IS THEN CALLED TO DRIVE
R1470    THE SHAFT ANGLE TO -45 DEGREES. THE RR ANTENNA MODE FLAG
R1471    (RADMODES BIT 12) IS CHECKED AGAIN. CONTROL IS AGAIN
R1472    TRANSFERRED TO RRTONLY TO DRIVE THE TRUNNION ANGLE TO -130
R1473    DEGREES TO PLACE THE RR IN MODE 2 IF CURRENTLY IN MODE 1 OR TO
R1474    -50 DEGREES IF IN MODE 2 TO PLACE THE RR IN MODE 1. RMODINV
R1475    IS THEN CALLED TO SET RADMODES BIT 12 TO INDICATE THE NEW
R1476    RR ANTENNA MODE. THE REMODE FLAG (RADMODES BIT 14)
R1477    IS REMOVED TO INDICATE THAT REMODING IS COMPLETE. THE PROGRAM
R1478    THEN EXITS TO STDESIG TO BEGIN 2-AXIS CONTROL.

R1479    CALLING SEQUENCE:
R1480    FROM BEGDES WHEN REMODE FLAG (RADMODES BIT 14) IS SET.
R1481    THIS FLAG MAY BE SET IN RRDESSM AND RRDESNB IF RRLIMCHK
R1482    DETERMINES THAT THE DESIRED ANGLES ARE WITHIN THE LIMITS OF THE
R1483    OTHER MODE.

R1484    ERASABLE INITIALIZATION REQUIRED:
R1485    RADMODES

R1486    SUBROUTINES CALLED_
R1487    RRTONLY, RRSONLY, RMODINV (ACTUALLY PART OF)

R1488    JOBS OR TASKS INITIATED_
R1489    NONE

R1490    ALARMS_  NONE

R1491    EXIT_  STDESIG

 1492    REF    6  LAST  530    25,2171  3 4740 0  REMODE    CAF     ANTENBIT           DRIVE TRUNNION TO 0 (180)
 1493    REF   49  LAST  530    25,2172  7 0110 0            MASK    RADMODES           (ERROR COUNTER ALREADY ENABLED)
 1494    REF  173  LAST  530    25,2173  10 000 0            CCS     A
 1495    REF   30  LAST  530    25,2174  3 4735 1            CAF     BIT15
 1496    REF    2  LAST  530    25,2175  0 2241 1            TC      RRTONLY

 1497    REF    1               25,2176  3 7740 0            CAF     -45DEGSR
 1498    REF    2  LAST  530    25,2177  0 2244 1            TC      RRSONLY
 1499   REF  50  LAST  531   25,2200  4 0110 0            CS      RADMODES
 1500   REF   7  LAST  531   25,2201  7 4740 1            MASK    ANTENBIT
 1501   REF 174  LAST  531   25,2202  10 000 0            CCS     A
 1502   REF   1              25,2203  3 2232 0            CAF     -80DEGSR        GO TO T = -130 (-50).
 1503   REF   1              25,2204  6 2231 0            AD      -50DEGSR
 1504   REF   3  LAST  531   25,2205  0 2241 1            TC      RRTONLY

 1505   REF  51  LAST  532   25,2206  4 0110 0            CS      RADMODES
 1506   REF   8  LAST  532   25,2207  7 4740 1            MASK    ANTENBIT
 1507   REF 175  LAST  532   25,2210  10 000 0            CCS     A
 1508   REF  31  LAST  531   25,2211  3 4735 1            CAF     BIT15           GO TO T = -180 (+0).
 1509   REF   4  LAST  532   25,2212  0 2241 1            TC      RRTONLY

 1510   REF  52  LAST  532   25,2213  4 0110 0            CS      RADMODES        GO TO S = -90 (+0).
 1511   REF   9  LAST  532   25,2214  7 4740 1            MASK    ANTENBIT
 1512   REF 176  LAST  532   25,2215  10 000 0            CCS     A
 1513   REF   6  LAST  530   25,2216  4 4736 0            CS      HALF
 1514   REF   3  LAST  531   25,2217  0 2244 1            TC      RRSONLY

 1515   REF   1              25,2220  0 2233 1            TC      RMODINV

 1516   REF   1              25,2221  4 4736 0            CS      REMODBIT        END OF REMODE.
 1517   REF  53  LAST  532   25,2222  7 0110 0            MASK    RADMODES
 1518   REF  54  LAST  532   25,2223  54 110 0            TS      RADMODES

 1519   REF   2  LAST  530   25,2224  3 4742 1            CAF     DESIGBIT        WAS REMODE CALLED DURING DESIGNATE?
 1520   REF  55  LAST  532   25,2225  7 0110 0            MASK    RADMODES        (BIT10 RADMODES = 1)
 1521                         25,2226  0 0006 1            EXTEND
 1522   REF   1              25,2227  1 3555 0            BZF     RGOODEND        NO-RETURN TO CALLER WAITING IN RADSTALL
 1523   REF   2  LAST  511   25,2230  0 2602 1            TC      STDESIG         YES - RETURN TO DESIGNATE
 1524   REF   2  LAST  282      7740          -45DEGSR    =       13,14,15
 1525                        25,2231   67070 1 -50DEGSR   DEC     -.27778
 1526                        25,2232   61615 1 -80DEGSR   DEC     -.44444

 1527   REF  56  LAST  532   25,2233  22 110 1 RMODINV    LXCH    RADMODES        INVERT THE MODE STATUS.
 1528   REF  10  LAST  532   25,2234  3 4740 0            CAF     ANTENBIT
 1529                        25,2235  0 0006 1            EXTEND
 1530   REF  11  LAST  525   25,2236  06 001 0            RXOR    LCHAN
 1531   REF  57  LAST  532   25,2237  54 110 0            TS      RADMODES
 1532   REF 158  LAST  530   25,2240  0 0002 0            TC      Q
```

```
P1533    PROGRAM NAMES_  RRTONLY, RRSONLY

R1534    FUNCTIONAL DESCRIPTION_
R1535    RRTONLY AND RRSONLY ARE SUBROUTINES FOR DOING SINGLE AXIS
R1536    RR MANEUVERS FOR REMODE AND REPOSITION. IT DRIVES TO
R1537    WITHIN 1 DEGREE. INITIALLY, AT RR1AX2, THE REMODE AND REPOSITION
R1538    FLAGS (RADMODES BITS 14, 11) ARE CHECKED. IF BOTH EXIST,
R1539    THE PROGRAM EXITS TO REPOSRPT (SEE DORREPOS). THIS INDICATES
R1540    THAT SOMEONE POSSIBLY REQUESTED A DESIGNATE (RADMODES BIT 10)
R1541    WHICH REQUIRES A REMODE (RADMODES BIT 14) AND THAT A
R1542    REPOSITION IS IN P-OGRESS (RADMODES BIT 11). IF NONE
R1543    OR ONLY ONE OF THE FLAGS EXIST, REMODE OR REPOSITION, MAGSUB
R1544    IS CALLED TO SEE IF THE APPROPRIATE ANGLE IS WITHIN 1 DEGREE. IF YES,
R1545    CONTROL RETURNS TO THE CALLING ROUTINE. IF NOT, CONTROL IS
R1546    TRANSFERRED TO RROUT FOR SINGLE AXIS MANEUVERS WITH THE OTHER
R1547    ANGLE SET = 0. FOLLOWING A .5 SECOND WAIT, THE ABOVE PROCEDURE IS
R1548    REPEATED.

R1549    CALLING SEQUENCE: L-1 CAF *ANGLE*  (DESIRED ANGLE SCALED PI)
R1550    L  TC  RRTONLY (TRUNNION ONLY)
R1551    RRSONLY (SHAFT ONLY)
R1552    RRTONLY IS CALLED BY PREPOS29;
R1553    RRTONLY AND RRSONLY ARE CALLED BY DORREPOS AND REMODE

R1554    ERASABLE INITIALIZATION REQUIRED:
R1555    C(A) = DESIRED ANGLE, RADMODES

R1556    SUBROUTINES CALLED_
R1557    FIXDELAY, REPOSRPT, MAGSUB, RROUT

R1558    JOBS OR TASKS INITIATED_
R1559    NONE

R1560    ALARMS_  NONE

R1561    EXIT_  REPOSRPT (REMODE AND REPOSITION FLAGS PRESENT - RADMODES
R1562    BITS 14, 11)
R1563    L+1  (ANGLE WITHIN ONE DEGREE OR RR OUT OF AUTO MODE)

 1564    REF   2  LAST  106    25,2241  55'316 0  RRTONLY   TS      RDES             DESIRED TRUNION ANGLE.
 1565    REF 115  LAST  528    25,2242  3 4755 1            CAF     ZERO
 1566    REF   1               25,2243  1 2246 1            TCF     RR1AXIS

 1567    REF   3  LAST  533    25,2244  55'316 0  RRSONLY   TS      RDES             SHAFT COMMANDS ARE UNRESOLVED SINCE THIS
 1568    REF  64  LAST  527    25,2245  3 4753 1            CAF     ONE              ROUTINE ENTERED ONLY WHEN T = 0 OR 180.

 1569    REF   1               25,2246  55'317 1  RR1AXIS   TS      RRINDEX
 1570                          25,2247  0 0006 1            EXTEND
 1571    REF   4  LAST  528    25,2250  23'315 1            QXCH    RRRET
 1572    REF   1               25,2251  1 2254 1            TCF     RR1AX2
 1573   REF    7  LAST   529    25,2252   0 5221 0  NXTRR1AX TC       FIXDELAY
 1574                           25,2253    00062 0           DEC      50                2 SAMPLES PER SECOND.

 1575   REF   58  LAST   532    25,2254   4 0110 0  RR1AX2   CS       RADMODES          IF SOMEONE REQUESTES AS DESIGNATE WHICH
 1576   REF    2  LAST   290    25,2255   7 7710 1           MASK     PRIO22            REQUIRES A REMODE AND A REPOSITION IS IN
 1577                           25,2256   0 0006 1           EXTEND                     PROGRESS, INTERRUPT IT AND START THE
 1578   REF    1                25,2257   1 2144 0           BZF      REPOSRPT          REMODE IMMEDIATELY.

 1579   REF    4  LAST   533    25,2260   3 1316 1           CA       RDES
 1580                           25,2261   0 0006 1           EXTEND
 1581   REF    2  LAST   533    25,2262   5 1317 0           INDEX    RRINDEX
 1582   REF    7  LAST   522    25,2263  20 035  0           MSU      CDUT
 1583   REF    9  LAST   523    25,2264  54 061  1           TS       ITEMP1            SAVE ERROR SIGNAL.
 1584                           25,2265   0 0006 1           EXTEND
 1585   REF    1                25,2266   7 2305 1           MP       RRSPGAIN          TRIES TO NULL .7 OF ERROR OVER NEXT .5
 1586   REF   71  LAST   525    25,2267  54 001  1           TS       L
 1587   REF   59  LAST   534    25,2270   3 0110 1           CA       RADMODES
 1588   REF    3  LAST   184    25,2271   7 4752 1           MASK     AUTOMBIT
 1589   REF   10  LAST   534    25,2272  56 061  0           XCH      ITEMP1            STORE RR-OUT-OF-AUTO-MODE BIT.
 1590   REF    6  LAST   528    25,2273   0 4512 0           TC       MAGSUB            SEE IF WITHIN ONE DEGREE.
 1591                           25,2274    77644 1           DEC      -.00555           SCALED IN HALF-REVS.

 1592   REF   11  LAST   534    25,2275  10 061  1           CCS      ITEMP1            NO.  IF RR OUT OF AUTO MODE, EXIT.
 1593   REF    5  LAST   533    25,2276   0 1315 1           TC       RRRET             RETURN TO CALLER.

 1594   REF    3  LAST   534    25,2277  11 317  1           CCS      RRINDEX           COMMAND FOR OTHER AXIS IS ZERO.
 1595                           25,2300   1 2302 0           TCF      +2                SETTING A TO 0.
 1596   REF   72  LAST   534    25,2301  56 001  0           XCH      L
 1597   REF    8  LAST   508    25,2302  53 110  1           DXCH     TANG

 1598   REF    1                25,2303   0 2306 0           TC       RROUT

 1599   REF    1                25,2304   1 2252 1           TCF      NXTRR1AX          COME BACK IN .5 SECONDS.

 1600                           25,2305    22715 1  RRSPGAIN DEC      .59062            NULL .7 ERROR IN .5 SEC.
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P1601   PROGRAM NAME_  RROUT                                                          RROR COUNTER SCALING. RROUT LIMITS THEM

R1603   FUNCTIONAL DESCRIPTION_
R1604   RROUT RECEIVES RR GYRO COMMANDS IN TANG, TANG +1 IN RR
R1605   ERROR COUNTER SCALING. RROUT THEN LIMITS THEM AND
R1606   GENERATES COMMANDS TO THE CDU TO ADJUST THE ERROR COUNTERS
R1607   TO THE DESIRED VALUES. INITIALLY MAGSUB CHECKS THE MAGNITUDE OF
R1608   THE COMMAND (SHAFT ON 1ST PASS) TO SEE IF IT IS GREATER THAN
R1609   384 PULSES. IF NOT, CONTROL IS TRANSFERRED TO RROUTLIM TO
R1610   LIMIT THE COMMAND TO +384 OR -384 PULSES. THE DIFFERENCE IS
R1611   THEN CALCULATED BETWEEN THE DESIRED STATE AND THE PRESENT STATE OF
R1612   THE ERROR COUNTER AS RECORDED IN LASTYCMD AND LASTXCMD.
R1613   THE RESULT IS STORED IN OPTXCMD (1ST PASS) AND OPTYCMD (2ND
R1614   PASS). FOLLOWING THE SECOND PASS, FOR THE TRUNNION COMMAND, THE
R1615   OCDUT AND OCDUS ERROR COUNTER DRIVE BITS (CHAN 14 BITS 12, 11)
R1616   ARE SET. THIS PROGRAM THEN EXITS TO THE CALLING PROGRAM.

R1617   CALLING SEQUENCE:
R1618   L TC RROUT (WITH RUPT INHIBITED) RROUT IS CALLED BY
R1619   RRTONLY, RRSONLY, AND DCDES

R1620   ERASABLE INITIALIZATION REQUIRED:
R1621   TANG, TANG +1 (DESIRED COMMANDS), LASTYCMD, LASTXCMD
R1622   (1ST PASS = 0), RR ERROR COUNTER ENABLE SET (CHAN 12 BIT 2).

R1623   SUBROUTINES CALLED_
R1624   MAGSUB

R1625   JOBS OR TASKS INITIATED_
R1626   NONE

R1627   ALARMS_  NONE

R1628   EXIT_  L+1 (ALWAYS)                                                           SIRED VALUES. RUPT MUST BE INHIBITED.

 1630   REF 159  LAST  532    25,2306  22 002 0  RROUT     LXCH    Q                  SAVE RETURN.
 1631   REF  65  LAST  533    25,2307  3 4753 1            CAF     ONE                LOOP TWICE.
 1632   REF   5  LAST  523    25,2310  54 062 1  RROUT2    TS      ITEMP2
 1633   REF 177  LAST  532    25,2311  50 000 1            INDEX   A
 1634   REF   9  LAST  534    25,2312  3 1107 0            CA      TANG
 1635   REF  12  LAST  534    25,2313  54 061 1            TS      ITEMP1             SAVE SIGN OF COMMAND FOR LIMITING.

 1636   REF   7  LAST  534    25,2314  0 4512 0            TC      MAGSUB             SEE IF WITHIN LMITS.
 1637                         25,2315   77177 0  -RRLIMIT  DEC     -384
 1638   REF   1               25,2316  1 2335 1            TCF     RROUTLIM           LIMIT COMMAND TO MAG OF 384.

 1639   REF  13  LAST  535    25,2317  3 0061 0  SETRRCTR  CA      ITEMP1             COUNT OUT DIFFERENCE BETWEEN DESIRED
 1640   REF   6  LAST  535    25,2320  50 062 0            INDEX   ITEMP2             STATE AND PRESENT STATE AS RECORDED IN
 1641   REF   8  LAST  530    25,2321  56 112 0            XCH     LASTYCMD           LASTYCMD AND LASTXCMD
 1642                         25,2322  4 0000 0            COM
 1643   REF  14  LAST  535   25,2323  6 0061 0             AD      ITEMP1
 1644   REF   9  LAST  231   25,2324  6 4754 0             AD      NEGO                PREVENT +0 IN OUTCOUNTER
 1645   REF   7  LAST  535   25,2325  50 062 0             INDEX   ITEMP2
 1646   REF   1              25,2326  54 053 0             TS      CDUTCMD

 1647   REF   8  LAST  536   25,2327  10 062 1             CCS     ITEMP2              PROCESS BOTH INPUTS.
 1648   REF   1              25,2330  1 2310 0             TCF     RROUT2

 1649   REF   1              25,2331  3 5620 0             CAF     PRIO6               ENABLE COUNTERS.
 1650                        25,2332  0 0006 1             EXTEND
 1651   REF   7  LAST  282   25,2333  05 014 1             WOR     CHAN14              PUT ON CDU DRIVES S AND T
 1652   REF  73  LAST  534   25,2334  0 0001 0             TC      L                   RETURN.

 1653   REF  15  LAST  536   25,2335  10 061 1  RROUTLIM   CCS     ITEMP1              LIMIT COMMAND TO ABS VAL OF 384.
 1654   REF   1              25,2336  4 2315 0             CS      -RRLIMIT
 1655                        25,2337  1 2341 1             TCF     +2
 1656   REF   2  LAST  536   25,2340  3 2315 1             CA      -RRLIMIT
 1657   REF  16  LAST  536   25,2341  54 061 1             TS      ITEMP1
 1658   REF   1              25,2342  1 2320 0             TCF     SETRRCTR +1
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P1659            ROUTINE TO ZERO THE RR CDUS AND DETERMINE THE ANTENNA MODE.

 1660   REF   1              25,2343  3 2372 0  RRZERO   CAF      BIT11+1          SEE IF MONITOR REPOSITION OR NOT IN AUTO
 1661   REF  60  LAST  534   25,2344  7 0110 0           MASK     RADMODES         IF SO, DONT RE-ZERO CDUS.
 1662   REF 173  LAST  535   25,2345 10 000  0           CCS      A
 1663   REF   1              25,2346  1 3530 0           TCF      RADNOOP          (IMMEDIATE TASK TO RGOODEND).

 1664                        25,2347  0 0004 0           INHINT
 1665   REF   4  LAST  527   25,2350  4 4737 1           CS       RCDU0BIT         SET FLAG TO SHOW ZEROING IN PROGRESS.
 1666   REF  61  LAST  537   25,2351  7 0110 0           MASK     RADMODES
 1667   REF   5  LAST  537   25,2352  6 4737 0           AD       RCDU0BIT
 1668   REF  62  LAST  537   25,2353 54 110  0           TS       RADMODES

 1669   REF  66  LAST  535   25,2354  3 4753 1           CAF      ONE
 1670   REF  20  LAST  490   25,2355  0 5203 0           TC       WAITLIST
 1671   REF  22  LAST  526   E7,1456                     EBANK=   LOSCOUNT
 1672   REF   1              25,2356   02370 1           2CADR    RRZ2
 1672   REF   1              25,2357   52067 1

 1673   REF  63  LAST  537   25,2360  4 0110 0           CS       RADMODES         SEE IF IN AUTO MODE.
 1674   REF   4  LAST  534   25,2361  7 4752 1           MASK     AUTOMBIT
 1675   REF 179  LAST  537   25,2362 10 000  0           CCS      A
 1676   REF   1              25,2363  1 2366 1           TCF      ROADBACK
 1677   REF  21  LAST  388   25,2364  0 5567 0           TC       ALARM            AUTO DISCRETE NOT PRESENT - TRYING
 1678                        25,2365   00510 0           OCT      510
 1679                        25,2366  0 0003 1  ROADBACK RELINT
 1680   REF   3  LAST  328   25,2367  1 4631 0           TCF      SWRETURN

 1681   REF   2  LAST  526   25,2370  0 2071 0  RRZ2     TC       RRZEROSB         COMMON TO TURNON AND RRZERO.
 1682   REF   1              25,2371  1 3546 1           TCF      ENDRADAR

 1683                        25,2372   02001 1  BIT11+1  OCT      02001
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P1684    PROGRAM NAME_  RRDESSM                                                  R (HALF-UNIT) IN RRTARGET. REMODES IF

R1686    FUNCTIONAL DESCRIPTION_
R1687    THIS INTERPRETIVE ROUTINE WILL DESIGNATE, IF DESIRED ANGLES ARE
R1688    WITHIN THE LIMITS OF EITHER MODE, TO A LINE-OF SIGHT (LOS) VECTOR
R1689    (HALF-UNIT) KNOWN WITH RESPECT TO THE STABLE MEMBER PRESENT
R1690    ORIENTATION. INITIALLY THE IMU CDU:S ARE READ AND CONTROL
R1691    TRANSFERRED TO SMNB TO TRANSFORM THE LOS VECTOR FROM STABLE
R1692    MEMBER TO NAVIGATION BASE COORDINATES (SEE STG MEMO ¬699)
R1693    RRANGLES IS THEN CALLED TO CALCULATE THE RR GIMBAL ANGLES,
R1694    TRUNNION AND SHAFT, FOR BOTH THE PRESENT AND ALTERNATE MODE.
R1695    RRLIMCHK IS CALLED TO SEE IF THE ANGLES CALCULATED FOR THE
R1696    PRESENT MODE ARE WITHIN LIMITS. IF WITHIN LIMITS, THE RETURN
R1697    LOCATION IS INCREMENTED, INASMUCH AS NO VEHICLE MANEUVER IS
R1698    REQUIRED, BEFORE EXITING TO STARTDES. IF NOT WITHIN LIMITS OF THE
R1699    CURRENT MODE, TRYSWS IS CALLED. FOLLOWING INVERTING OF THE RR
R1700    ANTENNA MODE FLAG (RADMODES BIT 12), RRLIMCHK IS CALLED
R1701    TO SEE IF THE ANGLES CALCULATED FOR THE ALTERNATE MODE ARE WITHIN
R1702    LIMITS. IF YES, THE RR ANTENNA MODE FLAG IS AGAIN INVERTED,
R1703    THE REMODE FLAG (RADMODES BIT 14) SET, AND THE RETURN LOCATION
R1704    INCREMENTED, TO INDICATE NO VEHICLE MANEUVER IS REQUIRED, BEFORE
R1705    EXITING TO STARTDES. IF THESE ANGLES ARE NOT WITHIN LIMITS
R1706    OF THE ALTERNATE MODE, THE RR ANTENNA MODE FLAG (RADMODES
R1707    BIT 12) IS INVERTED BEFORE RETURNING DIRECTLY TO THE CALLING PROGRAM
R1708    TO INDICATE THAT A VEHICLE MANEUVER IS REQUIRED.

R1709    CALLING SEQUENCE:
R1710    L   STCALL   RRTARGET  (LOS HALF-UNIT VECTOR IN SM COORDINATES)
R1711    L+1  RRDESSM
R1712    L+2  BASIC  (VEHICLE MANEUVER REQUIRED)
R1713    L+3  BASIC  (NO VEHICLE MANEUVER REQUIRED)

R1714    ERASABLE INITIALIZATION REQUIRED:
R1715    RRTARGET, RADMODES

R1716    SUBROUTINES CALLED_
R1717    READCDUS, SMNB, RRANGLES, RRLIMCHK, TRYSWS (ACTUALLY
R1718    PART OF), RMODINV

R1719    JOBS OR TASKS INITIATED_
R1720    NONE

R1721    ALARMS_  NONE

R1722    EXIT_  L+2 (NEITHER SET OF ANGLES ARE WITHIN LIMITS OF RELATED MODE)
R1723    STARTDES (DESIGNATE POSSIBLE AT PRESENT VEHICLE ATTITUDE-RETURNS
R1724    TO L+3 FROM STARTDES)                                                   CAN BE DONE IN PRESENT VEH ATTITUDE.

 1726                         25,2373   43020 1  RRDESSM  STQ     CLEAR
 1727    REF   4  LAST  271   25,2374   01113 0                   DESRET
 1728   REF   1                25,2375   00271 0                      RRNBSW
 1729                          25,2376   77624 1            CALL                  COMPUTES SINES AND COSINES, ORDER Y Z X
 1730   REF   2  LAST  487     25,2377   47537 0                      CDUTRIG
 1731                          25,2400   45175 0            VLOAD     CALL        LOAD VECTOR AND CALL TRANSFORMATION
 1732   REF   4  LAST  518     25,2401   01102 0                      RRTARGET
 1733   REF   2  LAST  487     25,2402   47671 1                      *SMNB*

 1734                          25,2403   77624 1            CALL                  GET RR GIMBAL ANGLES IN PRESENT AND
 1735   REF   1                25,2404   26133 1                      RRANGLES    ALTERNATE MODE.
 1736                          25,2405   77776 1            EXIT

 1737                          25,2406  0 0004 0            INHINT
 1738   REF   3  LAST  513     25,2407  0 4523 1            TC        RRLIMCHK
 1739   REF   4  LAST  323     25,2410   01107 0            ADRES     MODEA       CONFIGURATION FOR CURRENT MODE.
 1740                          25,2411  0 2414 1            TC        +3          NOT IN CURRENT MODE
 1741   REF   5  LAST  538     25,2412  25'113 0  OKDESSM   INCR      DESRET      INCREMENT SAYS NO VEHICLE MANEUVER REQ.
 1742   REF   1                25,2413  0 2432 0            TC        STARTDES    SHOW DESIGNATE REQUIRED
 1743   REF   5  LAST  507     25,2414  4 0104 0            CS        FLAGWRD8
 1744   REF   4  LAST  507     25,2415  7 4744 0            MASK      SURFFBIT    CHECK IF ON LUNAR SURFACE (SURFFLAG=P22F
 1745                          25,2416  0 0006 1            EXTEND
 1746   REF   1                25,2417  1 2456 0            BZF       NORDSTAL    BRANCH-YES-CANNOT DESIGNATE IN MODE 2
 1747   REF   1                25,2420  0 2461 0            TC        TRYSWS


 1748   REF   6  LAST  539     25,2421  4 0104 0  LUNDESCH  CS        FLAGWRD8    OVERFLOW RETURN FROM RRANGLES
 1749   REF   5  LAST  539     25,2422  7 4744 0            MASK      SURFFBIT    CHECK IF ON LUNAR SURFACE
 1750                          25,2423  0 0006 1            EXTEND
 1751   REF   2  LAST  539     25,2424  1 2456 0            BZF       NORDSTAL    BRANCH-YES-RETURN TO CALLER - ALARM 527
 1752   REF  37  LAST  519     25,2425  3 0074 1            CA        STATE
 1753   REF   9  LAST  [illegible]  25,2426  7 4745 1            MASK      RNDVZBIT
 1754   REF 180  LAST  537     25,2427 10 000 0             CCS       A           TEST RNDVZFLG.
 1755   REF   1                25,2430  0 2471 1            TC        NODESSM     NOT ON MOON-CALL FOR ATTITUDE MANEUVER
 1756   REF  87  LAST  519     25,2431  1 5155 1            TCF       ENDOFJOB    ...BUT NOT IN R29.
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R1757   PROGRAM NAME_  STARTDES                                           STORED AS A HALF-UNIT VECTOR IN RRTARGET

R1759   FUNCTIONAL DESCRIPTION_                                           CKON IS DESIRED. BIT14 OF RADMODES IS
R1761   STARTDES IS ENTERED WHEN WE ARE READY TO BEGIN DESIGNATION.       OR REPOSITION OPERATION. IN THIS
R1763   BIT 14 OF RADMODES IS ALREADY SET IF A REMODE IS REQUIRED.        THE REPOSITION WILL BE INTERRUPTED.
R1765   AT THIS TIME, THE RR ANTENNA MAY BE IN A REPOSITION               GINS.
R1767   OPERATION. IN THIS CASE, IF A REMODE IS REQUIRED IT MAY HAVE
R1768   ALREADY BEGUN BUT IN ANY CASE THE REPOSITION WILL BE INTERRUPTED.
R1769   OTHERWISE, THE REPOSITION WILL BE COMPLETED BEFORE 2-AXIS
R1770   DESIGNATION BEGINS. INITIALLY DESCOUNT IS SET = 60 TO INDICATE
R1771   THAT 30 SECONDS WILL BE ALLOWED FOR THE RR DATA GOOD INBIT
R1772   (CHAN 33 BIT 4) IF LOCK-ON IS DESIRED (STATE BIT 5). BIT 10
R1773   OF RADMODES IS SET TO SHOW THAT A DESIGNATE IS REQUIRED.
R1774   THE REPOSITION FLAG (RADMODES BIT 11) IS CHECKED. IF SET,
R1775   THE PROGRAM EXITS TO L+3 OF THE CALLING PROGRAM (SEE RRDESSM
R1776   AND RRDESNB). THE PROGRAM WILL BEGIN DESIGNATING TO THE DESIRED
R1777   ANGLES FOLLOWING THE REPOSITION OR REMODE IF ONE WAS
R1778   REQUESTED. IF THE REPOSITION FLAG IS NOT SET, SETRRECR IS CALLED
R1779   WHICH SETS THE RR ERROR COUNTER ENABLE BIT (CHAN 12 BIT 2)
R1780   AND SETS LASTYCMD AND LASTXCMD = 0 TO INDICATE THE
R1781   DIFFERENCE BETWEEN THE PRESENT AND DESIRED STATE OF THE ERROR
R1782   COUNTERS. A 20 MILLISECOND WAITLIST CALL IS SET FOR BEGDES
R1783   AFTER WHICH THE PROGRAM EXITS TO L+3 OF THE CALLING PROGRAM.

R1784   CALLING SEQUENCE:
R1785   FROM RRDESSM AND RRDESNB WHEN ANGLES WITHIN LIMITS.

R1786   ERASABLE INITIALIZATION REQUIRED:
R1787   RADMODES, (SEE RRDES)

R1788   SUBROUTINES CALLED_
R1789   SETRRECR, WAITLIST

R1790   JOBS OR TASKS INITIATED_
R1791   BEGDES

R1792   ALARMS_  NONE

R1793   EXIT_  L+3 OF CALLING PROGRAM (SEE RRDESSM)
R1794   L+2 OF CALLING PROGRAM (SEE RRDESNB)

 1795   REF   6  LAST  539    25,2432  2 5113 0  STARTDES INCR    DESRET
 1796   REF  64  LAST  537    25,2433  4 0110 0           CS      RADMODES
 1797   REF   3  LAST  532    25,2434  7 4742 0           MASK    DESIGBIT
 1798   REF  65  LAST  540    25,2435  26 110 0           ADS     RADMODES
 1799   REF   3  LAST  530    25,2436  7 4741 0           MASK    REPOSBIT         SEE IF REPOSITIONING IN PROGRESS.
 1800   REF 181  LAST  539    25,2437  10 000 0           CCS     A
 1801   REF   1               25,2440  1 2446 1           TCF     DESRETRN         ECTR ALREADY SET UP.

 1802   REF   2  LAST  529    25,2441  0 2156 1           TC      SETRRECR         SET UP ERROR COUNTERS.
 1803   REF  34  LAST  506    25,2442  3 4752 0              CAF      TWO
 1804   REF  21  LAST  537    25,2443  0 5203 0              TC       WAITLIST
 1805   REF  23  LAST  537    E7,1456                        EBANK=   LOSCOUNT
 1806   REF   3  LAST  530    25,2444   02573 1              2CADR    BEGDES
 1806                         25,2445   52067 1

 1807   REF   3  LAST  516    25,2446  3 1306 0    DESRETRN  CA       RADCADR             FIRST PASS THRU DESIGNATE
 1808                         25,2447  0 0006 1              EXTEND
 1809   REF   1               25,2450  1 2452 1              BZF      DESRTRN             YES    SET EXIT
 1810   REF  88  LAST  539    25,2451  0 5155 0              TC       ENDOFJOB            NO
 1811                         25,2452  0 0003 1    DESRTRN   RELINT
 1812   REF   7  LAST  540    25,2453  25'113 0              INCR     DESRET
 1813   REF   8  LAST  541    25,2454  3 1113 0              CA       DESRET
 1814   REF   9  LAST  519    25,2455  1 4640 0              TCF      BANKJUMP


 1815   REF 116  LAST  533    25,2456  3 4755 1    NORDSTAL  CAF      ZERO                ZERO RADCADR TO WIPE  OUT ANYONE
 1816   REF   4  LAST  541    25,2457  55'306 1              TS       RADCADR             WAITING IN RADSTALL SINCE WE ARE NOW
 1817   REF   2  LAST  541    25,2460  1 2452 1              TCF      DESRTRN             RETURNING TO P20 AND MAY DO NEW RADSTALL
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P1818            SEE IF RRDESSM CAN BE ACCOMPLISHED AFTER A REMODE.

 1819   REF   2  LAST  532   25,2461  0 2233 1  TRYSWS    TC     RMODINV          (NOTE RUPT INHIBIT)
 1820   REF   4  LAST  539   25,2462  0 4523 1            TC     RRLIMCHK         TRY DIFFERENT MODE.
 1821   REF   4  LAST  323   25,2463   01111 1            ADRES  MODEB
 1822   REF   2  LAST  539   25,2464  1 2471 0            TCF    NODESSM          VEHICLE MANEUVER REQUIRED.

 1823   REF   3  LAST  542   25,2465  0 2233 1            TC     RMODINV          RESET BIT12
 1824   REF   2  LAST  532   25,2466  3 4736 1            CAF    REMODBIT         SET FLAG FOR REMODE.
 1825   REF  66  LAST  540   25,2467  26 110 0            ADS    RADMODES

 1826   REF   1              25,2470  1 2412 0            TCF    OKDESSM

 1827   REF   4  LAST  542   25,2471  0 2233 1  NODESSM   TC     RMODINV          RE-INVERT MODE AND RETURN
 1828   REF   9  LAST  541   25,2472  25'113 0            INCR   DESRET           TO CALLER +2
 1829   REF   3  LAST  539   25,2473  1 2456 0            TCF    NORDSTAL

 1830                        25,2474   00074 1  MAXTRYS   DEC    60
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P1831              DESIGNATE TO SPECIFIC RR GIMBAL ANGLES (INDEPENDENT OF VEHICLE MOTION). ENTER WITH DESIRED ANGLES IN
R1833     TANG AND TANG +1.

 1834     REF   6  LAST  517    25,2475   0 4645 1  RRDESNB  TC      MAKECADR
 1835     REF  10  LAST  542    25,2476  55'113 1            TS      DESRET

 1836     REF  49  LAST  519    25,2477   0 5516 0           TC      DOWNFLAG           RESET FLAG TO PREVENT DODES FROM GOING
 1837     REF   6  LAST  515    25,2500   00041 1            ADRES   LOSCMFLG           BACK TO R21
 1838     REF   1               25,2501   3 2474 1           CA      MAXTRYS            SET TIME LIMIT COUNTER
 1839     REF   2  LAST  509    25,2502  55'114 0            TS      DESCOUNT           FOR DESIGNATE
 1840                           25,2503   0 0004 0           INHINT                     SEE IF CURRENT MODE OK.
 1841     REF   1               25,2504   0 2540 1           TC      RRLIMNB            DO SPECIAL V41 LIMIT CHECK
 1842     REF  10  LAST  535    25,2505   01107 0            ADRES   TANG
 1843     REF   1               25,2506   1 2523 0           TCF     TRYSWN             SEE IF IN OTHER MODE.

 1844                           25,2507   0 0003 1  OKDESNB  RELINT
 1845                           25,2510   0 0006 1           EXTEND
 1846     REF  11  LAST  543    25,2511   3 1110 0           DCA     TANG
 1847     REF   6  LAST  324    25,2512  53'753 0            DXCH    TANGNB
 1848     REF  44  LAST  518    25,2513   0 6037 0           TC      INTPRET

 1849                           25,2514    77624 1           CALL                       GET LOS IN NB COORDS.
 1850     REF   1               25,2515    46041 0                   RRNB
 1851     REF   2  LAST  539    25,2516    01102 0           STORE   RRTARGET

 1852                           25,2517    77414 0           SET     EXIT
 1853     REF   2  LAST  539    25,2520    00071 1                   RRNBSW

 1854                           25,2521   0 0004 0           INHINT
 1855     REF   2  LAST  539    25,2522   1 2433 0           TCF     STARTDES +1
 1856     REF   5  LAST  542    25,2523   0 2233 1  TRYSWN   TC      RMODINV            SEE IF OTHER MODE WILL DO.
 1857     REF   2  LAST  543    25,2524   0 2540 1           TC      RRLIMNB            DO SPECIAL V41 LIMIT CHECK
 1858     REF  12  LAST  543    25,2525   01107 0            ADRES   TANG
 1859     REF   1               25,2526   1 2533 1           TCF     NODESNB            NOT POSSIBLE.

 1860     REF   6  LAST  543    25,2527   0 2233 1           TC      RMODINV
 1861     REF   3  LAST  542    25,2530   3 4736 1           CAF     REMODBIT           CALL FOR REMODE.
 1862     REF  67  LAST  542    25,2531  26 110 0            ADS     RADMODES
 1863     REF   1               25,2532   1 2507 0           TCF     OKDESNB

 1864     REF   7  LAST  543    25,2533   0 2233 1  NODESNB  TC      RMODINV            REINVERT MODE BIT.
 1865     REF  22  LAST  537    25,2534   0 5567 0           TC      ALARM              BAD INPUT ANGLES.
 1866                           25,2535   00502 0            OCT     502
 1867     REF   9  LAST  516    25,2536   0 6011 1           TC      CLRADMOD
 1868     REF  89  LAST  541    25,2537   0 5155 0           TC      ENDOFJOB           AVOID 503 ALARM.

 1869     REF 160  LAST  535    25,2540  50 002 0   RRLIMNB  INDEX   Q                  THIS ROUTINE IS IDENTICAL TO RRLIMCHK
 1870                           25,2541   3 0000 1           CAF     0                  EXCEPT THAT THE MODE 1 SHAFT LOWER
 1871     REF 161  LAST  543    25,2542  24 002 0            INCR    Q                  LIMIT IS -85 INSTEAD OF -70 DEGREES
 1872                           25,2543   0 0006 1           EXTEND
 1873   REF 182  LAST  540    25,2544  5 0000 1               INDEX   A              READ GIMBAL ANGLES INTO ITEMP STORAGE
 1874                         25,2545  3 0001 0               DCA     0
 1875   REF  17  LAST  536    25,2546  52 062 1               DXCH    ITEMP1
 1876   REF 162  LAST  543    25,2547  22 002 0               LXCH    Q              L(CALLER +2) TO L

 1877   REF  11  LAST  532    25,2550  3 4740 0               CAF     ANTENBIT       SEE WHICH MODE RR IS IN.
 1878   REF  68  LAST  543    25,2551  7 0110 0               MASK    RADMODES
 1879   REF 183  LAST  544    25,2552  10 000 0               CCS     A
 1880   REF   2  LAST  522    25,2553  1 4550 1               TCF     MODE2CHK       MODE 2 CAN USE RRLIMCHK CODING
 1881   REF  18  LAST  544    25,2554  3 0061 0               CA      ITEMP1
 1882   REF   8  LAST  535    25,2555  0 4512 0               TC      MAGSUB         MODE 1 IS DEFINED AS
 1883                         25,2556   66161 1               DEC     -.30555          1. ABS(T) L 55 DEGS
 1884   REF  74  LAST  536    25,2557  0 0001 0               TC      L                2  SHAFT LIMITS AT +59, -85 DEGS

 1885   REF   9  LAST  536    25,2560  3 0062 0               CA      ITEMP2         LOAD SHAFT ANGLE
 1886                         25,2561  0 0006 1               EXTEND
 1887   REF   1               25,2562  6 2570 1               BZMF    NEGSHAFT       IF NEGATIVE SHAFT ANGLE, ADD 20.5 DEGS
 1888   REF   2  LAST  523    25,2563  6 4562 1               AD      5.5DEGS
 1889   REF   9  LAST  544    25,2564  0 4512 0    SHAFTLIM   TC      MAGSUB
 1890                         25,2565   64420 0               DEC     -.35833        64.5 DEGREES
 1891   REF  75  LAST  544    25,2566  0 0001 0               TC      L              NOT IN LIMITS
 1892   REF   2  LAST  523    25,2567  0 4560 0               TC      RRLIMOK        IN LIMITS
 1893   REF   1               25,2570  6 2572 0    NEGSHAFT   AD      20.5DEGS       MAKE NEGATIVE SHAFT LIMIT -85 DEGREES
 1894   REF   1               25,2571  1 2564 0               TCF     SHAFTLIM


 1895                         25,2572   03512 1    20.5DEGS   DEC     .11389
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R1896   PROGRAM NAME_  BEGDES

R1897   FUNCTIONAL DESCRIPTION_
R1898   BEGDES CHECKS VARIOUS DESIGNATE REQUESTS AND REQUESTS THE
R1899   ACTUAL RR DESIGNATION. INITIALLY A CHECK IS MADE TO SEE IF A
R1900   REMODE (RADMODES BIT 14) IS REQUESTED OR IN PROGRESS. IF SO,
R1901   CONTROL IS TRANSFERRED TO STDESIG AFTER ROUTINE REMODE IS
R1902   EXECUTED. IF NO REMODE, STDESIG IS IMMEDIATELY CALLED WHERE
R1903   FIRST THE REPOSITION FLAG (RADMODES BIT 11) IS CHECKED. IF
R1904   PRESENT, THE DESIGNATE FLAG (RADMODES BIT 10) IS REMOVED
R1905   AFTER WHICH THE PROGRAM EXITS TO RDBADEND. IF THE REPOSITION
R1906   FLAG IS NOT PRESENT, THE CONTINUOUS DESIGNATE FLAG (RADMODES
R1907   BIT 15) IS CHECKED. IF PRESENT, ON EXECUTIVE CALL IS IMMEDIATELY
R1908   MADE FOR DODES AFTER WHICH A .5 SECOND WAIT IS INITIATED BEFORE
R1909   REPEATING AT STDESIG. IF THE RR SEARCH ROUTINE (LRS24.1) IS DESIGNATING
R1910   TO A NEW POINT (NEWPTFLG SET) THE CURRENT DESIGNATE TASK IS TERMINATED.
R1911   IF CONTINUOUS DESIGNATE IS NOT WANTED, THE DESIGNATE FLAG (RADMODES
R1912   BIT 10) IS CHECKED. IF NOT PRESENT, THE PROGRAM EXITS TO ENDRADAR TO
R1913   CHECK RR CDU FAIL BEFORE RETURNING TO THE CALLING PROGRAM. IF DESIGNATE
R1914   IS STILL REQUIRED, DESCOUNT IS CHECKED TO SEE IF THE 30 SECONDS HAS
R1915   EXPIRED BEFORE RECEIVING THE RR DATA GOOD (CHAN 33 BIT 4)
R1916   SIGNAL. IF OUT OF TIME, PROGRAM ALARM 00503 IS REQUESTED, THE
R1917   RR AUTO TRACKER ENABLE AND RR ERROR COUNTER ENABLE
R1918   (CHAN 12 BITS 14,2) BITS REMOVED, AND THE DESIGNATE FLAG
R1919   (RADMODES BIT 10) REMOVED BEFORE EXITING TO RDBADEND. IF
R1920   TIME HAS NOT EXPIRED, DESCOUNT IS DECREMENTED, THE
R1921   EXECUTIVE CALL MADE FOR DODES, AND A .5 SECOND WAIT INITIATED
R1922   BEFORE REPEATING THIS PROCEDURE AT STDESIG.

R1923   CALLING SEQUENCE:
R1924   WAITLIST CALL FROM STARTDES
R1925   TCF BEGDES FROM DORREPOS
R1926   TC STDESIG RETURNING, FROM REMODE

R1927   ERASABLE INITIALIZATION REQUIRED:
R1928   DESCOUNT, RADMODES

R1929   SUBROUTINES CALLED_
R1930   ENDRADAR, FINDVAC

R1931   JOBS OR TASKS INITIATED_  DODES

R1932   ALARMS_  PROGRAM ALARM 00503 (30 SECONDS HAVE EXPIRED) WITH NO RR DATA
R1933   GOOD (CHAN 33 BIT 4) RECEIVED WHEN LOCK-ON (STATE BIT 5) WAS REQUESTED.

R1934   EXIT_  TASKOVER (SEARCH PATTERN DESIGNATING TO NEW POINT)
R1935   ENDRADAR (NO DESIGNATE - RADMODES BIT 10)
R1936   RDBADEND (REPOSITION OR 30 SECONDS EXPIRED)

 1937   REF  69  LAST  544   25,2573  4 0110 0  BEGDES   CS      RADMODES
 1938   REF   4  LAST  543   25,2574  7 4736 0             MASK    REMODBIT
 1939   REF 184  LAST  544   25,2575  10 000 0             CCS     A
 1940   REF   3  LAST  532   25,2576  0 2602 1             TC      STDESIG
 1941   REF   1              25,2577  0 2171 1             TC      REMODE
 1942   REF   8  LAST  534   25,2600  0 5221 0   DESLOOP   TC      FIXDELAY          2 SAMPLES PER SECOND.
 1943                        25,2601   00062 0             DEC     50

 1944   REF   4  LAST  540   25,2602  3 4741 1   STDESIG   CAF     REPOSBIT
 1945   REF  70  LAST  545   25,2603  7 0110 0             MASK    RADMODES          SEE IF GIMBAL LIMIT MONITOR HAS FOUND US
 1946   REF 185  LAST  546   25,2604  10 000 0             CCS     A                 OUT OF BOUNDS. IF SO, THIS BIT SHOWS A
 1947   REF   1              25,2605  1 2623 0             TCF     BADDES            REPOSITION TO BE IN PROGRESS.

 1948   REF  71  LAST  546   25,2606  10 110 0             CCS     RADMODES          SEE IF CONTINUOUS DESIGNATE WANTED.
 1949                        25,2607  1 2612 1             TCF     +3                IF SO, DONT CHECK BIT 10 TO SEE IF IN
 1950                        25,2610  1 2612 1             TCF     +2                LIMITS BUT GO RIGHT TO FINDVAC ENTRY.
 1951   REF   1              25,2611  1 2630 1             TCF     MOREDES +1

 1952   REF  72  LAST  546   25,2612  4 0110 0             CS      RADMODES          IF NON-CONTINUOUS, SEE IF END OF
 1953   REF   4  LAST  540   25,2613  7 4742 0             MASK    DESIGBIT          PROBLEM (DATA GOOD IF LOCK-ON WANTED OR
 1954   REF 186  LAST  546   25,2614  10 000 0             CCS     A                 WITHIN LIMITS IF NOT). IF SO, EXIT AFTER
 1955   REF   2  LAST  537   25,2615  1 3546 1             TCF     ENDRADAR          CHECKING RR CDU FAIL.

 1956   REF   3  LAST  543   25,2616  11'114 0   STDESIG1  CCS     DESCOUNT          SEE IF THE TIME LIMIT HAS EXPIRED
 1957   REF   2  LAST  546   25,2617  1 2627 1             TCF     MOREDES

 1958   REF   1              25,2620  4 2635 1             CS      B14+B2            IF OUT OF TIME, REMOVE ECR ENABLE + TRKR
 1959                        25,2621  0 0006 1             EXTEND
 1960   REF  32  LAST  530   25,2622  03 012 1             WAND    CHAN12
 1961   REF   5  LAST  546   25,2623  4 4742 0   BADDES    CS      DESIGBIT          REMOVE DESIGNATE FLAG
 1962   REF  73  LAST  546   25,2624  7 0110 0             MASK    RADMODES
 1963   REF  74  LAST  546   25,2625  54 110 0             TS      RADMODES
 1964   REF   1              25,2626  1 3562 1             TCF     RCBADEND

 1965   REF   4  LAST  546   25,2627  55'114 0   MOREDES   TS      DESCOUNT
 1966   REF   9  LAST  519   25,2630  3 3714 1             CAF     PRIO26            UPDATE GYRO TORQUE COMMANDS.
 1967   REF  22  LAST  519   25,2631  0 5105 0             TC      FINDVAC
 1968   REF  24  LAST  541   E7,1456                       EBANK=  LOSCOUNT
 1969   REF   1              25,2632   02636 0             2CADR   DODES
 1969   REF   1              25,2633   52067 1

 1970   REF   1              25,2634  1 2600 1             TCF     DESLOOP

 1971                        25,2635   20002 1   B14+B2    OCT     20002
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P1972    PROGRAM NAME_  DODES

R1973    FUNCTIONAL DESCRIPTION_
R1974    DODES CALCULATES AND REQUESTS ISSUANCE OF RR GYRO TORQUE
R1975    COMMANDS. INITIALLY THE CURRENT RR CDU ANGLES ARE STORED AND
R1976    THE LOS HALF-UNIT VECTOR TRANSFORMED FROM STABLE MEMBER TO
R1977    NAVIGATION BASE COORDINATES VIA SMNB IF NECESSARY. THE
R1978    SHAFT AND TRUNNION COMMANDS ARE THEN CALCULATED AS FOLLOWS_
R1979    + SHAFT = LOS  . (COS(S), 0, -SIN (S)) (DOT PRODUCT)
R1980    -TRUNNION = LOS  . (SIN (T) SIN (S), COS (T), SIN (T) COS (S) )
R1981    THE SIGN OF THE SHAFT COMMAND IS THEN REVERSED IF IN MODE 2
R1982    (RADMODES BIT 12) BECAUSE A RELAY IN THE RR REVERSES THE
R1983    POLARITY OF THE COMMAND. AT RRSCALUP EACH COMMAND IS
R1984    SCALED AND IF EITHER, OR BOTH, OF THE COMMANDS IS GREATER THAN
R1985    .5 DEGREES, MPAC +1 IS SET POSITIVE. IF A CONTINUOUS DESIGNATE
R1986    (RADMODES BIT 15) IS DESIRED AND THE SEARCH ROUTINE IS NOT OPERATING,
R1987    THE RR AUTO TRACKER ENABLE BIT (CHAN 12 BIT 14) IS CLEARED AND RROUT
R1988    CALLED TO PUT OUT THE COMMANDS PROVIDED NO REPOSITION (RADMODES BIT 11)
R1989    IS IN PROGRESS. IF A CONTINUOUS DESIGNATE AND THE SEARCH ROUTINE IS
R1990    OPERATING (SRCHOPT FLAG SET) THE TRACK ENABLE IS NOT CLEARED. IF NO
R1991    CONTINUOUS DESIGNATE AND BOTH COMMANDS ARE NOT LESS THAN .5 DEGREES AS
R1992    INDICATED BY MPAC +1, THE RR AUTO TRACKER ENABLE BIT (CHAN 12 BIT 14) IS
R1993    CLEARED AND RROUT CALLED TO PUT OUT THE COMMANDS PROVIDED NO REPOSITION
R1994    (RADMODES BIT 11) IS IN PROGRESS. IF BOTH COMMANDS ARE LESS THAN .5
R1995    DEGREES AS INDICATED BY MPAC+1, THE RR AUTO TRACKER ENABLE BIT
R1996    (CHAN 12 BIT 14) IS CLEARED AND RROUT CALLED TO PUT OUT THE
R1997    COMMANDS PROVIDED NO REPOSITION (RADMODES BIT 11) IS IN
R1998    PROGRESS. IF BOTH COMMANDS ARE LESS THAN .5 DEGREES, THE
R1999    LOCK-ON FLAG (STATE BIT 5) IS CHECKED. IF NOT PRESENT, THE
R2000    DESIGNATE FLAG (RADMODES BIT 10) IS CLEARED, THE RR ERROR
R2001    COUNTER ENABLE BIT (CHAN 12 BIT 2) IS CLEARED, AND ENDOFJOB
R2002    CALLED. IF LOCK-ON IS DESIRED, THE RR AUTO TRACKER (CHAN 12
R2003    BIT 14) IS ENABLED FOLLOWED BY A CHECK OF THE RECEIPT OF THE
R2004    RR DATA GOOD (CHAN 33 BIT 4) SIGNAL. IF RR DATA GOOD
R2005    PRESENT, THE DESIGNATE FLAG (RADMODES BIT 10) IS CLEARED,
R2006    THE RR ERROR COUNTER ENABLE BIT (CHAN 12 BIT 2) IS CLEARED,
R2007    AND ENDOFJOB CALLED. IF RR DATA GOOD IS NOT PRESENT, RROUT
R2008    IS CALLED TO PUT OUT THE COMMANDS PROVIDED NO REPOSITION
R2009    (RADMODES BIT 11) IS IN PROGRESS AFTER WHICH THE JOB IS TERMINATED
R2010    VIA ENDOFJOB.

R2011    CALLING SEQUENCE:
R2012    EXECUTIVE CALL EVERY .5 SECONDS FROM BEGDES.

R2013    ERASABLE INITIALIZATION REQUIRED:
R2014    RRTARGET (HALF-UNIT LOS VECTOR IN EITHER SM OR NB COORDINATES),
R2015    LOKONSW (STATE BIT 5), RRNBSW (STATE BIT 6), RADMODES

R2016    SUBROUTINES CALLED_
R2017    READCDUS, SMNB, CDULOGIC, MAGSUB, RROUT
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R2018   JOBS OR TASKS INITIATED_
R2019   NONE

R2020   ALARMS_  NONE

R2021   EXIT_  ENDOFJOB (ALWAYS)

 2022                            25,2636   0 0006 1  DODES     EXTEND
 2023   REF   8  LAST  534       25,2637   3 0036 1            DCA     CDUT
 2024   REF  13  LAST  543       25,2640   5 3110 1            DXCH    TANG

 2025   REF  45  LAST  543       25,2641   0 6037 0            TC      INTPRET

 2026                            25,2642    77201 1            SETPD   VLOAD
 2027                            25,2643    00001 0                    0
 2028   REF   6  LAST  543       25,2644    01102 0                    RRTARGET
 2029                            25,2645    74214 0            BON     VXSC
 2030   REF   3  LAST  543       25,2646    00311 1                    RRNBSW
 2031   REF   1                  25,2647    52661 1                    DONBRD          TARGET IN NAV-BASE COORDINATES
 2032   REF   1                  25,2650    01767 0                    MLOSV           MULTIPLY UNIT LOS BY MAGNITUDE
 2033                            25,2651    63372 1            VSL1    PDVL
 2034   REF   2  LAST  112       25,2652    01761 0                    LOSVEL
 2035                            25,2653    53361 0            VXSC    VAD             ADD ONE SECOND RELATIVE VELOCITY TO LOS
 2036   REF   1                  25,2654    13072 0                    MCTOMS
 2037                            25,2655    45056 0            UNIT    CALL
 2038   REF   3  LAST  539       25,2656    47537 0                    CDUTRIG
 2039                            25,2657    77624 1            CALL
 2040   REF   3  LAST  539       25,2660    47671 1                    *SMNB*

 2041                            25,2661    14041 1  DONBRD    STODL   32D
 2042   REF  14  LAST  548       25,2662    01111 1                    TANG +1
 2043                            25,2663    41434 1            RTB     PUSH            SHAFT COMMAND = V(32D).(COS(S), 0,
 2044   REF  11  LAST  374       25,2664    21576 0                    CDULOGIC             (-SIN(S)).
 2045                            25,2665    65356 1            SIN     PDDL            SIN(S) TO 0 AND COS(S) TO 2.
 2046                            25,2666    41546 0            COS     PUSH
 2047                            25,2667    65205 0            DMP     PDDL
 2048                            25,2670    00041 1                    32D
 2049                            25,2671    00045 0                    36D
 2050                            25,2672    44205 0            DMP     BDSU
 2051                            25,2673    00001 0                    0
 2052                            25,2674    77626 0            STADR
 2053   REF  15  LAST  548       25,2675    76666 0            STORE   TANG +1         SHAFT COMMAND

 2054                            25,2676    47135 0            SLOAD   RTB
 2055   REF  16  LAST  548       25,2677    01110 0                    TANG
 2056   REF  12  LAST  548       25,2700    21576 0                    CDULOGIC
 2057                            25,2701    71406 0            PUSH    COS             COS(T) TO 4.
 2058                            25,2702    73525 1            PDDL    SIN
 2059                            25,2703    41206 0            PUSH    DMP             SIN(T) TO 6.
 2060                            25,2704    00003 1                    2
 2061                   25,2705   65352 0          SL1     PDDL          DEFINE VECTOR U = (SIN(T)SIN(S))
 2062                   25,2706   00005 1                  4                                (COS(T)      )
 2063                   25,2707   41325 0          PDDL    DMP                              (SIN(T)COS(S))
 2064                   25,2710   00007 0                  6
 2065                   25,2711   00001 0                  0
 2066                   25,2712   55552 0          SL1     VDEF
 2067                   25,2713   77441 0          DOT     EXIT          DOT U WITH LOS TO GET TRUNNION COMMAND.
 2068                   25,2714   00041 1                  32D
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R2069               AT THIS POINT WE HAVE A ROTATION VECTOR IN DISH AXES LYING IN THE TS PLANE. CONVERT THIS TO A
R2071      COMMANDED RATE AND ENABLE THE TRACKER IF WE ARE WITHIN .5 DEGREES OF THE TARGET.

  2073     REF 235  LAST  520     25,2715  4 0154 0               CS      MPAC               DOT WAS NEGATIVE OF DESIRED ANGLE.
  2074                            25,2716  0 0006 1               EXTEND
  2075     REF   1                25,2717  7 3066 0               MP      RDESGAIN           SCALING ON INPUT ANGLE WAS 4 RADIANS.
  2076     REF  17  LAST  548     25,2720  55'107 1               TS      TANG               TRUNNION COMMAND.
  2077     REF  75  LAST  546     25,2721  4 0110 0               CS      RADMODES           A RELAY IN THE RR REVERSES POLARITY OF
  2078     REF  23  LAST  508     25,2722  7 4740 1               MASK    BIT12              THE SHAFT COMMANDS IN MODE 2 SO THAT A
  2079                            25,2723  0 0006 1               EXTEND                     POSITIVE TORQUE APPLIED TO THE SHAFT
  2080                            25,2724  1 2727 0               BZF     +3                 GYRO CAUSES A POSITIVE CHANGE IN THE
  2081     REF  18  LAST  550     25,2725  3 1110 0               CA      TANG +1            SHAFT ANGLE. COMPENSATE FOR THIS SWITCH
  2082                            25,2726  1 2730 0               TCF     +2                 BY CHANGING THE POLARITY OF OUR COMMAND.
  2083     REF  19  LAST  550     25,2727  4 1110 1          +3   CS      TANG +1
  2084                            25,2730  0 0006 1               EXTEND
  2085     REF   2  LAST  550     25,2731  7 3066 0               MP      RDESGAIN           SCALING ON INPUT ANGLE WAS 4 RADIANS.
  2086     REF  20  LAST  550     25,2732  55'110 1               TS      TANG +1            SHAFT COMMAND.
  2087     REF  46  LAST  548     25,2733  0 6037 0               TC      INTPRET

  2088                            25,2734   41345 0               DLOAD   DMP
  2089                            25,2735   00003 1                       2                  COS(S).
  2090                            25,2736   00005 1                       4                  COS(T).
  2091                            25,2737   65352 0               SL1     PDDL               Z COMPONENT OF URR.
  2092                            25,2740   65276 1               DCOMP   PDDL               Y COMPONENT = -SIN(T).
  2093                            25,2741   00001 0                       0                  SIN(S).
  2094                            25,2742   72405 0               DMP     SL1
  2095                            25,2743   00005 1                       4                  COS(T).
  2096                            25,2744   43066 0               VDEF    BON                FORM URR IN NB AXES.
  2097     REF   4  LAST  548     25,2745   00311 1                       RRNBSW             BYPASS NBSM CONVERSION IN VERB 41.
  2098                            25,2746   52751 0                       +3
  2099                            25,2747   77624 1               CALL
  2100     REF   1                25,2750   47673 0                       *NBSM*             GET URR IN SM AXES.
  2101                            25,2751   77441 0               DOT     EXIT
  2102     REF   7  LAST  548     25,2752   01102 0                       RRTARGET           GET COSINE OF ANGLE BETWEEN RR AND LOS.

  2103                            25,2753  0 0006 1               EXTEND
  2104     REF   1                25,2754  4 3070 1               DCS     COS1/2DG
  2105     REF 236  LAST  550     25,2755  20 155 1               DAS     MPAC               DIFFERENCE OF COSINES, SCALED B-2.
  2106     REF 237  LAST  550     25,2756  10 154 0               CCS     MPAC
  2107     REF 117  LAST  541     25,2757  3 4755 1               CA      ZERO               IF COS ERROR BIGGER, ERROR IS SMALLER.
  2108                            25,2760  1 2762 1               TCF     +2
  2109     REF  67  LAST  537     25,2761  3 4753 1               CA      ONE
  2110     REF 238  LAST  550     25,2762  54 155 1               TS      MPAC +1            ZERO IF RR IS POINTED OK, ONE IF NOT.
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P2111               SEE IF TRACKER SHOULD BE ENABLED OR DISABLED.

 2112   REF  76  LAST  550   25,2763  10 110 0            CCS     RADMODES       IF CONTINUOUS DESIGNATE WANTED, PUT OUT
 2113   REF   1              25,2764  1 2767 1            TCF     SIGNLCHK       COMMANDS WITHOUT CHECKING MAGNITUDE OF
 2114   REF   2  LAST  551   25,2765  1 2767 1            TCF     SIGNLCHK       ERROR SIGNALS
 2115   REF   1              25,2766  1 3017 0            TCF     DORROUT
 2116   REF 239  LAST  550   25,2767  10 155 1  SIGNLCHK  CCS     MPAC +1        SEE IF BOTH AXES WERE WITHIN .5 DEGS.
 2117   REF   1              25,2770  1 3000 0            TCF     DGOODCHK
 2118   REF  38  LAST  539   25,2771  4 0074 0            CS      STATE          IF WITHIN LIMITS AND NO LOCK-ON WANTED,
 2119   REF   1              25,2772  7 4747 0            MASK    LOKONBIT       PROBLEM IS FINISHED.
 2120   REF 187  LAST  546   25,2773  10 000 0            CCS     A
 2121   REF   1              25,2774  1 3005 0            TCF     RRDESDUN

 2122   REF  51  LAST  513   25,2775  3 4736 1            CAF     BIT14          ENABLE THE TRACKER.
 2123                        25,2776  0 0006 1            EXTEND
 2124   REF  33  LAST  546   25,2777  05 012 1            WOR     CHAN12

 2125   REF  23  LAST  468   25,3000  3 4750 1  DGOODCHK  CAF     BIT4           SEE IF DATA GOOD RECEIVED YET
 2126                        25,3001  0 0006 1            EXTEND
 2127   REF   9  LAST  504   25,3002  02 033 0            RAND    CHAN33
 2128   REF 188  LAST  551   25,3003  10 000 0            CCS     A
 2129   REF   2  LAST  551   25,3004  1 3017 0            TCF     DORROUT

 2130   REF  28  LAST  475   25,3005  4 4742 0  RRDESDUN  CS      BIT10          WHEN PROBLEM DONE, REMOVE BIT 10 SO NEXT
 2131   REF  77  LAST  551   25,3006  7 0110 0            MASK    RADMODES       WAITLIST TASK WE WILL GO TO RGOODEND.
 2132                        25,3007  0 0004 0            INHINT
 2133   REF  78  LAST  551   25,3010  54 110 0            TS      RADMODES

 2134   REF  50  LAST  543   25,3011  0 5516 0            TC      DOWNFLAG       RESET LOSCMFLG TO PREVENT A
 2135   REF   7  LAST  543   25,3012   00041 1            ADRES   LOSCMFLG       RECOMPUTATION OF LOS AFTER DATA GOOD
 2136   REF  32  LAST  530   25,3013  4 4752 1            CS      BIT2           TURN OFF ENABLE RR ERROR COUNTER
 2137                        25,3014  0 0006 1            EXTEND
 2138   REF  34  LAST  551   25,3015  03 012 1            WAND    CHAN12
 2139   REF  90  LAST  543   25,3016  1 5155 1            TCF     ENDOFJOB       WITH ECTR DISABLED.

 2140   REF   8  LAST  497   25,3017  3 0076 0  DORROUT   CA      FLAGWRD2       IF BOTH LOSCMFLAG AND SEARCH FLAG ARE
 2141   REF   1              25,3020  7 7712 0            MASK    BIT12,14       ZERO, BYPASS VELOCITY ADJUSTMENT TO LOS
 2142                        25,3021  0 0006 1            EXTEND
 2143   REF   1              25,3022  1 3041 0            BZF     NOTP20
 2144   REF  47  LAST  550   25,3023  0 6037 0            TC      INTPRET
 2145                        25,3024   74375 0            VLOAD   VXSC           MULTIPLY UNIT LOS BY MAGNITUDE
 2146   REF   8  LAST  550   25,3025   01102 0                    RRTARGET
 2147   REF   2  LAST  548   25,3026   01767 0                    MLOSV
 2148                        25,3027   41572 1            VSL1    PUSH
 2149                        25,3030   74375 0            VLOAD   VXSC           ADD .5 SEC. OF VELOCITY
 2150   REF   3  LAST  548   25,3031   01761 0                    LOSVEL         TO LOS VECTOR
 2151   REF   2  LAST  548   25,3032   13072 0                    MCTCMS
 2152                        25,3033   53362 0            VSR1    VAD
 2153                        25,3034   77656 1            UNIT
 2154   REF   9  LAST  551   25,3035   15102 0            STODL   RRTARGET       STORE VELOCITY-CORRECTED LOS (UNIT)
 2155                          25,3036   00045 0                      36D
 2156   REF   3  LAST  551     25,3037   01767 0             STORE    MLOSV               AND STORE MAGNITUDE
 2157                          25,3040   77776 1             EXIT
 2158                          25,3041  0 0004 0  NOTP20     INHINT
 2159   REF  79  LAST  551     25,3042  4 0110 0             CS       #ADMODES            PUT OUT COMMAND UNLESS MONITOR
 2160   REF   5  LAST  546     25,3043  7 7741 0             MASK     REPOSBIT            REPOSITION HAS TAKEN OVER.
 2161   REF 189  LAST  551     25,3044  10 000 0             CCS      A
 2162   REF   2  LAST  534     25,3045  0 2306 0             TC       RROUT

 2163   REF   9  LAST  551     25,3046  3 0076 0             CA       FLAGWRD2
 2164   REF   1                25,3047  7 4740 1             MASK     LOSCMBIT            IF LOSCMFLG NOT SET, DON'T TEST
 2165                          25,3050  0 0006 1             EXTEND                       LOS COUNTER
 2166   REF  91  LAST  551     25,3051  1 5155 1             BZF      ENDOFJOB
 2167   REF  25  LAST  546     25,3052  11'456 0             CCS      LOSCOUNT            TEST LOS COUNTER TO SEE IF TIME TO GET
 2168   REF   1                25,3053  0 3064 0             TC       DODESEND            A NEW LOS
 2169                          25,3054  0 0004 0             INHINT
 2170   REF   5  LAST  516     25,3055  0 6027 1             TC       KILLTASK            YES - KILL TASK WHICH SCHEDULES DODES
 2171   REF   2  LAST  546     25,3056   52602 1             CADR     DESLOOP +2
 2172                          25,3057  0 0003 1             RELINT
 2173   REF   3  LAST  378     25,3060  10 067 1             CCS      NEWJOB
 2174   REF   2  LAST  378     25,3061  0 5122 0             TC       CHANG1
 2175   REF 141  LAST  519     25,3062  0 4616 1             TC       BANKCALL
 2176   REF   1                25,3063   50731 1             CADR     R21LEM2


 2177   REF  26  LAST  552     25,3064  55'456 0  DODESEND   TS       LOSCOUNT
 2178   REF  92  LAST  552     25,3065  0 5155 0             TC       ENDOFJOB


 2179                          25,3066   21122 0  PDESGAIN   DEC      .53624              TRIES TO NULL .5 ERROR IN .5 SEC.
 21795  REF   1                   7712            BIT12,14   EQUALS   PRIO24              OCT 24000
 2180                          25,3067   07777 1  COS1/2DG   2DEC     .999961923 B-2      COSINE OF 0.5 DEGREES.
 2180                          25,3070   33005 1
 2181                          25,3071   00310 0  MCTOMS     2DEC     100 B-13
 2181                          25,3072   00000 1
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P2182   RADAR READ INITIALIZATION

R2183   RADAR DATA ARE READ BY A BANKCALL FOR THE APPROPRIATE LEAD-IN BELOW.

 2184   REF   1                 25,3073  0 3113 1  LRALT     TC      INITREAD -1     ONE SAMPLE PER READING.
 2185                           25,3074   00017 1  ALLREAD   OCT     17

 2186   REF   2  LAST  553      25,3075  0 3114 0  LRVELZ    TC      INITREAD
 2187                           25,3076   00016 0            OCT     16

 2188   REF   3  LAST  553      25,3077  0 3114 0  LRVELY    TC      INITREAD
 2189                           25,3100   00015 0            OCT     15

 2190   REF   4  LAST  553      25,3101  0 3114 0  LRVELX    TC      INITREAD
 2191                           25,3102   00014 1            OCT     14

 2192   REF   5  LAST  553      25,3103  0 3113 1  RRRDOT    TC      INITREAD -1
 2193                           25,3104   00012 1            OCT     12

 2194   REF   6  LAST  553      25,3105  0 3113 1  RRRANGE   TC      INITREAD -1
 2195                           25,3106   00011 1            OCT     11

R2196   LRVEL IS THE ENTRY TO THE LR VELOCITY READ ROUTINE WHEN 5 SAMPLES ARE
R2197   WANTED. ENTER WITH C(A)= 0,2,4 FOR LRVELZ,LRVELY,LRVELX RESP.

 2198   REF   1                 25,3107  55'105 0  LRVEL     TS      TIMEHOLD        STORE VBEAM INDEX HERE MOMEMTARILY
 2199   REF  11  LAST  506      25,3110  3 4756 1            CAF     FIVE            SPECIFY FIVE SAMPLES
 2200   REF   2  LAST  553      25,3111  51'105 1            INDEX   TIMEHOLD
 2201   REF   2  LAST  491      25,3112  1 3075 1            TCF     LRVELZ
 2202   REF  68  LAST  550    25,3113  3 4753 1    -1       CAF     ONE          ENTRY TO TAKE ONLY 1 SAMPLE.
 2203                         25,3114  0 0004 0  INITREAD   INHINT

 2204   REF   3  LAST  553    25,3115  55'105 0             TS      TIMEHOLD     GET DT OF MIDPOINT OF NOMINAL SAMPLING
 2205                         25,3116  0 0006 1             EXTEND               INTERVAL (ASSUMES NO BAD SAMPLES WILL BE
 2206   REF  24  LAST  489    25,3117  7 4751 1             MP      BIT3         ENCOUNTERED).
 2207   REF   4  LAST  554    25,3120  53'106 0             DXCH    TIMEHOLD

 2208   REF 190  LAST  552    25,3121  10 000 0             CCS     A
 2209   REF   1               25,3122  55'111 0             TS      NSAMP
 2210   REF  69  LAST  554    25,3123  6 4753 1             AD      ONE
R2211                INSERT FOLLOWING INSTRUCTION TO GET 2N TRIES FOR N SAMPLES.
A2212                                                       DOUBLE
 2213   REF   2  LAST  222    25,3124  55'100 0             TS      SAMPLIM

 2214   REF   1               25,3125  3 3147 0             CAF     DGBITS       READ CURRENT VALUE OF DATA GOOD BITS.
 2215                         25,3126  0 0006 1             EXTEND
 2216   REF  10  LAST  551    25,3127  02 033 0             RAND    CHAN33
 2217   REF   1               25,3130  55'113 1             TS      OLDATAGD

 2218   REF   1               25,3131  4 3074 0             CS      ALLREAD
 2219                         25,3132  0 0006 1             EXTEND
 2220   REF   8  LAST  470    25,3133  03 013 0             WAND    CHAN13       REMOVE ALL RADAR BITS

 2221   REF 163  LAST  544    25,3134  50 002 0             INDEX   Q
 2222                         25,3135  3 0000 1             CAF     0
 2223                         25,3136  0 0006 1             EXTEND
 2224   REF   9  LAST  554    25,3137  05 013 0             WOR     CHAN13       SET NEW RADAR BITS

 2225                         25,3140  0 0006 1             EXTEND
 2226   REF  14  LAST  462    25,3141  3 0025 0             DCA     TIME2
 2227   REF   5  LAST  554    25,3142  21'106 0             DAS     TIMEHOLD     TIME OF NOMINAL MIDPOINT.

 2228   REF 118  LAST  550    25,3143  3 4755 1             CAF     ZERO
 2229   REF  76  LAST  544    25,3144  54 001 1             TS      L
 2230   REF   3  LAST  490    25,3145  53'102 1             DXCH    SAMPLSUM
 2231   REF   2  LAST  537    25,3146  1 2366 1             TCF     ROADBACK

 2232                         25,3147   00230 0  DGBITS     OCT     230
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P2233    RADAR RUPT READER

R2234    THIS ROUTINE STARTS FROM A RADARUPT. IT READS THE DATA $ LOTS MORE.

  2235   REF    2  LAST    41     25,2000                          SETLOC  RADARUPT
  2236                            25,3150                          BANK

  2237   REF    2 LAST    41 TO   41:      3       3*              COUNT*  $$/RRUPT
  2238                            25,3150   0 0006 1  RADAREAD EXTEND                    MUST SAVE SBANK BECAUSE OF RUPT EXITS
  2239   REF   10  LAST   456     25,3151  04 007  1           ROR     SUPERBNK          VIA TASKOVER (BADEND OR GOODEND.
  2240   REF    3  LAST   254     25,3152  54 016  1           TS      BANKRUPT
  2241                            25,3153   0 0006 1           EXTEND
  2242   REF    3  LAST   254     25,3154  22 012  1           QXCH    QRUPT

  2243   REF    8  LAST   503     25,3155   3 4757 0           CAF     SEVEN
  2244                            25,3156   0 0006 1           EXTEND
  2245   REF   10  LAST   554     25,3157  02 013  1           RAND    CHAN13
  2246   REF    2  LAST   107     25,3160  55'335  1           TS      DNINDEX
  2247                            25,3161   0 0006 1           EXTEND                    IF RADAR SELECT BITS ZERO,DO NOT STORE
  2248   REF    1                 25,3162   1 3166 1           BZF     TRYCOUNT          DATA FOR DOWNLIST (ERASABLE PROBLEMS)
  2249   REF    1                 25,3163   3 0046 0           CA      RNRAD
  2250   REF    3  LAST   555     25,3164  51'335  0           INDEX   DNINDEX
  2251   REF    4  LAST   196     25,3165  55'332  0           TS      DNRRANGE -1
  2252   REF    3  LAST   554     25,3166  11'100  0  TRYCOUNT CCS     SAMPLIM
  2253   REF    1                 25,3167   1 3211 1           TCF     PLENTY
  2254   REF    1                 25,3170   1 3174 1           TCF     NOMORE
  2255   REF   23  LAST   543     25,3171   0 5567 0           TC      ALARM
  2256                            25,3172    00520 0           OCT     520
  2257   REF   16  LAST   260     25,3173   0 5270 1           TC      RESUME

  2258   REF    3  LAST   280     25,3174   3 0107 1  NOMORE   CA      FLGWRD11          IS LRBYPASS SET?
  2259   REF    3  LAST   280     25,3175   7 4735 0           MASK    LRBYBIT
  2260                            25,3176   0 0006 1           EXTEND
  2261   REF    1                 25,3177   1 3206 1           BZF     BADRAD            NO.  P12 IS ON -- BYPASS 521 ALARM.

  2262   REF   10  LAST   374     25,3200   4 0077 0           CS      FLAGWRD3          CHECK R04FLAG.
  2263   REF    4  LAST   277     25,3201   7 4743 1           MASK    R04FLBIT          IF 1,R04 IS RUNNING. DO NOT ALARM-
  2264                            25,3202   0 0006 1           EXTEND
  2265   REF    2  LAST   555     25,3203   1 3206 1           BZF     BADRAD

  2266   REF   24  LAST   555     25,3204   0 5567 0           TC      ALARM             P20 WANTS THE ALARM.
  2267                            25,3205    00521 1           OCT     521
  2268   REF   70  LAST   554     25,3206   4 4753 0  BADRAD   CS      ONE
  2269   REF    4  LAST   555     25,3207  55'100  0           TS      SAMPLIM
  2270   REF    2  LAST   546     25,3210   0 3560 1           TC      RDBADEND -2
  2271   REF    5  LAST   555     25,3211  55'100  0  PLENTY   TS      SAMPLIM
  2272   REF   25  LAST   554     25,3212   3 4751 0           CAF     BIT3
  2273                            25,3213   0 0006 1           EXTEND
  2274   REF   11  LAST   555     25,3214  02 013  1           RAND    CHAN13            TO FIND OUT WHICH RADAR
  2275                            25,3215   0 0006 1           EXTEND
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 2276    REF    1                   25,3216   1 3276 0                BZF     RENDRAD

 2277    REF    1                   25,3217   0 3364 0                TC      R77CHECK           R77 QUITS HERE.
 2278    REF   80   LAST   552      25,3220   3 0110 1   LRPOSCHK     CA      RADMODES           SEE IF LR IN DESIRED POSITION.
 2279                               25,3221   0 0006 1                EXTEND
 2280    REF   11   LAST   554      25,3222   06 033 1                RXOR    CHAN33
 2281    REF   37   LAST   462      25,3223   7 4746 1                MASK    BIT6
 2282                               25,3224   0 0006 1                EXTEND
 2283    REF    1                   25,3225   1 3231 0                BZF     VELCHK

 2284    REF   25   LAST   555      25,3226   0 5567 0                TC      ALARM
 2285                               25,3227    00522 1                OCT     522
 2286    REF    3   LAST   555      25,3230   0 3206 0                TC      BADRAD

 2287    REF    1                   25,3231   3 6245 1   VELCHK       CAF     BIN3               = 00003 OCT
 2288                               25,3232   0 0006 1                EXTEND
 2289    REF   12   LAST   555      25,3233   06 013 0                RXOR    CHAN13             RESET ACTIVITY BIT
 2290    REF    2   LAST   556      25,3234   7 6245 0                MASK    BIN3
 2291                               25,3235   0 0006 1                EXTEND
 2292    REF    1                   25,3236   1 3272 1                BZF     LRHEIGHT           TAKE A LR RANGE READING

 2293    REF   11   LAST   525      25,3237   3 4733 1                CAF     POSMAX
 2294    REF    2   LAST   555      25,3240   7 0046 1                MASK    RNRAD
 2295    REF    1                   25,3241   6 2000 0                AD      LVELBIAS
 2296    REF   77   LAST   554      25,3242   54 001 1                TS      L
 2297    REF    3   LAST   556      25,3243   30 046 0                CAF     RNRAD
 2298                               25,3244   6 0000 1                DOUBLE
 2299    REF   27   LAST   527      25,3245   7 4753 0                MASK    BIT1
 2300    REF    7   LAST   258      25,3246   52 064 1                DXCH    ITEMP3

 2301    REF   25   LAST   524      25,3247   3 4744 1                CAF     BIT8               DATA GOOD ISNT CHECKED UNTIL AFTER READ-
 2302    REF    1                   25,3250   0 3442 0                TC      DGCHECK            ING DATA SO SOME RADAR TESTS WILL WORK
A2303                                                                                            INDEPENDENT OF DATA GOOD.

 2304    REF    2   LAST   554      25,3251   11'111 0                CCS     NSAMP
 2305    REF    1                   25,3252   0 3262 1                TC      NOEND
 2306    REF   71   LAST   555      25,3253   4 4753 0   GOODRAD      CS      ONE
 2307    REF    6   LAST   555      25,3254   55'100 0                TS      SAMPLIM
 2308    REF   19   LAST   544      25,3255   4 0061 1                CS      ITEMP1             WHEN ENOUGH GOOD DATA HAS BEEN GATHERED,
 2309    REF   81   LAST   556      25,3256   7 0110 0                MASK    RADMODES           RESET DATA FAIL FLAGS FOR SETTRKF.
 2310    REF   82   LAST   556      25,3257   54 110 0                TS      RADMODES
 2311    REF    1                   25,3260   0 3616 0                TC      RADLITES           LAMPS MAY GO OFF IF DATA JUST GOOD.
 2312    REF    2   LAST   532      25,3261   0 3553 1                TC      RGOODEND -2

 2313    REF    3   LAST   556      25,3262   55'111 0   NOEND        TS      NSAMP
 2314    REF    7   LAST   556      25,3263   11'100 0   RESAMPLE     CCS     SAMPLIM            SEE IF ANY MORE TRIES SHOULD BE MADE.
 2315                               25,3264   1 3266 1                TCF     +2
 2316    REF    1                   25,3265   1 3461 0                TCF     DATAFAIL           N SAMPLES NOT AVAILABLE.
 2317    REF   24   LAST   551      25,3266   3 4750 1                CAF     BIT4               RESET ACTIVITY BIT.
 2318                               25,3267   0 0006 1                EXTEND
 2319   REF  13  LAST  556   25,3270  05 C13 0             WOR     CHAN13         RESET ACTIVITY BIT
 2320   REF  17  LAST  555   25,3271  0 5270 1             TC      RESUME


 2321   REF  25  LAST  488   25,3272  3 4747 1  LRHEIGHT   CAF     BIT5
 2322   REF  20  LAST  556   25,3273  54 061 1             TS      ITEMP1         (POSITION OF DATA GOOD BIT IN CHAN 33)

 2323   REF  19  LAST  331   25,3274  3 4743 0             CAF     BIT9
 2324   REF   1              25,3275  0 3320 0             TC      SCALECHK -1

 2325   REF   6  LAST  552   25,3276  3 4741 1  RENDRAD    CAF     REPOSBIT       MAKE SURE ANTENNA HAS NOT GONE OUT OF
 2326   REF  83  LAST  556   25,3277  7 0110 0             MASK    RADMODES       LIMITS.
 2327   REF 191  LAST  554   25,3300  10 000 0             CCS     A
 2328   REF   4  LAST  556   25,3301  1 3206 1             TCF     BADRAD

 2329   REF  84  LAST  557   25,3302  4 0110 0             CS      RADMODES       BE SURE RR CDU HASNT FAILED.
 2330   REF   6  LAST  470   25,3303  7 4745 1             MASK    RCDUFBIT
 2331   REF 192  LAST  557   25,3304  10 000 0             CCS     A
 2332   REF   5  LAST  557   25,3305  1 3206 1             TCF     BADRAD

 2333   REF  25  LAST  556   25,3306  3 4750 1             CAF     BIT4           SEE IF DATA HAS BEEN GOOD.
 2334   REF  21  LAST  557   25,3307  54 061 1             TS      ITEMP1         (POSITION OF DATA GOOD BIT IN CHAN 33)

 2335   REF  28  LAST  556   25,3310  3 4753 1             CAF     BIT1           SEE IF RR RDOT.
 2336                        25,3311  0 0006 1             EXTEND
 2337   REF  14  LAST  557   25,3312  02 013 1             RAND    CHAN13
 2338   REF 164  LAST  554   25,3313  54 002 1             TS      Q              FOR LATER TESTING.
 2339   REF 193  LAST  557   25,3314  10 000 0             CCS     A
 2340                        25,3315  1 3317 0             TCF     +2
 2341   REF   1              25,3316  1 3331 1             TCF     RADIN          NO SCALE CHECK FOR RR RDOT.
 2342   REF  26  LAST  555   25,3317  3 4751 0             CAF     BIT3
 2343   REF  78  LAST  556   25,3320  54 001 1             TS      L

 2344                        25,3321  0 0006 1  SCALECHK   EXTEND
 2345   REF  12  LAST  556   25,3322  02 033 0             RAND    CHAN33         SCALE STATUS NOW
 2346   REF  79  LAST  557   25,3323  56 001 0             XCH     L
 2347   REF  85  LAST  557   25,3324  7 0110 0             MASK    RADMODES       SCALE STATUS BEFORE
 2348                        25,3325  0 0006 1             EXTEND
 2349   REF  12  LAST  532   25,3326  06 001 0             RXOR    LCHAN          SEE IF THEY DIFFER
 2350   REF 194  LAST  557   25,3327  10 000 0             CCS     A
 2351   REF   1              25,3330  0 3350 1             TC      SCALCHNG       THEY DIFFER

 2352   REF  12  LAST  556   25,3331  3 4733 1  RADIN      CAF     POSMAX
 2353   REF   4  LAST  556   25,3332  7 0046 1             MASK    RNRAD
 2354   REF   5  LAST  258   25,3333  54 064 1             TS      ITEMP4

 2355   REF   5  LAST  557   25,3334  30 046 0             CAE     RNRAD
 2356                        25,3335  6 0000 1             DOUBLE
 2357   REF  29  LAST  557   25,3336  7 4753 0             MASK    BIT1
 2358   REF   8  LAST  556   25,3337  54 063 0             TS      ITEMP3
 2359   REF 165  LAST  557   25,3340  10 002 1            CCS     Q                SEE IF RR RDOT.
 2360   REF   1              25,3341  1 3402 0            TCF     SCALADJ          NO, BUT SCALE CHANGING MAY BE NEEDED.

 2361                        25,3342  0 0006 1            EXTEND                   IF RR RANGE RATE, THROW OUT BIAS.
 2362   REF   1              25,3343  4 2002 0            DCS     RDOTBIAS
 2363   REF   9  LAST  557   25,3344  20 064 1  DASAMPL   DAS     ITEMP3
 2364   REF  22  LAST  557   25,3345  3 0061 0  DGCHECK2  CA      ITEMP1           SEE THAT DATA HAS BEEN GOOD BEFORE AND
 2365   REF   2  LAST  556   25,3346  0 3443 1            TC      DGCHECK +1       AFTER TAKING SAMPLE.
 2366   REF   1              25,3347  0 3253 0            TC      GOODRAD

 2367   REF  86  LAST  557   25,3350  22 110 1  SCALCHNG  LXCH    RADMODES
 2368   REF  30  LAST  557   25,3351  6 4753 1            AD      BIT1
 2369                        25,3352  0 0006 1            EXTEND
 2370   REF  13  LAST  557   25,3353  06 001 0            RXOR    LCHAN
 2371   REF  87  LAST  558   25,3354  54 110 0            TS      RADMODES
 2372   REF   2  LAST  554   25,3355  3 3147 0            CAF     DGBITS ←         UPDATE LAST VALUE OF DATA GOOD BITS.
 2373                        25,3356  0 0006 1            EXTEND
 2374   REF  13  LAST  557   25,3357  02 033 0            RAND    CHAN33
 2375   REF   2  LAST  554   25,3360  55 113 1            TS      OLDATAGD
 2376   REF  30  LAST  519   25,3361  0 5504 0            TC      UPFLAG           SET RNGSCFLG
 2377   REF   1              25,3362   00120 1            ADRES   RNGSCFLG         FOR LRS24.1
 2378   REF   6  LAST  557   25,3363  1 3206 1            TCF     BADRAD

R2379   R77 MUST IGNORE DATA FAILS SO AS NOT TO DISTURB THE ASTRONAUT.

 2380   REF  16  LAST  490   25,3364  4 0101 0  R77CHECK  CS      FLAGWRD5
 2381   REF   4  LAST  490   25,3365  7 4741 0            MASK    R77FLBIT
 2382   REF 195  LAST  557   25,3366  10 000 0            CCS     A
 2383   REF 166  LAST  558   25,3367  0 0002 0            TC      Q                NOT R77
 2384   REF   1              25,3370  4 3401 0            CS      BITS5,8          UPDATE LR DATA GOOD BITS IN RADMODES
 2385   REF  88  LAST  558   25,3371  7 0110 0            MASK    RADMODES
 2386   REF  80  LAST  557   25,3372  54 001 1            TS      L
 2387   REF   2  LAST  558   25,3373  3 3401 1            CA      BITS5,8
 2388                        25,3374  0 0006 1            EXTEND
 2389   REF  14  LAST  558   25,3375  02 033 0            RAND    CHAN33
 2390   REF  91  LAST  558   25,3376  6 0001 0            AD      L
 2391   REF  89  LAST  558   25,3377  54 110 0            TS      RADMODES
 2392   REF   3  LAST  556   25,3400  0 3553 1            TC      RGOODEND -2
 2393                        25,3401   00220 1  BITS5,8   OCT     220
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P2394             THE FOLLOWING ROUTINE INCORPORATES RR RANGE AND LR ALT SCALE INFORMATION AND LEAVES DATA AT LO SCALE.

 2396   REF  82  LAST  558   25,3402  10 001 1  SCALADJ  CCS    L                  L HAS SCALE INBIT FOR THIS RADAR.
 2397                        25,3403   1 3405 1           TCF    +2                 ON HIGH SCALE.
 2398   REF   1              25,3404   1 3345 1           TCF    DGCHECK2

 2399   REF   4  LAST  555   25,3405   3 1335 0           CA     DNINDEX
 2400   REF  27  LAST  557   25,3406   7 4751 1           MASK   BIT3
 2401   REF 196  LAST  558   25,3407  10 000 0           CCS    A
 2402   REF   1              25,3410   1 3417 1           TCF    LRSCK

 2403   REF  10  LAST  558   25,3411  52 064 1           DXCH   ITEMP3
 2404                        25,3412  20 001 1           DDOUBL
 2405                        25,3413  20 001 1           DDOUBL
 2406                        25,3414  20 001 1           DDOUBL
 2407   REF  11  LAST  559   25,3415  52 064 1           DXCH   ITEMP3

 2408   REF   2  LAST  559   25,3416   1 3345 1           TCF    DGCHECK2

 2409   REF  12  LAST  559   25,3417  10 063 0  LRSCK    CCS    ITEMP3
 2410                        25,3420   1 3431 0           TCF    +11
 2411   REF   6  LAST  557   25,3421   4 0064 1           CS     ITEMP4
 2412   REF   1              25,3422   6 3441 0           AD     HISCALIM
 2413                        25,3423   0 0006 1           EXTEND
 2414                        25,3424   6 3431 1           BZMF   +5

 2415   REF   4  LAST  555   25,3425   4 0107 0           CS     FLGWRD11
 2416   REF   1              25,3426   7 4751 1           MASK   SCABBIT
 2417   REF   5  LAST  559   25,3427  26 107 0           ADS    FLGWRD11
 2418                        25,3430   1 3434 0           TCF    +4

 2419   REF   2  LAST  559   25,3431   4 4751 1           CS     SCABBIT
 2420   REF   6  LAST  559   25,3432   7 0107 0           MASK   FLGWRD11
 2421   REF   7  LAST  559   25,3433  54 107 0           TS     FLGWRD11

 2422                        25,3434   0 0006 1           EXTEND
 2423   REF  13  LAST  559   25,3435   3 0064 0           DCA    ITEMP3
 2424                        25,3436  20 001 1           DDOUBL
 2425                        25,3437  20 001 1           DDOUBL
 2426   REF   1              25,3440   1 3344 0           TCF    DASAMPL

 2427                        25,3441   00714 0  HISCALIM DEC    460                2481.7 FT   ******************************
 2428   REF  23  LAST  558   25,3442  54 0o1 1  DGCHECK   TS      ITEMP1         UPDATE DATA GOOD BIT IN OLDATAGD AND
 2429                        25,3443  0 0006 1            EXTEND                 MAKE SURE IT WAS ON BEFORE AND AFTER THE
 2430   REF  15  LAST  558   25,3444  02 033 0            RAND    CHAN33         SAMPLE WAS TAKEN BEFORE RETURNING. IF
 2431   REF  83  LAST  559   25,3445  54 001 1            TS      L              NOT, GOES TO RESAMPLE TO TRY AGAIN. IF
 2432   REF  24  LAST  560   25,3446  4 0061 1            CS      ITEMP1         MAX NUMBER OF TRIES HAS BEEN REACHED,
 2433   REF   3  LAST  558   25,3447  7 1113 1            MASK    OLDATAGD       THE BIT CORRESPONDING TO THE DATA GOOD
 2434   REF  84  LAST  560   25,3450  6 0001 0            AD      L              WHICH FAILED TO APPEAR IS IN ITEMP1 AND
 2435   REF   4  LAST  560   25,3451  57'113 0            XCH     OLDATAGD       CAN BE USED TO SET RADMODES WHICH VIA
 2436   REF  25  LAST  560   25,3452  7 0061 1            MASK    ITEMP1         SETTRKF SETS THE TRACKER FAIL LAMP.
 2437   REF  85  LAST  560   25,3453  6 0001 0            AD      L
 2438   REF 197  LAST  559   25,3454  10 000 0            CCS     A              SHOULD BOTH BE ZERO.
 2439   REF   1              25,3455  0 3263 0            TC      RESAMPLE
 2440   REF  14  LAST  559   25,3456  52 064 1            DXCH    ITEMP3         IF DATA GOOD BEFORE AND AFTER, ADD TO
 2441   REF   4  LAST  554   25,3457  21'102 1            DAS     SAMPLSUM       ACCUMULATION.
 2442   REF 167  LAST  558   25,3460  0 0002 0            TC      Q

 2443   REF  26  LAST  560   25,3461  4 0061 1  DATAFAIL  CS      ITEMP1         IN THE ABOVE CASE, SET RADMODES BIT
 2444   REF  90  LAST  558   25,3462  7 0110 0            MASK    RADMODES       SHOWING SOME RADAR DATA FAILED.
 2445   REF  27  LAST  560   25,3463  6 0061 0            AD      ITEMP1
 2446   REF  91  LAST  560   25,3464  54 110 0            TS      RADMODES

 2447   REF  15  LAST  560   25,3465  52 064 1            DXCH    ITEMP3         IF WE HAVE BEEN UNABLE TO GATHER N
 2448   REF   5  LAST  560   25,3466  53'102 1            DXCH    SAMPLSUM       SAMPLES, USE LAST ONE ONLY.

 2449   REF   2  LAST  556   25,3467  0 3616 0            TC      RADLITES
 2450   REF   2  LAST  555   25,3470  1 3174 1            TCF     NOMORE
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P2451    THIS ROUTINE CHANGES THE LR POSITION, AND CHECKS THAT IT GOT THERE.

 2452    REF    2  LAST  526    25,2000                          SETLOC P20S1
 2453                           25,3471                          BANK

 2454    REF    2 LAST  526 TO  555:    566    566*              COUNT* $$/RSUB
 2455                           25,3471  0 0004 0  LRPOS2        INHINT

 2456    REF   92  LAST  560    25,3472  4 0110 0                CS      RADMODES
 2457    REF    1               25,3473  7 4746 1                MASK    LRPOSBIT          SHOW DESIRED LR POSITION IS 2
 2458    REF   93  LAST  561    25,3474  26 110 0                ADS     RADMODES

 2459    REF   24  LAST  511    25,3475  3 4745 0                CAF     BIT7
 2460                           25,3476  0 0006 1                EXTEND
 2461    REF   16  LAST  560    25,3477  02 033 0                RAND    CHAN33            SEE IF ALREADY THERE.
 2462                           25,3500  0 0006 1                EXTEND
 2463    REF    2  LAST  537    25,3501  1 3530 0                BZF     RADNOOP

 2464    REF   23  LAST  424    25,3502  3 4737 0                CAF     BIT13
 2465                           25,3503  0 0006 1                EXTEND
 2466    REF    3  LAST  551    25,3504  05 012 1                WOR     CHAN12            COMMAND TO POSITION 2
 2467    REF    1               25,3505  3 3545 0                CAF     6SECS             START SCANNING FOR INBIT AFTER 7 SECS.
 2468    REF   22  LAST  541    25,3506  0 5203 0                TC      WAITLIST
 2469    REF   27  LAST  552    E7,1456                          EBANK=  LOSCOUNT
 2470    REF    1               25,3507   03543 0                2CADR   LRPOSCAN
 2470    REF    1               25,3510   52067 1
 2471    REF    3  LAST  554    25,3511  0 2366 0                TC      RDADBACK

 2472    REF    8  LAST  556    25,3512  55'100 0  LRPOSNXT      TS      SAMPLIM
 2473    REF    9  LAST  546    25,3513  0 5221 0                TC      FIXDELAY          SCAN ONCE PER SECOND 15 TIMES MAX AFTER
 2474                           25,3514   00144 0                DEC     100               INITIAL DELAY OF 7 SECONDS.

 2475    REF   25  LAST  561    25,3515  3 4745 0                CAF     BIT7              SEE IF LR POS2 IS ON
 2476                           25,3516  0 0006 1                EXTEND
 2477    REF   17  LAST  561    25,3517  02 033 0                RAND    CHAN33
 2478                           25,3520  0 0006 1                EXTEND
 2479    REF    1               25,3521  1 3535 0                BZF     LASTLFDT          IF THERE, WAIT FINAL SECOND FOR BOUNCE.

 2480    REF       LAST  561    25,3522  11'100 0                CCS     SAMPLIM           SEE IF MAX TIME UP.
 2481    REF    1               25,3523  1 3512 0                TCF     LRPOSNXT

 2482    REF   24  LAST  561    25,3524  4 4737 1                CS      BIT13             IF TIME UP, DISABLE COMMAND AND ALARM.
 2483                           25,3525  0 0006 1                EXTEND
 2484    REF   36  LAST  561    25,3526  03 012 1                WAND    CHAN12
 2485    REF    3  LAST  555    25,3527  1 3562 1                TCF     RDBADEND

 2486    REF   72  LAST  556    25,3530  3 4753 1  RADNOOP       CAF     ONE               NO FURTHER ACTION REQUESTED.
 2487    REF   23  LAST  561    25,3531  0 5203 0                TC      WAITLIST
 2488    REF   28  LAST  561    E7,1456                          EBANK=  LOSCOUNT
 2489    REF    4  LAST  558    25,3532   03555 1                2CADR   RGOODEND
 2489                           25,3533   52067 1
 2490   REF   4  LAST  561    25,3534   0 2366 0              TC       ROADBACK

 2491   REF   3  LAST  507    25,3535   3 5000 1  LASTLRDT CA       2SECS             WAIT TWO SECONDS AFTER RECEIPT OF INBIT
 2492   REF   3  LAST  165    25,3536   0 5224 0              TC       VARDELAY          TO WAIT FOR ANTENNA BOUNCE TO DIE OUT.

 2493   REF  25  LAST  561    25,3537   4 4737 1              CS       BIT13             REMOVE COMMAND
 2494                         25,3540   0 0006 1              EXTEND
 2495   REF  37  LAST  561    25,3541   03 012 1              WAND     CHAN12
 2496   REF   5  LAST  561    25,3542   1 3555 0              TCF      RGOODEND

 2497   REF   1               25,3543   3 4317 0  LRPOSCAN CAF      FOURTEEN          SET UP FOR 15 SAMPLES.
 2498   REF   2  LAST  561    25,3544   1 3512 0              TCF      LRPOSNXT

 2499                         25,3545    01130 1  6SECS    DEC      600
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P2500             SEQUENCES TO TERMINATE RR OPERATIONS.

 2501    REF   7  LAST  557   25,3546  3 4745 0  ENDRADAR CAF     RCDUFBIT          PROLOG TO CHECK RR CDU FAIL BEFORE END.
 2502    REF  94  LAST  561   25,3547  7 0110 0           MASK    RADMODES
 2503    REF 198  LAST  560   25,3550 10 000 0            CCS     A
 2504    REF   6  LAST  562   25,3551  1 3555 0           TCF     RGOODEND
 2505    REF   4  LAST  561   25,3552  1 3562 1           TCF     RDBADEND
 2506    REF 119  LAST  554   25,3553  4 4755 0   -2      CS      ZERO              RGOODEND WHEN NOT UNDER WAITLIST CONTROL
 2507    REF   2  LAST  100   25,3554 54 734 0            TS      RUPTAGN

 2508    REF  35  LAST  541   25,3555  3 4752 0  RGOODEND CAF     TWO
 2509    REF  37  LAST  519   25,3556  0 4635 0           TC      POSTJUMP
 2510    REF   2  LAST  245   25,3557   17665 1           CADR    GOODEND

 2511    REF 120  LAST  563   25,3560  4 4755 0   -2      CS      ZERO              RDBADEND WHEN NOT UNDER WAITLIST.
 2512    REF   3  LAST  563   25,3561 54 734 0            TS      RUPTAGN
 2513    REF  36  LAST  563   25,3562  3 4752 0  RDBADEND CAF     TWO
 2514    REF  38  LAST  563   25,3563  0 4635 0           TC      POSTJUMP
 2515    REF   1              25,3564   17662 0           CADR    BADEND

 2516    REF  18  LAST  509      6245            BIN3     EQUALS THREE
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P2517    PROGRAM NAME_ LPS20.1 VECTOR EXTRAPOLATION AND LOS COMPUTATION
R2518    MOD. NO.  2       BY  J.D. COYNE     SDC     DATE   12-7-66

R2519    FUNCTIONAL DESCRIPTION_

R2520    1) EXTRAPOLATE THE LEM AND CSM VECTORS IN ACCORDANCE WITH THE TIME REFERED TO IN CALLER + 1.
R2522    2) COMPUTES THE LOS VECTOR TO THE CSM, CONVERTS IT TO STABLE MEMBER COORDINATES AND STORES IT IN RRTARGET.
R2524    3) COMPUTES THE MAGNITUDE OF THE LOS VECTOR AND STORES IT IN MLOSV

R2525    CALLING SEQUENCE        CALL
R2526                                       LPS20.1

R2527    SUBROUTINES CALLED_

R2528    LEMPREC,CSMPREC

R2529    NORMAL EXIT_ RETURN TO CALLER + 2

R2530    ERROR EXITS_ NONE

R2531    ALARMS_ NONE

R2532    OUTPUT_

R2533    LOS VECTOR (HALF UNIT) IN SM COORDINATES STORED IN RRTARGET
R2534    MAGNITUDE OF THE LOS VECTOR (METERS SCALED B-29) STORED IN MSLOV
R2535    RRNBSW CLEARED

R2536    INITIALIZED ERASFABLE

R2537    TDEC1 MUST CONTAIN THE TIME FOR EXTRAPOLATION
R2538    SEE ORBITAL INTEGRATION ROUTINE

R2539    DEBRIS_

R2540    MPAC DESTROYED BY THIS ROUTINE

 2541                         23,2314                 BANK    23
 2542    REF    4  LAST  516   24,2000                 SETLOC P20S
 2543                         24,3255                 BANK
 2544   REF    1                                                 COUNT* $$/LPS20

 2545                          24,3255   43020 1  LPS20.1   STQ     BOFF
 2546   REF    3  LAST  500    24,3256   01757 0                    LS21X
 2547   REF    8  LAST  551    24,3257   01343 1                    LOSCMFLG        LOSCMFLG = 0 MEANS NOT CALLED BY R21
 2548   REF    1               24,3260   51264 0                    LMINT           SO CALL LEMCONIC TO GET LM STATE
 2549                          24,3261   77614 1            BON                     IF IN R21 AND ON LUNAR SURFACE
 2550   REF    5  LAST  500    24,3262   04307 1                    SURFFLAG        DON'T CALL LEMCONIC
 2551   REF    1               24,3263   51274 1                    CSMINT
 2552                          24,3264   77624 1  LMINT     CALL
 2553   REF    3  LAST  487    24,3265   27100 0                    LEMCONIC        EXTRAPOLATE LEM
 2554                          24,3266   77775 1            VLOAD
 2555   REF    5  LAST  487    24,3267   00001 0                    RATT
 2556   REF    3  LAST  500    24,3270   26352 1            STOVL   LMPOS           SAVE LM POSITION B-29
 2557   REF    1               24,3271   00007 0                    VATT
 2558   REF    3  LAST  500    24,3272   16360 0            STODL   LMVEL           SAVE LM VELOCITY B-7
 2559   REF    5  LAST  493    24,3273   00015 0                    TAT
 2560   REF   15  LAST  518    24,3274   34041 0  CSMINT    STCALL  TDEC1
 2561   REF    2  LAST  339    24,3275   27066 1                    CSMCONIC         EXTRAPOLATE CSM
 2562                          24,3276   52375 1            VLOAD   VSU             COMPUTE RELATIVE VELOCITY V(CSM) - V(LM)
 2563   REF    2  LAST  565    24,3277   00007 0                    VATT
 2564   REF    4  LAST  565    24,3300   02360 0                    LMVEL
 2565                          24,3301   76521 0            MXV     VSL1
 2566   REF    8  LAST  487    24,3302   01734 0                    REFSMMAT
 2567                          24,3303   77776 1            EXIT
 2569   REF    6  LAST  552    24,3304   0 6027 1           TC      KILLTASK        KILL THE TASK WHICH CALLS DODES SINCE
 2570   REF    3  LAST  552    24,3305   52602 1            CADR    DESLOOP +2      STORING INTO ERASEABLES DODES USES
 2571   REF   48  LAST  551    24,3306   0 6037 0           TC      INTPRET
 2572   REF    4  LAST  551    24,3307   25761 0            STOVL   LOSVEL
 2573   REF    6  LAST  565    24,3310   00001 0                    RATT
 2574                          24,3311   43051 1            VSU     BOFF
 2575   REF    4  LAST  565    24,3312   02352 1                    LMPOS
 2576   REF    3  LAST  495    24,3313   00350 1                    RNDVZFLG
 2577   REF    1               24,3314   51321 0                    NOTSHIFT
 2578                          24,3315   77604 0            BOVB
 2579   REF    1               24,3316   57753 1                    TCDANZIG
 2580                          24,3317   77661 0            VSL
 2581                          24,3320   20212 1                    9D
 2583                          24,3321   41056 1  NOTSHIFT  UNIT    BOVB            IF OVERFLOW , RANGE MUST BE GREATER
25835   REF    1               24,3322   50102 1                    526ALARM        THAN 400 N. M.
 2584                          24,3323   76521 0            MXV     VSL1
 2585   REF    9  LAST  565    24,3324   01734 0                    REFSMMAT        CONVERT TO STABLE MEMBER
 2586   REF   10  LAST  551    24,3325   15102 0            STODL   RRTARGET
 2587                          24,3326   00045 0                    36D             SAVE MAGNITUDE OF LOS VECTOR FOR
 2588   REF    4  LAST  552    24,3327   01767 0            STORE   MLOSV           VELOCITY CORRECTION IN DESIGNATE
 2589                          24,3330   77614 1            CLRGO
 2590   REF    5  LAST  550    24,3331   00231 1                    RRNBSW
 2591   REF    4  LAST  565    24,3332   01757 0                    LS21X
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R2592   PROGRAM NAME_ LPS20.2  400 NM RANGE CHECK
R2593   MOD. NO. 2   BY J.D. COYNE   SDC     DATE  12-7-66

R2594   FUNCTIONAL DESCRIPTION_

R2595   COMPARES THE MAGNITUDE OF THE LOS VECTOR TO 400 NM

R2596   CALLING SEQUENCE _     CALL
R2597                                    LPS20.2

R2598   SUBROUTINES CALLED_ NONE

R2599   NORMAL EXIT _ RETURN TO CALLER +1, MPAC EQ 0 (RANGE 400NM OR LESS.)

R2600   ERROR EXITS _ RETURN TO CALLER +1, MPAC EQ 1 (RANGE GREATER THAN 400NM)

R2601   ALARMS_ NONE

R2602   OUTPUT_ NONE

R2603   INITIALIZED ERASEABLE_

R2604   PDL 36D MUST CONTAIN THE MAGNITUDE OF THE VECTOR
R2605   DEBRIS

R2606   MPAC DESTROYED BY THIS ROUTINE

  2607  REF   3  LAST  561   25,2000                          SETLOC P20S1
  2608                       25,3565                          BANK
  2609  REF   1                                               COUNT* $$/LPS20

  2610                       25,3565   45345 1  LPS20.2  DLOAD  DSU
  2611  REF   5  LAST  565   25,3566   01767 0                  MLOSV             MAGNITUDE OF LOS
  2612  REF   1              25,3567   13600 0                  FHNM              OVER 400NM  _
  2613                       25,3570   77644 1           BPL
  2614  REF   1              25,3571   53574 1                  TOFAR
  2615                       25,3572   43535 0           SLOAD  RVQ
  2616  REF   1              25,3573   06522 1                  ZERO/SP
  2617                       25,3574   43535 0  TOFAR    SLOAD  RVQ
  2618  REF   1              25,3575   13577 0                  ONE/SP
  2619                       25,3576   00001 0  ONE/SP   DEC    1
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 2620                          25,3577   26467 0  FHNM      2DEC     740800 B-20      400 NAUTICAL MILES IN METERS B-20
 2620                          25,3600   00000 1
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P2621    PROGRAM NAME: LRS22.1 (DATA READ SUBROUTINE 1)
R2622    MOD. NO.: 1         BY:  P. VOLANTE  SDC             DATE: 11-15-66


R2623    FUNCTIONAL DESCRIPTION

R2624    1) READS RENDEZVOUS RADAR RANGE AND RANGE-RATE,TRUNION AND SHAFT ANGLES,THREE CDU VALUES AND TIME. CONVERTS THIS
R2626    DATA AND LEAVES IT FOR THE MEASUREMENT INCORPORATION ROUTINE (LSR22.3). CHECKS FOR THE RR DATA GOOD DISCRETE,FOR
R2628    RR REPOSITION AND RR CDU FAIL

R2629    2) COMPARES RADAR LOS WITH LOS COMPUTED FROM STATE VECTORS TO SEE IF THEY ARE WITHIN THREE DEGREES


R2631    CALLING SEQUENCE: BANKCALL FOR LRS22.1


R2632    SUBROUTINES CALLED:

R2633            RRRDOT    LPS20.1
R2634            RRRANGE   BANKCALL
R2635            RADSTALL  CDULOGIC
R2636            RRNB      SMNB
R2637    NORMAL EXIT: RETURN TO CALLER+1 WITH MPAC SET TO +0


R2638    ERROR EXITS: RETURN TO CALLER+1 WITH ERROR CODE STORED IN MPAC AS FOLLOWS:

R2640                   00001-ERROR EXIT 1-RR DATA NO GOOD (NO RR DATA GOOD DISCRETE OR RR CDU FAIL OR RR REPOSITION)
R2642                   00002-ERROR EXIT 2-RR LOS NOT WITHIN THREE DEGREES OF LOS COMPUTED FROM STATE VECTORS


R2644    ALARMS:  521-COULD NOT READ RADAR DATA (RR DATA GOOD DISCRETE NOT PRESENT BEFORE AND AFTER READING THE RADAR)
R2646     (THIS ALARM IS ISSUED BY THE RADAREAD SUBROUTINE WHICH IS ENTERED FROM A RADARUPT)


R2648    OUTPUT: RRLOSVEC- THE RR LINE-OF-SIGHT VECTOR(USED BY LRS22.2)-A HALF-UNIT VECTOR
R2650            RM- THE RR RANGE READING(TO THE CSM) DP, IN METERS SCALED B-29(USED BY LRS22.2 AND LRS22.3)

R2652      ALL OF THE FOLLOWING OUTPUTS ARE USED BY LRS22.3:

R2653            RDOTM- THE RR RANGE-RATE READING,DP, IN METERS PER CENTISECOND, SCALED B-7
R2655            RRTRUN-RR TRUNION ANGLE,DP,IN REVOLUTIONS,SCALED B0
R2656            RRSHAFT-RR SHAFT ANGLE,DP,IN REVOLUTIONS,SCALED B0
R2657            AIG,AMG,AOG-THE CDU ANGLES,THREE SP WORDS
R2658            MKTIME-THE TIME OF THE RR READING,DP,IN CENTISECONDS


R2659    ERASABLE INITIALIZATION REQUIRED:

R2660      RNRAD,THE RADAR READ COUNTER FROM WHICH IS OBTAINED:
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R2661        1)RR RANGE SCALED 9.38 FT. PER BIT ON THE LOW SCALE AND 75.04 FT. PER BIT ON THE HIGH SCALE
R2663        2)RR RANGE RATE,SCALED .6278 FT./SEC. PER BIT

R2664        THE CDU ANGLES FROM CDUX,CDUY,CDUZ AND TIME1 AND TIME2

R2665     DEBRIS:  LRS22.1X,A,L,Q,PUSHLIST

  2666                           32,2366                           BANK     32
  2667    REF    2  LAST   41    32,2000                           SETLOC LRS22
  2668                           32,2366                           BANK
  2669    REF    2 LAST   41 TO   41:      4     4*                COUNT*  $$/LRS22

  2670    REF    7  LAST  543    32,2366  0 4645 1   LRS22.1       TC      MAKECADR
  2671    REF    3  LAST  504    32,2367  55'737 1                 TS      LRS22.1X
  2672    REF   51  LAST  551    32,2370  0 5516 0                 TC      DOWNFLAG
  2673    REF    2  LAST  558    32,2371   00120 1                 ADRES   RNGSCFLG
  2674                           32,2372  0 0004 0                 INHINT
  2675    REF   28  LAST  559    32,2373  3 4751 0                 CAF     BIT3
  2676                           32,2374  0 0006 1                 EXTEND                     GET RR RANGE SCALE
  2677    REF   19  LAST  561    32,2375  02 033 0                 RAND    CHAN33             FROM CHANNEL 33 BIT 3
  2678    REF   86  LAST  560    32,2376  54 0001 1                TS      L
  2679    REF    1               32,2377  4 4751 1                 CS      RRRSBIT
  2680    REF   95  LAST  563    32,2400  7 0110 0                 MASK    RADMODES
  2681    REF   87  LAST  569    32,2401  6 0001 0                 AD      L
  2682    REF   96  LAST  569    32,2402  54 110 0                 TS      RADMODES
  2683                           32,2403  0 0003 1                 RELINT
  2684    REF  142  LAST  552    32,2404  0 4616 1   READRDOT      TC      BANKCALL
  2685    REF    3  LAST  507    32,2405   53103 0                 CADR    RRRDOT             READ RANGE-RATE (ONE SAMPLE)
  2686    REF  143  LAST  569    32,2406  0 4616 1                 TC      BANKCALL
  2687    REF    9  LAST  509    32,2407   17714 0                 CADR    RADSTALL           WAIT FOR DATA READ COMPLETION
  2688    REF    1               32,2410  1 2542 1                 TCF     EREXIT1            COULD NOT READ RADAR-ERROR EXIT 1

  2689                           32,2411  0 0004 0                 INHINT                     NO INTERRUPTS WHILE READING TIME AND CDU
  2690    REF    6  LAST  554    32,2412  53'106 0                 DXCH    TIMEHOLD           SET MARK TIME EQUAL TO THE MID-POINT
  2691    REF  240  LAST  551    32,2413  52 162 0                 DXCH    MPAC +5            TEMP BUFFER FOR DOWNLINK
  2692    REF    6  LAST  560    32,2414  53'102 1                 DXCH    SAMPLSUM           SAVE RANGE-RATE READING
  2693    REF    3  LAST  146    32,2415  53'747 0                 DXCH    RDOTMSAV
  2694                           32,2416  0 0006 1                 EXTEND
  2695    REF    2  LAST  254    32,2417  3 0034 0                 DCA     CDUY               SAVE ICDU ANGLES
  2696    REF  241  LAST  569    32,2420  52 160 1                 DXCH    MPAC +3            TEMP BUFFER FOR DOWNLINK
  2697    REF   10  LAST  387    32,2421  3 0032 0                 CA      CDUX
  2698    REF  242  LAST  569    32,2422  54 156 1                 TS      MPAC +2            TEMP BUFFER FOR DOWNLINK
  2699                           32,2423  0 0006 1                 EXTEND
  2700    REF   15  LAST  554    32,2424  3 0025 0                 DCA     TIME2               SAVE TIME
  2701    REF  243  LAST  569    32,2425  52 155 1                 DXCH    MPAC               SAVE TIME OF CDY READINGS IN MPAC
  2702                           32,2426  0 0006 1                 EXTEND
  2703    REF    9  LAST  548    32,2427  3 0036 1                 DCA     CDUT               SAVE TRUNION AND SHAFT ANGLES FOR RRNB
  2704    REF   21  LAST  550    32,2430  53'110 1                 DXCH    TANG
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2705                          32,2431   0 0003 1       RELINT
2706    REF 144  LAST  569    32,2432   0 4616 1       TC      BANKCALL
2707    REF   2  LAST  491    32,2433    53105 0       CADR    RRRANGE       READ RR RANGE (ONE SAMPLE)
2708    REF 145  LAST  570    32,2434   0 4616 1       TC      BANKCALL
2709    REF   9  LAST  569    32,2435    17714 0       CADR    RADSTALL      WAIT FOR READ COMPLETE
2710    REF   1               32,2436   0 2536 0       TC      CHEXERR       CHECK FOR ERRORS DURING READ
271005                        32,2437   0 0004 0       INHINT                COPY CYCLE FOR MARK DATA ON DOWNLINK
27101   REF   5  LAST  555    32,2440   53'334 0       DXCH    DNRRANGE      RANGE,RANGE RATE (RAW DATA)
27102   REF   3  LAST  199    32,2441   53'761 1       DXCH    RANGRDOT
27103   REF 244  LAST  569    32,2442   52 162 0       DXCH    MPAC +5
27104   REF   5  LAST  201    32,2443   53'755 0       DXCH    MKTIME        MARK TIME
27105   REF 245  LAST  570    32,2444   52 160 1       DXCH    MPAC +3
27106   REF   3  LAST  201    32,2445   53'460 0       DXCH    AIG           CDUY, CDUZ
271062                        32,2446   0 0006 1       EXTEND
27107   REF  22  LAST  569    32,2447   3 1110 0       DCA     TANG          PRESERVE TANG
27108   REF   7  LAST  543    32,2450   53'753 0       DXCH    TANGNB        TRUNNION AND SHAFT ANGLES
27109   REF 246  LAST  570    32,2451   3 0156 0       CA      MPAC +2
271095  REF   3  LAST  201    32,2452   55'461 1       TS      AOG           CDUX
2711    REF  49  LAST  565    32,2453   0 6037 0       TC      INTPRET
2712                          32,2454    14025 0       STODL   20D           SAVE TIME OF CDU READINGS IN 20D
2713    REF   4  LAST  569    32,2455    03747 0               RDOTMSAV      CONVERT RDOT UNITS AND SCALING
2714                          32,2456    57261 0       SL      DMPR          START WITH READING SCALED B-28, -.6278
2715                          32,2457    20217 1               14D           FT./SECOND PER BIT
2716    REF   1               32,2460    24002 0               RDOTCONV      END WITH METERS/CENTISECOND, B-7
2717    REF   2  LAST  146    32,2461    03751 1       STORE   RDOTM
2720                          32,2462    47135 0       SLOAD   RTB
2721    REF  23  LAST  570    32,2463    01110 0               TANG          GET TRUNION ANGLE
2722    REF  13  LAST  548    32,2464    21576 0               CDULOGIC      CONVERT TO DP ONES COMP. IN REVOLUTIONS
2723    REF   2  LAST  146    32,2465    03734 1       STORE   RRTRUN        AND SAVE FOR TMI ROUTINE (LSR22.3)
2724                          32,2466    47135 0       SLOAD   RTB
2725    REF  24  LAST  570    32,2467    01111 1               TANG +1       DITTO FOR SHAFT ANGLE
2726    REF  14  LAST  570    32,2470    21576 0               CDULOGIC
2727    REF   2  LAST  146    32,2471    17736 0       STODL   RRSHAFT
2728    REF   7  LAST  569    32,2472    01102 0               SAMPLSUM
2729                          32,2473    66405 0       DMP     SL2R          CONVERT UNITS AND SCALING OF RANGE
2730    REF   1               32,2474    24004 0               RANGCONV      PER BIT, END WITH METERS,SCALED -29
2732    REF   4  LAST  201    32,2475    37757 0       STCALL  RM
2733    REF   2  LAST  543    32,2476    46041 0               RRNB          COMPUTE RADAR LOS USING RRNB
2734    REF   3  LAST  146    32,2477    17741 0       STODL   RRBORSIT      AND SAVE
2735                          32,2500    00025 0               20D
2736    REF  17  LAST  565    32,2501    34041 0       STCALL  TDEC1         GET STATE VECTOR LOS AT TIME OF CDU READ
2737    REF   5  LAST  518    32,2502    51255 1               LPS20.1
2738                          32,2503    77776 1       EXIT
2739    REF   4  LAST  570    32,2504   3 1457 0       CA      AIG           STORE IMU CDU ANGLES AT MARKTIME
2740    REF  10  LAST  478    32,2505   54 766 1       TS      CDUSPOT       IN CDUSPOT FOR TRG*SMNB
2741    REF   1               32,2506   3 1460 1       CA      AMG
2742    REF  11  LAST  570    32,2507   54 770 0       TS      CDUSPOT +2
2743    REF   4  LAST  570    32,2510   3 1461 0       CA      AOG
2744    REF  12  LAST  570    32,2511   54 772 1       TS      CDUSPOT +4
2745    REF  50  LAST  570    32,2512   0 6037 0       TC      INTPRET
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 2746                            32,2513   45175 0           VLOAD  CALL            LOAD VECTOR AND CALL TRANSFORMATION
 2747   REF  11  LAST  565       32,2514   01102 0                  RRTARGET
 2748   REF   1                  32,2515   47651 0                  TRG*SMNB        ROTATE LOS AT MARKTIME FROM SM TO NB.
 2749                            32,2516   77641 1           DOT                    DOT WITH RADAR LOS TO GET ANGLE
 2750   REF   4  LAST  570       32,2517   03741 0                  RRBORSIT
 2751                            32,2520   65552 0           SL1    ACOS            BETWEEN THEM
 2752   REF  22  LAST  448       32,2521   01046 1           STORE  DSPTEM1         STORE FOR POSSIBLE DISPLAY
 2753                            32,2522   50025 0           DSU    BMN             IS IT LESS THAN 3 DEGREES
 2754   REF   1                  32,2523   24546 0                  THREEDEG
 2755   REF   1                  32,2524   64531 1                  NORMEXIT        YES-NORMAL EXIT

 2756                            32,2525   77776 1           EXIT                   ERROR EXIT 2
 2757   REF  33  LAST  551       32,2526  3 4752 0           CAF    BIT2            SET ERROR CODE
 2758   REF 247  LAST  570       32,2527  54 154 0           TS     MPAC
 2759   REF   1                  32,2530  1 2534 0           TCF    OUT22.1

 2760                            32,2531   77776 1  NORMEXIT EXIT                   NORMAL EXIT-SET MPAC EQUAL ZERO
 2761   REF 121  LAST  563       32,2532  3 4755 1           CAF    ZERO
 2762   REF 248  LAST  571       32,2533  54 154 0           TS     MPAC
 2763   REF   4  LAST  569       32,2534  31 737 0  OUT22.1  CAE    LRS22.1X        EXIT FROM LRS22.1
 2764   REF  10  LAST  541       32,2535  0 4640 1           TC     BANKJUMP
 2765   REF  17  LAST  558       32,2536  30 101 1  CHEXERR  CAE    FLAGWRD5
 2766   REF   1                  32,2537  7 4742 0           MASK   RNGSCBIT
 2767   REF 199  LAST  563       32,2540  10 000 0           CCS    A               CHECK IF RANGE SCALE CHANGED
 2768   REF   1                  32,2541  1 2404 1           TCF    READRDOT        YES-TAKE ANOTHER READING

 2769   REF  31  LAST  558       32,2542  3 4753 1  EREXIT1  CA     BIT1            SET ERROR CODE
 2770   REF 249  LAST  571       32,2543  54 154 0           TS     MPAC
 2771   REF   2  LAST  571       32,2544  0 2534 1           TC     OUT22.1
 2772                            32,2545   00210 1  THREEDEG 2DEC   .008333333      THREE DEGREES,SCALED  REVS,B0
 2772                            32,2546   21042 1
 2773   REF  12  LAST  571          1101            RRLOSVEC EQUALS RRTARGET
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L        P20-P25                                                                          USER'S PAGE NO.  81      E7 S3

P2774    PROGRAM NAME - LRS22.2 (DATA READ SUBROUTINE 2)

R2775    MOD. NO. : 1        BY: P VOLANTE  SDC          DATE   4-11-67

R2776    FUNCTIONAL DESCRIPTION-

R2777       2) CHECKS IF THE RR LOS (I.E. THE RADAR BORESIGHT VECTOR) IS WITHIN 30 DEGREES OF THE LM +Z AXIS

R2779    CALLING SEQUENCE- BANKCALL FOR LRS22.2

R2780    SUBROUTINES CALLED: G+N,AUTO   SETMAXDB
R2781    NORMAL EXIT - RETURN TO CALLER WITH MPAC SET TO +0 (VIA SWRETURN)

R2782    ERROR EXIT - RETURN TO CALLER WITH MPAC SET TO +0001 -RADAR LOS NOT WITHIN 30 DEGREES OF LM +Z AXIS

R2784    ALARMS - NONE                                                                   IN THE AUTO MODE

R2786    ERASABLE INITIALIZATION REQUIRED -
R2787          RRLOSVEC - THE RR LINE-OF-SIGHT VECTOR-A HALF UNIT VECTOR COMPUTED BY LRS22.1
R2789          RM - RR RANGE, METERS B-29, FROM LRS22.1
R2790          BIT 14 CHANNEL 31 -INDICATES AUTOPILOT IS IN AUTO MODE

R2791    DEBRIS -  A,L,Q MPAC -PUSHLIST AND PUSHLOC ARE NOT CHANGED BY THIS ROUTINE

 2793    REF   5  LAST  564    24,2000                          SETLOC P20S
 2794                          24,3333                          BANK
 2795    REF   8  LAST  569    24,3333   0 4645 1  LRS22.2      TC     MAKECADR
 2796    REF   1  LAST  571    24,3334   55737 1                TS     LRS22.1X
 2797    REF  51  LAST  570    24,3335   0 6037 0               TC     INTPRET
A2798                                                                              CHECK IF RR LOS IS WITHIN 30 DEG OF
 2799                          24,3336    65545 0  30DEGCHK     DLOAD  ACOS        THE SPACECRAFT +Z AXIS
 2800    REF   5  LAST  571    24,3337    03745 1                      RRBORSIT +4 BY TAKING ARCCOS OF Z-COMP. OF THE RR
A2801                                                                              LOS VECTOR,A HALF UNIT VECTOR
A2802                                                                              IN NAV BASE AXES)
 2803                          24,3340    50025 0               DSU    BMN
 2804    REF   1               24,3341    11355 1                      30DEG
 2805    REF   1               24,3342    51347 0                      OKEXIT      NORMAL EXIT-WITHIN 30 DEG.
 2806                          24,3343    77776 1               EXIT               ERROR EXIT-NOT WITHIN 30 DEG.
 2807    REF  32  LAST  571    24,3344   3 4753 1               CAF    BIT1        SET ERROR CODE IN MPAC
 2808    REF 250  LAST  571    24,3345   54 154 0               TS     MPAC
 2809    REF   1               24,3346   1 3352 1               TCF    OUT22.2
 2810                          24,3347    77776 1  OKEXIT       EXIT               NORMAL EXIT-SET MPAC = ZERO
 2811    REF 122  LAST  571    24,3350  3 4755 1            CAF     ZERO
 2812    REF 251  LAST  572    24,3351  54 154 0            TS      MPAC
 2813    REF   6  LAST  572    24,3352  31'737 0  OUT22.2   CAE     LRS22.1X
 2814    REF  11  LAST  571    24,3353  0 4640 1            TC      BANKJUMP

 2815                          24,3354   02525 1  30DEG     2DEC    .083333333       THIRTY DEGREES,SCALED REVS,B0
 2815                          24,3355   12525 0
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R2816   PROGRAM NAME - LSR22.3                                                          DATE - 29 MAY 1967
R2818   MOD. NO 3                                                                       LOG SECTION - P20-25
R2820   MOD. BY - DANFORTH                                                              ASSEMBLY LEMP20S REV 10
R2822
R2823   FUNCTIONAL DESCRIPTION

R2824   THIS ROUTINE COMPUTES THE B-VECTORS AND DELTA Q FOR EACH OF THE QUANTITIES MEASURED BY THE RENDEZVOUS
R2826   RADAR.(RANGE,RANGE RATE,SHAFT AND TRUNNION ANGLES). THE ROUTINE CALLS THE INCORP1 AND INCORP2 ROUTINES
R2828   WHICH COMPUTE THE DEVIATIONS AND CORRECT THE STATE VECTOR.

R2829   CALLING SEQUENCE
R2830   THIS ROUTINE IS PART OF P20 RENDEZVOUS NAVIGATION FOR THE LM COMPUTER O NLY. THE ROUTINE IS ENTERED FROM
R2832   R22LEM  ONLY AND RETURNS DIRECTLY TO R22LEM  FOLLOWING SUCCESSFUL INCORPORATION OF MEASURED DATA. IF THE
R2834   COMPUTED STATE VECTOR DEVIATIONS EXCEED THE MAXIMUM PERMITTED. THE ROUTINE RETURNS TO R22LEM  TO DISPLAY
R2836   THE DEVIATIONS. IF THE ASTRONAUT ACCEPTS THE DATA R22LEM  RETURNS TO    LSR22.3 TO INCORPORATE THE
R2838   DEVIATIONS INTO THE STATE VECTOR. IF THE ASTRONAUT REJECTS THE DEVIATIONS, NO MORE MEASUREMENTS ARE
R2840   PROCESSED FOR THIS MARK,I.E.,R22LEM  GETS THE NEXT MARK.

R2841
R2842   SUBROUTINES CALLED
R2843    WLINIT      LGCUPDTE      INTEGRV      INCORP1      ARCTAN
R2844    GETULC      RARARANG      INCORP2      NBSM         INSTALL
R2845
R2846   OUTPUT
R2847    CORRECTED LM OR CSM STATE VECTOR (PERMANENT)
R2848    NUMBER OF MARKS INCORPORATED IN MARKCTR
R2849    MAGNITUDE OF POSITION DEVIATION (FOR DISPLAY) IN R22DISP METERS B-29
R2850    MAGNITUDE OF VELOCITY DEVIATION (FOR DISPLAY) IN R22DISP +2 M/CSEC B-7
R2851    UPDATED W-MATRIX
R2852

R2853   ERASABLE INITIALIZATION REQUIRED
R2854    LM AND CSM STATE VECTORS
R2855    W-MATRIX
R2856    MARK TIME IN MKTIME
R2857    RADAR RANGE IN RM METERS B-29
R2858          RANGE RATE IN RDOTM METERS/CSES B-7
R2859          SHAFT ANGLE IN RRSHAFT REVS.B0
R2860          TRUNNION ANGLE IN RRTRUN REVS. B0
R2861    GIMBAL ANGLES  INNER IN AIG
R2862                   MIDDLE IN AMG
R2863                   OUTER IN AOG
R2864    REFSMMAT
R2865    RENDWFLG
R2866    NOANGFLG
R2867    VEHUPFLG

R2868   DEBRIS
R2869    PUSHLIST--ALL
R2870    MX, MY, MZ  (VECTORS)
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R2871     ULC,RXZ,SINTHETA,LGRET,RDRET,BVECTOR,W.IND,X78T

 2872                          13,2207                        BANK    13
 2873    REF    1              26,2000                        SETLOC  P20S3
 2874                          26,2412                        BANK

 2875    REF   29   LAST  561  E7,1456                        EBANK=  LOSCOUNT
 2876    REF    1                                             COUNT*  $$/LSR22
 2877                          26,2412   77624 1  LSR22.3     CALL
 2878    REF    7   LAST  506  26,2413   11244 0                      GRP2PC
 2879                          26,2414   43014 0              BON     SET
 2880    REF    7   LAST  565  26,2415   04307 1                      SURFFLAG       ARE WE ON LUNAR SURFACE
 2881    REF    1              26,2416   55200 0                      LSR22.4        YES
 2882    REF    1              26,2417   02466 1                      DMENFLG
 2883                          26,2420   45014 0              BOFF    CALL
 2884    REF    6   LAST  500  26,2421   00747 0                      VEHUPFLG
 2885    REF    1              26,2422   54454 0                      DOLEM
 2886    REF   11   LAST  500  26,2423   27414 0                      INTSTALL
 2887                          26,2424   45014 0              CLEAR   CALL           LM PRECISION INTEGRATION
 2888    REF   10   LAST  500  26,2425   01674 0                      VINTFLAG
 2889    REF    4   LAST  500  26,2426   26644 0                      SETIFLGS
 2890                          26,2427   77624 1              CALL
 2891    REF    1              26,2430   55242 0                      INTGRCAL
 2892                          26,2431   77624 1              CALL
 2893    REF    8   LAST  575  26,2432   11244 0                      GRP2PC
 2894                          26,2433   77624 1              CALL
 2895    REF   12   LAST  575  26,2434   27414 0                      INTSTALL
 2896                          26,2435   43014 0              CLEAR   BOFF
 2897    REF    7   LAST  500  26,2436   01676 1                      DIMOFLAG
 2898    REF    5   LAST  500  26,2437   02756 1                      RENDWFLG
 2899    REF    1              26,2440   54444 1                      NOTWCSM
 2900                          26,2441   43014 0              SET     SET            CSM WITH W-MATRIX INTEGRATION
 2901    REF    8   LAST  575  26,2442   01476 0                      DIMOFLAG
 2902    REF    5   LAST  500  26,2443   01475 0                      D6OR9FLG
 2903                          26,2444   43014 0  NOTWCSM     SET     CLEAR
 2904    REF   11   LAST  575  26,2445   01474 1                      VINTFLAG
 2905    REF    3   LAST  494  26,2446   01673 1                      INTYPFLG
 2906                          26,2447   45014 0              SET     CALL
 2907    REF    1              26,2450   01472 1                      STATEFLG
 2908    REF    2   LAST  575  26,2451   55242 0                      INTGRCAL
 2909                          26,2452   77650 1              GOTO
 2910    REF    1              26,2453   54504 1                      MARKTEST
 2911                          26,2454   77624 1  DOLEM       CALL
 2912    REF   13   LAST  575  26,2455   27414 0                      INTSTALL
 2913                          26,2456   45014 0              SET     CALL
 2914    REF   12   LAST  575  26,2457   01474 1                      VINTFLAG
 2915    REF    5   LAST  575  26,2460   26644 0                      SETIFLGS
 2916                          26,2461   77624 1              CALL
 2917    REF    3   LAST  575  26,2462   55242 0                      INTGRCAL
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2918                            26,2463  77624 1            CALL
2919    REF   9  LAST  575      26,2464  11244 0                   GRP2PC
2920                            26,2465  77624 1            CALL
2921    REF  14  LAST  575      26,2466  27414 0                   INTSTALL
2922                            26,2467  43014 0            CLEAR  BOFF
2923    REF   9  LAST  575      26,2470  01676 1                   DIMOFLAG
2924    REF   6  LAST  575      26,2471  02756 1                   RENDWFLG
2925    REF   1                 26,2472  54476 0                   NOTWLEM
2926                            26,2473  43014 0            SET    SET          LM WITH W-MATRIX INTEGRATION
2927    REF  10  LAST  576      26,2474  01476 0                   DIMOFLAG
2928    REF   6  LAST  575      26,2475  01475 0                   D6OR9FLG
2929                            26,2476  43014 0  NOTWLEM   CLEAR  CLEAR
2930    REF   4  LAST  575      26,2477  01673 1                   INTYPFLG
2931    REF  13  LAST  575      26,2500  01674 0                   VINTFLAG
2932                            26,2501  45014 0            SET    CALL
2933    REF   2  LAST  575      26,2502  01472 1                   STATEFLG
2934    REF   4  LAST  575      26,2503  55242 0                   INTGRCAL
2935                            26,2504  45014 0  MARKTEST  BON    CALL         HAS W-MATRIX BEEN INVALIDATED
2936    REF   7  LAST  576      26,2505  02716 0                   RENDWFLG     HAS W-MATRIX BEEN INVALIDATED
2937    REF   1                 26,2506  54510 1                   RANGEBQ
2938    REF   1                 26,2507  55251 1                   WLINIT       YES-REINITIALIZE
2939                            26,2510  77414 0  RANGEBQ   BON    EXIT         DON'T CALL R65 IF ON SURFACE
29393   REF   8  LAST  575      26,2511  04307 1                   SURFFLAG
29396   REF   1                 26,2512  54520 1                   RANGEBQ1
2940    REF 123  LAST  573      26,2513  3 4755 1           CA     ZERO
2941    REF   6  LAST  519      26,2514  55'745 1           TS     R65CNTR
2942    REF 146  LAST  570      26,2515  0 4616 1           TC     BANKCALL
2943    REF   3  LAST  507      26,2516  46123 0            CADR   R65LEM
2944    REF  52  LAST  572      26,2517  0 6037 0           TC     INTPRET
2945                            26,2520  43174 1  RANGEBQ1  AXT,2  BON           CLEAR X2
2946                            26,2521  00000 1                   0
2947    REF   2  LAST   37      26,2522  04304 1                   LMOONFLG     IS MOON SPHERE OF INFLUENCE
2948    REF   1                 26,2523  54526 1                   SETX2        YES. STORE ZERO IN SCALSHFT REGISTER
2949                            26,2524  77714 0            INCR,2
2950                            26,2525  00002 0                   2
2951                            26,2526  45134 0  SETX2     SXA,2  CALL
2952    REF   2  LAST  145      26,2527  03720 1                   SCALSHFT     0-MOON. 2-EARTH
2953    REF  10  LAST  576      26,2530  11244 0                   GRP2PC
29533                           26,2531  66170 1            AXT,1  SXA,1        STORE RANGE CODE (1) FOR R3 IN NOUN 49
29536                           26,2532  00001 0                   1
29539   REF   2  LAST  314      26,2533  03745 1                   WHCHREAD
2954                            26,2534  54335 0            SLOAD  SR           GET SINGLE PRECISION RVARMIN (B-12)
2955    REF   1                 26,2535  01775 0                   RVARMIN      SHIFT TO TRIPLE PRECISION    (B-40)
2956                            26,2536  20635 0                   28D
2957                            26,2537  77634 0            RTB
2958    REF   1                 26,2540  21633 1                   TPMODE       AND SAVE  IN 20D
2959                            26,2541  00025 0            STORE  20D
2960                            26,2542  77624 1            CALL                BEGIN COMPUTING THE B-VECTORS,DELTAQ
2961    REF   1                 26,2543  55333 1                   GETULC       B-VECTORS FOR RANGE
2962                            26,2544  57414 1            BON    VCOMP        BO, COMP. IF LM BEING CORRECTED
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2963   REF   7  LAST  575   26,2545   00707 1                     VEHUPFLG
2964                        26,2546   54547 0                     +1
2965   REF   2  LAST  145   26,2547   27525 0            STOVL    BVECTOR
2966   REF   2  LAST   37   26,2550   06522 1                     ZEROVECS
2967   REF   3  LAST  577   26,2551   03533 1            STORE    BVECTOR +6       B1
2968   REF   4  LAST  577   26,2552   17541 1            STODL    BVECTOR +12D     B2
2969                        26,2553   00045 0                     36D
2970                        26,2554   44257 1            SRR*     BDSU
2971                        26,2555   56174 0                     2,2              SHIFT FROM EARTH/MOON SPHERE TO B-29
2972   REF   5  LAST  570   26,2556   03757 1                     RM               RM - (MAGNITUDE RCSM-RLM)
2973                        26,2557   77657 0            SLR*
2974                        26,2560   56574 1                     2,2              SHIFT TO EARTH/MOON SPHERE
2975   REF   2  LAST  145   26,2561   17547 1            STODL    DELTAQ           EARTH B-29. MOON B-27
2976                        26,2562   00045 0                     36D              RLC  B-29/B-27
2977                        26,2563   63501 0            NORM     DSQ              NORMALIZE AND SQUARE
2978   REF   3  LAST  387   26,2564   00047 1                     X1
2979                        26,2565   53605 1            DMP      SR*
2980   REF   1              26,2566   01771 1                     RANGEVAR         MULTIPLY BY RANGEVAR(B12) THEN
2981                        26,2567   20577 0                     0 -2,1           UNNORMALIZE
2982                        26,2570   53657 0            SR*      SR*
2983                        26,2571   20601 1                     0,1
2984                        26,2572   57176 0                     0,2
2985                        26,2573   47057 0            SR*      RTB
2986                        26,2574   57176 0                     0,2
2987   REF   2  LAST  576   26,2575   21633 1                     TPMODE
2988   REF   2  LAST  126   26,2576   02707 0            STORE    VARIANCE         B-40
2989                        26,2577   76276 0            DCOMP    TAD
2990                        26,2600   00025 0                     20D                B-40
2991                        26,2601   72240 1            BMN      TLOAD
2992   REF   1              26,2602   54605 0                     OCK
2993                        26,2603   00025 0                     20D                B-40
2994   REF   3  LAST  577   26,2604   02707 0            STORE    VARIANCE
2995                        26,2605   77624 1   QOK      CALL
2996   REF   1              26,2606   55401 1                     IGCUPDTF

2997                        26,2607   45131 0            SSP      CALL
2998   REF   3  LAST  576   26,2610   03746 1                     WHCHREAD
29983                       26,2611   00002 0            DEC      2                STORE R-RATE CODE (2) FOR R3 IN NOUN 49
29986  REF  11  LAST  576   26,2612   11244 0                     GRP2PC
2999                        26,2613   77624 1            CALL                      B-VECTOR,DELTAQ FOR RANGE RATE
3000   REF   2  LAST  576   26,2614   55333 1                     GETULC
3001                        26,2615   53725 1            PDDL     SR*              GET RLC SCALED B-29/B-27
3002                        26,2616   00045 0                     36D              AND SHIFT TO B-23
3003                        26,2617   57202 0                     0 -4,2
3004                        26,2620   24045 0            STOVL    36D              THEN STORE BACK IN 36D
3005                        26,2621   57414 1            BON      VCOMP            B1, COMP. IF LM BEING CORRECTED
3006    EF   8  LAST  577   26,2622   00707 1                     VEHUPFLG
3007                        26,2623   54624 0                     +1
3008                        26,2624   77761 1            VXSC
3009                        26,2625   00045 0                     36D              B1 = RLC  (B-24/B-22)
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 3010   REF   5  LAST  577    26,2626    27533 1            STOVL   BVECTOR +6
 3011   REF   1               26,2627    01653 0                    NUVLEM
 3012                         26,2630    53257 1            VSR*    VAD
 3013                         26,2631    57170 0                    6,2                SHIFT FOR EARTH/MOON SPHERE
 3014   REF   2  LAST  500    26,2632    01667 1                    VCVLEM             EARTH B-7. MOON B-5
 3015                         26,2633    53715 1            PDVL    VSR*               VL TO PD6
 3016   REF   1               26,2634    01601 1                    NUVCSM
 3017                         26,2635    57170 0                    6,2                SHIFT FOR EARTH/MOON SPHERE
 3018                         26,2636    52255 1            VAD     VSU
 3019   REF   1               26,2637    01615 1                    VCVCSM
 3020                         26,2640    50315 0            PDVL    DOT                VC - VL = VLC TO PD6
 3021                         26,2641    00001 0                    0
 3022                         26,2642    00007 0                    6
 3023                         26,2643    53606 1            PUSH    SRR*               RDOT B-8/B-6 TO PD12
 3024                         26,2644    56174 0                    2,2                SHIFT FROM EARTH/MOON SPHERE TO B-8
 3025                         26,2645    57316 1            DSQ     DMPR               RDOT**2 B-16 X RATEVAR B12
 3026   REF   1               26,2646    01773 0                    RATEVAR
 3027   REF   4  LAST  577    26,2647    02707 0            STORE   VARIANCE
 3028                         26,2650    54335 0            SLOAD   SR
 3029   REF   1               26,2651    01776 0                    VVARMIN            GET SINGLE PRECISION VVARMIN (B+12)
 3030                         26,2652    20621 0                    16D                SHIFT TO DP (B -4)
 3031                         26,2653    00031 0            STORE   24D                AND SAVE IN 24D
 3032                         26,2654    50025 0            DSU     BMN                IS MIN. VARIANCE > COMPUTED VARIANCE
 3033   REF   5  LAST  578    26,2655    02707 0                    VARIANCE
 3034   REF   1               26,2656    54662 1                    VCK                BRANCH - NO
 3035                         26,2657    77745 1            DLOAD                      YES - USE MINIMUM VARIANCE
 3036                         26,2660    00031 0                    24D
 3037   REF   6  LAST  578    26,2661    02707 0            STORE   VARIANCE
 3038                         26,2662    60545 0   VCK      DLOAD   SR2                RDOT(PD12) FROM B-8/B-6
 3039                         26,2663    53725 1            PDDL    SLR*               TO B-10/B-8
 3040   REF   3  LAST  570    26,2664    03751 1                    RDOTM              SHIFT TO EARTH/MOON SPHERE
 3041                         26,2665    56577 1                    0 -1,2             B-7 TO B-10/B-8
 3042                         26,2666    77625 0            DSU
 3043                         26,2667    77675 0            DMPR
 3044                         26,2670    00045 0                    36D
 3045   REF   3  LAST  577    26,2671    27547 1            STOVL   DELTAQ               B-33
 3046                         26,2672    00001 0                    0                  NOW GET BO
 3047                         26,2673    47235 0            VXV     VXV                (ULC X VLC) X ULC
 3048                         26,2674    57414 1            BON     VCOMP              BO, COMP. IF LM BEING CORRECTED
 3049   REF   9  LAST  577    26,2675    00707 1                    VEHUPFLG
 3050                         26,2676    54677 0                    +1
 3051                         26,2677    77657 0            VSR*
 3052                         26,2700    57200 1                    0 -2,2             SCALED B-5
 3053   REF   6  LAST  578    26,2701    27525 0            STOVL   BVECTOR
 3054   REF   3  LAST  577    26,2702    06522 1                    ZEROVECS
 3055                         26,2703    00025 0            STORE   20D                ZERO OUT 20 TO 25 IN PUSHLIST
 3056   REF   7  LAST  578    26,2704    27541 1            STOVL   BVECTOR +12D
 3057   REF   8  LAST  578    26,2705    03525 0                    BVECTOR
 3058                         26,2706    60246 1            ABVAL   NORM               LOAD BO, GET MAGNITUDE AND NORMALIZE
 3059                         26,2707    00025 0                    20D                SHIFT COUNT IN 20D
 3060                         26,2710   51575 1            VLOAD   ABVAL
 3061   REF    9  LAST  578   26,2711   03533 1                    BVECTOR +6D     LOAD B1, GET MAGNITUDE AND NORMALIZE
 3062                         26,2712   71301 0            NORM    DLOAD
 3063                         26,2713   00027 1                    22D             SHIFT COUNT IN 22D
 3064                         26,2714   00027 1                    22D             FIND WHICH SHIFT IS SMALLER
 3065                         26,2715   50025 0            DSU     BMN             BRANCH- B0 HAS SMALLER SHIFT COUNT
 3066                         26,2716   00025 0                    20D
 3067   REF    1              26,2717   54723 0                    VOK1
 3068                         26,2720   52150 1            LXA,1   GOTO
 3069                         26,2721   00026 0                    22D             LOAD X2 WITH THE SMALLER SHIFT COUNT
 3070   REF    1              26,2722   54725 0                    VOK2
 3071                         26,2723   77750 0  VOK1      LXA,1
 3072                         26,2724   00024 1                    20D
 3073                         26,2725   53775 1  VOK2      VLOAD   VSL*            THEN ADJUST B0,B1,DELTAQ AND VARIANCE
 3074   REF   10  LAST  579   26,2726   03525 0                    BVECTOR         WITH THIS SHIFT COUNT
 3075                         26,2727   20201 0                    0,1
 3076   REF   11  LAST  579   26,2730   27525 0            STOVL   BVECTOR
 3077   REF   12  LAST  579   26,2731   03533 1                    BVECTOR +6
 3078                         26,2732   77657 0            VSL*
 3079                         26,2733   20201 0                    0,1
 3080   REF   13  LAST  579   26,2734   17533 1            STODL   BVECTOR +6
 3081   REF    4  LAST  578   26,2735   03547 1                    DELTAQ
 3082                         26,2736   77657 0            SL*
 3083                         26,2737   20201 0                    0,1
 3084   REF    5  LAST  579   26,2740   03547 1            STORE   DELTAQ
 3085                         26,2741   53745 1            DLOAD   SL*             GET RLC AND ADJUST FOR SCALE SHIFT
 3086                         26,2742   00045 0                    36D
 3087                         26,2743   20200 1                    0 -1,1
 3088                         26,2744   41316 0            DSQ     DMP             MULTIPLY RLC**2 BY VARIANCE
 3089   REF    7  LAST  578   26,2745   02707 0                    VARIANCE
 3090                         26,2746   47012 1            SL4     RTB             SHIFT TO CONFORM TO BVECTORS AND DELTAQ
 3091   REF    3  LAST  577   26,2747   21633 1                    TPMODE
 3092   REF    8  LAST  579   26,2750   36707 1            STCALL  VARIANCE        AND STORE TP VARIANCE
 3093   REF    2  LAST  577   26,2751   55401 1                    LGCUPDTE

 3094                         26,2752   77624 1            CALL
 3095   REF   12  LAST  577   26,2753   11244 0                    GRP2PC
 3096                         26,2754   77414 0            BON     EXIT            ARE ANGLES TO BE DONE
 3097   REF    9  LAST  576   26,2755   04307 1                    SURFFLAG
 3098   REF    1              26,2756   55176 1                    FENDEND         NO
 3099   REF    5  LAST  570   E7,1457                      EBANK=  AIG
 3100   REF    1              26,2757  3 3332 0  MXMYMZ    CAF     AIGBANK
 3101   REF   13  LAST  456   26,2760  54 006 0            TS      BBANK
 3102   REF    6  LAST  579   26,2761  3 1457 0            CA      AIG             YES, COMPUTE  MX, MY, MZ
 3103   REF   13  LAST  570   26,2762  54 766 1            TS      CDUSPOT
 3104   REF    2  LAST  570   26,2763  3 1460 1            CA      AMG
 3105   REF   14  LAST  579   26,2764  54 770 0            TS      CDUSPOT +2
 3106   REF    5  LAST  570   26,2765  3 1461 0            CA      AOG
 3107   REF   15  LAST  579   26,2766  54 772 1            TS      CDUSPOT +4      GIMBL ANGLES NOW IN CDUSPOT FOR TRG*NBSM
 3108   REF   53  LAST  576   26,2767  0 6037 0            TC      INTPRET
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  3109                              26,2770   45175 0            VLOAD   CALL
  3110   REF   5  LAST  339         26,2771   06520 0                    UNITX
  3111   REF   4  LAST  253         26,2772   47664 0                    TRG*NBSM
  3112                              26,2773   76505 0            VXM     VSL1
  3113   REF  10  LAST  565         26,2774   01734 0                    REFSMMAT
  3114   REF   5  LAST  145         26,2775   27677 1            STOVL   MX
  3115   REF   3  LAST  300         26,2776   06516 0                    UNITY
  3116                              26,2777   77624 1            CALL
  3117   REF   2  LAST  550         26,3000   47673 0                    *NBSM*
  3118                              26,3001   76505 0            VXM     VSL1
  3119   REF  11  LAST  580         26,3002   01734 0                    REFSMMAT
  3120   REF   2  LAST  145         26,3003   27705 0            STOVL   MY
  3121   REF   5  LAST  340         26,3004   06514 1                    UNITZ
  3122                              26,3005   77624 1            CALL
  3123   REF   3  LAST  580         26,3006   47673 0                    *NBSM*
  3124                              26,3007   76505 0            VXM     VSL1
  3125   REF  12  LAST  580         26,3010   01734 0                    REFSMMAT
  3126   REF   2  LAST  145         26,3011   37713 0  SHAFTBO   STCALL  RZ
  3127   REF   1                    26,3012   55361 0                    RADARANG
  3128                              26,3013   45131 0            SSP     CALL              STORE SHAFT CODE (3) FOR R3 IN NOUN 49
  3129   REF   4  LAST  577         26,3014   03746 1                    WHCHREAD
  31293                             26,3015   00003 1            DEC     3
  31296  REF  13  LAST  579         26,3016   11244 0                    GRP2PC
  3130                              26,3017   50375 0            VLOAD   DOT               COMPUTE DELTAQ,B VECTORS FOR SHAFT ANG.
  3131   REF   2  LAST  145         26,3020   03724 0                    ULC
  3132   REF   6  LAST  580         26,3021   03677 1                    MX
  3133                              26,3022   77752 1            SL1
  3134   REF   6  LAST  478         26,3023   24023 0            STOVL   SINTH             18D
  3135   REF   3  LAST  580         26,3024   03724 0                    ULC
  3136                              26,3025   72441 0            DOT     SL1
  3137   REF   3  LAST  580         26,3026   03713 1                    MZ
  3138   REF   6  LAST  478         26,3027   34021 0            STCALL  COSTH             16D
  3139   REF   3  LAST  478         26,3030   26510 1                    ARCTAN
  3140                              26,3031   41221 0            BDSU    DMP
  3141   REF   3  LAST  570         26,3032   03736 0                    RRSHAFT
  3142   REF   1                    26,3033   15441 1                    2PI/8
  3143                              26,3034   41472 0            SL3R    PUSH
  3144                              26,3035   52545 1            DLOAD   SL3
  3145   REF   2  LAST  196         26,3036   01701 0                    X789
  3146                              26,3037   44257 1            SRR*    BDSU              SHIFT FROM -5/-3 TO B0
  3147                              26,3040   56176 1                    0,2
  3148                              26,3041   53605 1            DMP     SRR*
  3149   REF   2  LAST  145         26,3042   03722 0                    RXZ
  3150                              26,3043   21601 0                    0,1               SHIFT TO EARTH/MOON SPHERE
  3151   REF   6  LAST  579         26,3044   27547 1            STOVL   DELTAQ            EARTH B-29. MOON B-27
  3152   REF   4  LAST  580         26,3045   03724 0                    ULC
  3153                              26,3046   76435 1            VXV     VSL1
  3154   REF   3  LAST  580         26,3047   03705 0                    MY
  3155                              26,3050   77656 1            UNIT
  3156                              26,3051   57414 1            BOFF    VCOMP             B0, COMP. IF CSM BEING CORRECTED
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 3157   REF  10  LAST  578   26,3052   00747 0                  VEHUPFLG
 3158                        26,3053   55054 0                  +1
 3159   REF  14  LAST  579   26,3054   27525 0           STOVL  BVECTOR
 3160   REF   4  LAST  578   26,3055   06522 1                  ZEROVECS
 3161   REF  15  LAST  581   26,3056   03533 1           STORE  BVECTOR +6
 3162   REF  16  LAST  581   26,3057   17541 1           STODL  BVECTOR +12D
 3163   REF   3  LAST  580   26,3060   03722 0                  RXZ
 3164                        26,3061   53657 0           SR*    SRR*              SHIFT FROM EARTH/MOON SPHERE TO B-25
 3165                        26,3062   20577 0                  0 -2,1
 3166                        26,3063   56176 1                  0,2
 3167   REF  17  LAST  581   26,3064   03541 1           STORE  BVECTOR +12D
 3168                        26,3065   77735 0           SLOAD
 3169   REF   1              26,3066   02011 0                  SHAFTVAR
 3170                        26,3067   41215 1           DAD    DMP
 3171   REF   1              26,3070   15436 1                  IMUVAR            RAD**2 B12
 3172   REF   4  LAST  581   26,3071   03722 0                  RXZ
 3173                        26,3072   41257 1           SRR*   DMP
 3174                        26,3073   21601 0                  0,1               SHIFT TO EARTH/MOON SPHERE
 3175   REF   5  LAST  581   26,3074   03722 0                  RXZ
 3176                        26,3075   53657 0           SR*    SR*
 3177                        26,3076   20577 0                  0 -2,1
 3178                        26,3077   57176 0                  0,2
 3179                        26,3100   47057 0           SR*    RTB
 3180                        26,3101   57176 0                  0,2
 3181   REF   4  LAST  579   26,3102   21633 1                  TPMODE            STORE VARIANCE TRIPLE PRECISION
 3182   REF   9  LAST  579   26,3103   36707 1           STCALL VARIANCE          B-40
 3183   REF   3  LAST  579   26,3104   55401 1                  LGCUPDTE

 3184                        26,3105   77624 1           CALL
 3185   REF  14  LAST  580   26,3106   11244 0                  GRP2PC
 3186                        26,3107   77624 1  TRUNBQ   CALL
 3187   REF   2  LAST  580   26,3110   55361 0                  RADARANG
 3188                        26,3111   45131 0           SSP    CALL              STORE TRUNNION CODE (4) FOR R3 IN N49
 3189   REF   5  LAST  580   26,3112   03746 1                  WHCHREAD
 31893                       26,3113   00004 0           DEC    4
 31896  REF  15  LAST  581   26,3114   11244 0                  GRP2PC
 3190                        26,3115   47375 0           VLOAD  VXV
 3191   REF   5  LAST  580   26,3116   03724 0                  ULC
 3192   REF   4  LAST  580   26,3117   03705 0                  MY
 3193                        26,3120   47372 1           VSL1   VXV
 3194   REF   6  LAST  581   26,3121   03724 0                  ULC
 3195                        26,3122   77772 0           VSL1                     (ULC X MY) X ULC
 3196                        26,3123   57414 1           BOFF   VCOMP             BO, COMP. IF CSM BEING CORRECTED
 3197   REF  11  LAST  581   26,3124   00747 0                  VEHUPFLG
 3198                        26,3125   55126 1                  +1
 3199   REF  18  LAST  581   26,3126   27525 0           STOVL  BVECTOR
 3200   REF   5  LAST  581   26,3127   06522 1                  ZEROVECS
 3201   REF  19  LAST  581   26,3130   03533 1           STORE  BVECTOR +6
 3202   REF  20  LAST  581   26,3131   17541 1           STODL  BVECTOR +12D
 3203   REF   6  LAST  581   26,3132   03722 0                  RXZ
 3204                          26,3133   53657 0            SR*     SRR*             SHIFT FROM EARTH/MOON SPHERE TO B-25
 3205                          26,3134   20577 0                    0 -2,1
 3206                          26,3135   56176 1                    0,2
 3207   REF  21  LAST  581     26,3136   03543 0            STORE   BVECTOR +14D
 3208                          26,3137   77735 0            SLOAD
 3209   REF   1                26,3140   02012 0                    TRUNVAR
 3210                          26,3141   41215 1            DAD     DMP
 3211   REF   2  LAST  581     26,3142   15436 1                    IMUVAR
 3212   REF   7  LAST  581     26,3143   03722 0                    RXZ
 3213                          26,3144   41257 1            SRR*    DMP
 3214                          26,3145   21601 0                    0,1              SHIFT TO EARTH/MOON SPHERE
 3215   REF   8  LAST  582     26,3146   03722 0                    RXZ
 3216                          26,3147   53657 0            SR*     SR*
 3217                          26,3150   20577 0                    0 -2,1
 3218                          26,3151   57176 0                    0,2
 3219                          26,3152   47057 0            SR*     RTB
 3220                          26,3153   57176 0                    0,2
 3221   REF   5  LAST  581     26,3154   21633 1                    TPMODE           STORE VARIANCE TRIPLE PRECISION
 3222   REF  10  LAST  581     26,3155   16707 0            STODL   VARIANCE
 3223   REF   2  LAST  146     26,3156   03732 1                    SINTHETA
 3224                          26,3157   44336 1            ASIN    BDSU             SIN  THETA IN PD6
 3225   REF   3  LAST  570     26,3160   03734 1                    RRTRUN
 3226                          26,3161   56405 0            DMP     SL3R
 3227   REF   2  LAST  580     26,3162   15441 1                    2PI/8
 3228                          26,3163   52525 1            PDDL    SL3
 3229   REF   3  LAST  580     26,3164   01703 1                    X789 +2
 3230                          26,3165   44257 1            SRR*    BDSU             SHIFT FROM -5/-3 TO B0
 3231                          26,3166   56176 1                    0,2
 3232                          26,3167   53605 1            DMP     SRR*
 3233   REF   9  LAST  582     26,3170   03722 0                    RXZ
 3234                          26,3171   21601 0                    0,1
 3235   REF   7  LAST  580     26,3172   37547 0            STCALL  DELTAQ           EARTH B-29. MOON B-27
 3236   REF   4  LAST  581     26,3173   55401 1                    LGCUPDTE
 3237                          26,3174   77624 1            CALL
 3238   REF  15  LAST  581     26,3175   11244 0                    GRP2PC
 3239                          26,3176   77650 1  RENDEND   GOTO
 3240   REF   1                26,3177   50566 1                    R22LEM93
R3241   FUNCTIONAL DESCRIPTION

R3242   LSR22.4 IS THE ENTRY TO PERFORM LUNAR SURFACE NAVIGATION FOR THE LM
R3243   COMPUTER ONLY. THIS ROUTINE COMPUTES THE B-VECTORS AND DELTA Q FOR RANGE
R3244   AND RANGE RATE MEASURED BY THE RENDEZVOUS RADAR

R3245   SUBROUTINES CALLED
R3246    INSTALL    LGCUPDTE    INCORP1    RP-TO-R
R3247    INTEGRV    GETULC      INCORP2

R3248   OUTPUT
R3249    CORRECTED CSM STATE VECTOR (PERMANENT)
R3250    NUMBER OF MARKS INCORPORATED IN MARKCTR
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R3251      MAGNITUDE OF POSITION DEVIATION (FOR DISPLAY) IN R22DISP METERS B-29
R3252      MAGNITUDE OF VELOCITY DEVIATION (FOR DISPLAY) IN R22DISP +2 M/CSEC B-7
R3253      UPDATED W-MATRIX

R3254     ERASABLE INITIALIZATION REQUIRED
R3255      LM AND CSM STATE VECTORS
R3256      W-MATRIX
R3257      MARK TIME IN MKTIME
R3258      RADAR RANGE IN RM METERS B-29
R3259                 RANGE RATE IN RDOTM METERS/CSEC B-7
R3260      VEHUPFLG


 3261                            26,3200   77624 1  LSR22.4  CALL
 3262   REF 15  LAST  576        26,3201   27414 0                   INTSTALL
 3263                            26,3202   43014 0           SET     CLEAR
 3264   REF  3  LAST  576        26,3203   01472 1                   STATEFLG
 3265   REF 14  LAST  576        26,3204   01674 0                   VINTFLAG           CALL TO GET LM POS + VEL IN REF COORD.
 3266                            26,3205   77624 1           CALL
 3267   REF  5  LAST  576        26,3206   55242 0                   INTGRCAL
 3268                            26,3207   77624 1           CALL
 3269   REF 17  LAST  582        26,3210   11244 0                   GRP2PC
 3270                            26,3211   45014 0           CLEAR   CALL
 3271   REF  2  LAST  575        26,3212   02666 0                   DMENFLG            SET MATRIX SIZE TO 6X6 FOR INCORP
 3272   REF 16  LAST  583        26,3213   27414 0                   INTSTALL
 3273                            26,3214   46145 0           DLOAD   BHIZ               IS THIS FIRST TIME THROUGH
 3274   REF  3  LAST  506        26,3215   03463 0                   MARKCTR
 3275   REF  1                   26,3216   55231 1                   INITWMX6           YES. INITIALIZE 6X6 W-MATRIX
 3276                            26,3217   43014 0           CLEAR   SET
 3277   REF  7  LAST  576        26,3220   01675 1                   D6OR9FLG
 3278   REF 11  LAST  576        26,3221   01476 0                   DIMOFLAG
 3279                            26,3222   43014 0           SET     CLEAR
 3280   REF 15  LAST  583        26,3223   01474 1                   VINTFLAG
 3281   REF  5  LAST  576        26,3224   01673 1                   INTYPFLG
 3282                            26,3225   77624 1           CALL
 3283   REF  6  LAST  583        26,3226   55242 0                   INTGRCAL
 3284                            26,3227   77650 1            GOTO
 3285   REF  2  LAST  576        26,3230   54510 1                   RANGEBQ

 3286                            26,3231   77624 1  INITWMX6 CALL
 3287   REF  2  LAST  576        26,3232   55251 1                   WLINIT             INITIALIZE W-MATRIX
 3288                            26,3233   45014 0           SET     CALL
 3289   REF 16  LAST  583        26,3234   01474 1                   VINTFLAG
 3290   REF  6  LAST  575        26,3235   26644 0                   SETIFLGS
 3291                            26,3236   77624 1           CALL
 3292   REF  7  LAST  583        26,3237   55242 0                   INTGRCAL
 3293                            26,3240   77650 1           GOTO
 3294   REF  3  LAST  583        26,3241   54510 1                   RANGEBQ

R3295   THIS ROUTINE CLEARS RFINAL (DP) AND CALLS INTEGRV
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 3296                          26,3242    71220 1  INTGRCAL STQ      DLOAD
 3297   REF   1                26,3243    03675 0                    IGRET
 3298   REF   6  LAST  570     26,3244    03755 0                    MKTIME
 3299   REF  18  LAST  570     26,3245    34041 0           STCALL   TDEC1
 3300   REF   8  LAST  500     26,3246    27134 1                    INTEGRV
 3301                          26,3247    77650 1           GOTO
 3302   REF   2  LAST  584     26,3250    03675 0                    IGRET

R3303   THIS ROUTINE INITIALIZES THE W-MATRIX BY ZEROING ALL W THEN SETTING
R3304   DIAGONAL ELEMENTS TO INITIAL STORED VALUES.

 3305   REF   4  LAST  127     E5,1400                      EBANK=   W
 3306                          26,3251    77776 1  WLINIT   EXIT
 3307   REF   1                26,3252  3 3331 0            CAF      WBANK
 3308   REF  14  LAST  579     26,3253  54 0006 0           TS       BBANK
 3309   REF   1                26,3254  3 3437 1            CAF      WSIZE
 3310   REF   2  LAST  107     26,3255  55'257 1            TS       W.IND
 3311   REF 124  LAST  576     26,3256  3 4755 1            CAF      ZERO
 3312   REF   3  LAST  584     26,3257  51'257 0            INDEX    W.IND
 3313   REF   5  LAST  584     26,3260  55'400 0            TS       W
 3314   REF   4  LAST  584     26,3261  11'257 1            CCS      W.IND
 3315                          26,3262  0 3255 0            TC       -5
 3316   REF   2  LAST  579     26,3263  3 3332 0            CAF      AIGBANK             RESTORE EBANK 7
 3317   REF  15  LAST  584     26,3264  54 0006 0           TS       BBANK
 3318   REF  54  LAST  579     26,3265  0 6037 0            TC       INTPRET
 3319                          26,3266    67214 1           BON      SLOAD               IF ON LUNAR SURFACE,INITIALIZE WITH
 3320   REF  10  LAST  579     26,3267    04307 1                    SURFFLAG            WSURFPOS AND WSURFVEL INSTEAD OF
 3321   REF   1                26,3270    55274 0                    WLSRFPOS            WRENDPOS AND WRENDVEL
 3322   REF   2  LAST  117     26,3271    02001 1                    WRENDPOS
 3323                          26,3272    77650 1           GOTO
 3324   REF   1                26,3273    55276 1                    WPOSTORE
 3325                          26,3274    77735 0  WLSRFPOS SLOAD
 3326   REF   1                26,3275    02007 1                    WSURFPOS
 3327                          26,3276    77661 0  WPOSTORE SR                           SHIFT TO B-19 SCALE
 3328                          26,3277    20606 0                    5
 3329   REF   6  LAST  584     26,3300    02401 0           STORE    W
 3330   REF   7  LAST  584     26,3301    02411 1           STORE    W +8D
 3331   REF   8  LAST  584     26,3302    02421 1           STORE    W +16D
 3332                          26,3303    67214 1           BON      SLOAD
 3333   REF  11  LAST  584     26,3304    04307 1                    SURFFLAG
 3334   REF   1                26,3305    55311 1                    WLSRFVEL
 3335   REF   1                26,3306    02002 1                    WRENDVEL
 3336                          26,3307    77650 1           GOTO
 3337   REF   1                26,3310    55313 0                    WVELSTOR
 3338                          26,3311    77735 0  WLSRFVEL SLOAD
 3339   REF   1                26,3312    02010 1                    WSURFVEL
 3340   REF   9  LAST  584     26,3313    02511 0  WVELSTOR STORE    W +72D
 3341   REF  10  LAST  584     26,3314    02521 0           STORE    W +80D
 3342   REF  11  LAST  584     26,3315    02531 1           STORE    W +88D
 3343                          26,3316    77735 0           SLOAD
 3344   REF   1                 26,3317   02003 0                     WSHAFT
 3345   REF  12  LAST   584     26,3320   02621 0           STORE     W +144D
 3346                           26,3321   77735 0           SLOAD
 3347   REF   1                 26,3322   02004 1                     WTRUN
 3348   REF  13  LAST   585     26,3323   02631 1           STORE     W +152D
 3349                           26,3324   56214 0           SET       SSP          SET RENDWFLG - W-MATRIX VALID
 3350   REF   9  LAST   576     26,3325   02476 0                     RENDWFLG
 3351   REF   4  LAST   583     26,3326   03463 0                     MARKCTR      SET MARK COUNTER EQUAL ZERO
 3352                           26,3327   00000 1                     0
 3353                           26,3330   77616 0           RVQ

 3354   REF  14  LAST   585     E5,1400                     EBANK=    W
 3355   REF   3  LAST   583     26,3331   54065 0  WBANK    BBCON     WLINIT
 3356   REF   7  LAST   579     E7,1457                     EBANK=    AIG
 3357   REF   2  LAST   506     26,3332   54067 1  AIGBANK  BBCON     LSR22.3

R3358   GETULC

R3359   THIS SUBROUTINE COMPUTES THE RELATIVE POSITION VECTOR BETWEEN THE CSM
R3360   AND THE LM, LEAVING THE UNIT VECTOR IN THE PUSHLIST AND MPAC AND THE
R3361   MAGNITUDE IN 36D.

 3362                           26,3333   77201 1  GETULC   SETPD     VLOAD
 3363                           26,3334   00001 0                     0
 3364   REF   1                 26,3335   01645 1                     DELTALEM
 3365                           26,3336   77754 1           LXA,2
 3366   REF   3  LAST   576     26,3337   03720 1                     SCALSHFT     LOAD X2 WITH SCALE SHIFT
 3367                           26,3340   53257 1           VSR*      VAD
 3368                           26,3341   57165 1                     9D,2         SHIFT FOR EARTH/MOON SPHERE
 3369   REF   2  LAST   500     26,3342   01661 1                     RCVLEM
 3370                           26,3343   53715 1           PDVL      VSR*
 3371   REF   1                 26,3344   01573 1                     DELTACSM
 3372                           26,3345   57165 1                     9D,2         SHIFT FOR EARTH/MOON SPHERE
 3373                           26,3346   52255 1           VAD       VSU
 3374   REF   1                 26,3347   01607 1                     RCVCSM
 3375                           26,3350   41434 1           RTB       PUSH         USE NORMUNIT TO PRESERVE ACCURACY
 3376   REF   1                 26,3351   21724 0                     NORMUNX1
 3377   REF   7  LAST   581     26,3352   17724 0           STODL     ULC
 3378                           26,3353   00045 0                     36D
 3379                           26,3354   77657 0           SL*                    ADJUST MAGNITUDE FROM NORMUNIT
 3380                           26,3355   20201 0                     0,1
 3381                           26,3356   24045 0           STOVL     36D          ULC IN PDO AND MPAC,RLC IN 36D
 3382   REF   8  LAST   585     26,3357   03724 0                     ULC
 3383                           26,3360   77616 0           RVQ
R3384   RADARANG

R3385   THIS SUBROUTINE COMPUTES SINTHETA = -ULC DOT MY
R3386   RXZ = (SQRT (1-SINTHETA**2))RLC
R3387   OUTPUT
R3388    ULC IN ULC, PDO
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R3389     RLC  IN PD36D
R3390     SIN THETA IN SINTHETA AND PD6
R3391     RXZ NORM IN RXZ (N IN X1)
 3392                          26,3361   45020 1  RADARANG STQ     CALL
 3393    REF   2  LAST  145    26,3362   03675 0                   RDRET
 3394    REF   3  LAST  577    26,3363   55333 1                   GETULC
 3395                          26,3364   50276 1           VCOMP   DOT
 3396    REF   5  LAST  581    26,3365   03705 0                   MY
 3397                          26,3366   41572 1           SL1R    PUSH             SIN THETA TO PD6
 3398    REF   3  LAST  582    26,3367   03732 1           STORE   SINTHETA
 3399                          26,3370   44316 0           DSQ     BDSU
 3400    REF   3  LAST  352    26,3371   06512 1                   DP1/4TH          1 - (SIN THETA)**2
 3401                          26,3372   41366 1           SQRT    DMP
 3402                          26,3373   00045 0                   36D
 3403                          26,3374   60352 0           SL1     NORM
 3404    REF   4  LAST  577    26,3375   00047 1                   X1               SET SHIFT COUNTER IN X1
 3405    REF  10  LAST  582    26,3376   03722 0           STORE   RXZ
 3406                          26,3377   77650 1           GOTO                     EXIT
 3407    REF   3  LAST  586    26,3400   03675 0                   RDRET
 3408                          26,3401   45020 1  LGCUPDTE STQ     CALL
 3409    REF   3  LAST  145    26,3402   03675 0                   LGRET
 3410    REF   1               26,3403   46531 1                   INCORP1
 3411                          26,3404   51575 1           VLOAD   ABVAL
 3412    REF   3  LAST  126    26,3405   02673 1                   DELTAX +6
 3413                          26,3406   53754 1           LXA,2   SRR*
 3414    REF   4  LAST  585    26,3407   03720 1                   SCALSHFT         0-MOON. 2-EARTH
 3415                          26,3410   56174 0                   2,2              SET VEL DISPLAY TO B-7
 3416    REF   3  LAST  314    26,3411   24317 1           STOVL   R22DISP +2
 3417    REF   4  LAST  586    26,3412   02665 0                   DELTAX
 3418                          26,3413   53646 0           ABVAL   SR*
 3419                          26,3414   56174 0                   2,2              SET POS DISPLAY TO B-29
 3420    REF   4  LAST  586    26,3415   00315 0           STORE   R22DISP
 3421                          26,3416   54335 0           SLOAD   SR
 3422    REF   1               26,3417   02005 0                   RMAX
 3423                          26,3420   20613 1                   10D
 3424                          26,3421   50025 0           DSU     BMN
 3425    REF   5  LAST  586    26,3422   00315 0                   R22DISP
 3426    REF   1               26,3423   50572 1                   R22LEM96         GO DISPLAY
 3427                          26,3424   45335 0           SLOAD   DSU
 3428    REF   1               26,3425   02006 0                   VMAX
 3429    REF   6  LAST  586    26,3426   00317 1                   R22DISP +2       VMAX MINUS VEL. DEVIATION
 3430                          26,3427   77640 0           BMN
 3431    REF   2  LAST  586    26,3430   50572 1                   R22LEM96         GO DISPLAY
 3432                          26,3431   77624 1  ASTOK    CALL
 3433    REF   1               26,3432   46743 0                   INCORP2
 3434                          26,3433   77650 1           GOTO
 3435    REF   4  LAST  586    26,3434   03675 0                   LGRET
 3436                          26,3435   00103 0  IMUVAR   2DEC    E-6 B12          RAD**2
 3436                          26,3436   03370 0
 3437                          26,3437   00241 0  WSIZE    DEC     161
 3438                           26,3440   31103 1  2PI/8     2DEC    3.141592653 B-2
 3438                           26,3441   36652 0
 3439   REF  30  LAST  575      E7,1456                      EBANK=  LOSCOUNT
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P3440   PROGRAM NAME LRS24.1    RR SEARCH ROUTINE
R3441   MOD NO  0         BY  P VOLANTE  SDC           DATE  1-15-67


R3442   FUNCTIONAL DESCRIPTION

R3443   DRIVES THE RENDEZVOUS RADAR IN A HEXAGONAL SEARCH PATTERN ABOUT THE LOS TO THE CSM (COMPUTED FROM THE CSM AND LM
R3445   STATE VECTORS) CHECKING FOR THE DATA GOOD DISCRETE AND MONITORING THE ANGLE BETWEEN THE RADAR BORESIGHT AND THE
R3447   LM +Z AXIS. IF THIS ANGLE EXCEEDS 30 DEGREES THE PREFERRED TRACKING ATTITUDE ROUTINE IS CALLED TO PERFORM AN
R3449   ATTITUDE MANEUVER.


R3450   CALLING SEQUENCE - BANKCALL FOR LRS24.1


R3451   SUBROUTINES CALLED

R3452          LEMCONIC         RAILEM
R3453          CSMCONIC         RRDESSM
R3454          JOBDELAY         FLAGDOWN
R3455          WAITLIST         FLAGUP
R3456          R NB             BANKCALL


R3457   EXIT  - TO ENDOFJOB WHEN THE SEARCH FLAG (SRCHOPT) IS NOT SET


R3458   OUTPUT

R3459       DATAGOOD (SP)-FOR DISPLAY IN R1- 00000 INDICATES NO LOCKON
R3460                                        11111 INDICATES LOCKON ACHIEVED
R3461       OMEGAD   (SP)-FOR DISPLAY IN R2- ANGLE BETWEEN RR BORESIGHT VECTOR AND THE SPACECRAFT +Z AXIS

R3463   ERASABLE INITIALIZATION REQUIRED
R3464      SEARCH FLAG MUST BE SET
R3465      LM AND CSM STATE VECTORS AND REFSMMAT MATRIX
R3466   DEBRIS

R3467      RLMSRCH       UXVECT
R3468      VXRLM         UYVECT
R3469      LOSDESRD      NSRCHPNT
R3470      DATAGOOD      OMEGAD
R3471      MPAC          PUSHLIST


  3472  REF   1                                                    COUNT* $$/LRS24
  3473  REF 125  LAST  584   26,3442  3 4755 1  LRS24.1   CAF     ZERO
  3474  REF   2  LAST  144   26,3443  55'736 0            TS      NSRCHPNT          SET SEARCH PATTERN POINT COUNTER TO ZERO
  3475  REF  52  LAST  551   26,3444  3 4736 1  CHKSRCH   CAF     BIT14             ISSUE AUTO TRACK ENABLE TO RADAR
  3476                       26,3445  0 0006 1                    EXTEND
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 3477   REF  38  LAST  562    26,3446  05 012 1             WOR     CHAN12
 3478   REF   1               26,3447  3 4736 1             CAF     SRCHOBIT      CHECK IF SEARCH STILL REQUESTED
 3479   REF  10  LAST  552    26,3450  7 0076 1             MASK    FLAGWRD2      (SRCHOPT FLAG SET)
 3480                         26,3451  0 0006 1             EXTEND
 3481   REF  93  LAST  552    26,3452  1 5155 1             BZF     ENDOFJOB      NO-TERMINATE JOB


 3482   REF   1               26,3453  3 3713 1             CAF     6SECONDS      SCHEDULE TASK TO DRIVE RADAR TO NEXT PT.
 3483                         26,3454  0 0004 0             INHINT
 3484   REF  24  LAST  561    26,3455  0 5203 0             TC      WAITLIST      IN 6 SECONDS
 3485   REF  31  LAST  587    E7,1456                       EBANK=  LOSCOUNT
 3486   REF   3  LAST  516    26,3456   03643 0             2CADR   CALLDGCH
 3486                         26,3457   54067 1
 3487                         26,3460  0 0003 1             RELINT
 3488   REF  97  LAST  569    26,3461  4 0110 0             CS      RADMODES      IS REMODE IN PROGRESS
 3489   REF   5  LAST  546    26,3462  7 4736 0             MASK    REMODBIT
 3490                         26,3463  0 0006 1             EXTEND
 3491   REF  94  LAST  589    26,3464  1 5155 1             BZF     ENDOFJOB      YES- WAIT SIX SECONDS
 3492   REF  55  LAST  584    26,3465  0 6037 0             TC      INTPRET

 3493                         26,3466   43234 0             RTB     DAD            COMPUTE LOS AT PRESENT TIME + 1.5 SEC.
 3494   REF  12  LAST  518    26,3467   21573 0                     LOADTIME
 34945  REF   1               26,3470   15715 0                     1.5SECS
 3495   REF  19  LAST  584    26,3471   34041 0  LPS24.11   STCALL  TDEC1
 3496   REF   4  LAST  565    26,3472   27100 0                     LEMCONIC      EXTRAPOLATE LM STATE VECTOR
 3497                         26,3473   77775 1             VLOAD
 3498   REF   7  LAST  565    26,3474   00001 0                     RATT
 3499   REF   4  LAST  148    26,3475   27676 0             STOVL   RLMSRCH       SAVE LEM POSITION
 3500   REF   3  LAST  565    26,3476   00007 0                     VATT
 3501   REF   1               26,3477   17740 1             STODL   SAVLEMV       SAVE LEM VELOCITY
 3502   REF   6  LAST  565    26,3500   00015 0                     TAT
 3503   REF  20  LAST  589    26,3501   34041 0             STCALL  TDEC1         EXTRAPOLATE CSM STATE VECTOR
 3504   REF   3  LAST  565    26,3502   2706  1                     CSMCONIC      EXTRAPOLATE CSM STATE VECTOR
 3505                         26,3503   52375 1             VLOAD   VSU           LOS VECTOR = R(CSM)-R(LM)
 3506   REF   8  LAST  589    26,3504   00001 0                     RATT
 3507   REF   5  LAST  589    26,3505   03676 0                     RLMSRCH
 3508                         26,3506   77656 1             UNIT
 3509   REF   2  LAST  144    26,3507   27712 0             STOVL   LOSDESRD      STORE DESIRED LOS
 3510   REF   4  LAST  589    26,3510   00007 0                     VATT          COMPUTE UNIT(V(CM) CROSS R(CM))
 3511                         26,3511   47256 0             UNIT    VXV
 3512   REF   9  LAST  589    26,3512   00001 0                     RATT
 3513                         26,3513   77656 1             UNIT
 3514   REF   2  LAST  144    26,3514   03704 1             STORE   VXRCM
 3515                         26,3515   52375 1             VLOAD   VSU
 3516   REF   5  LAST  589    26,3516   00007 0                     VATT
 3517   REF   2  LAST  589    26,3517   03740 1                     SAVLEMV
 3518                         26,3520   76521 0             MXV     VSL1          CONVERT FROM REFERENCE TO STABLE MEMBER
 3519   REF  13  LAST  580    26,3521   01734 0                     REFSMMAT
 3520   REF   3  LAST  589    26,3522   03740 1             STORE   SAVLEMV       VLC = V(CSM) - V(LM)
 3521                         26,3523   53135 0             SLOAD   BZE           CHECK IF N=0
 3522   REF   3  LAST  588    26,3524   03737 1                     NSRCHPNT
 3523   REF   1               26,3525   55636 1                     DESCLOS      YES-DESIGNATE ALONG LOS
 3524                         26,3526   53025 0             DSU     BZE          IS N=1
 3525   REF   1               26,3527   15711 1                     ONEOCT       YES-CALCULATE X AND Y AXES OF
 3526   REF   1               26,3530   55623 0                     CALCXY       SEARCH PATTERN COORDINATE SYSTEM
 3527                         26,3531   77775 1             VLOAD                NO-ROTATE X-Y AXES TO NEXT SEARCH POINT
 3528   REF   2  LAST  144    26,3532   03720 1                     UXVECT
 3529   REF   1               26,3533   24015 0             STOVL   UXVECTPR     SAVE ORIGINAL X AND Y VECTORS
 3530   REF   2  LAST  144    26,3534   03726 1                     UYVECT       UXPRIME = ORIGINAL UX
 3531   REF   1               26,3535   00023 0             STORE   UYVECTPR     UYPRIME = ORIGINAL UY
 3532                         26,3536   77761 1             VXSC
 3533   REF   1               26,3537   15705 1                     SIN60DEG     UX =(COS 60)UXPR +(SIN 60)UYPR
 3534   REF   3  LAST  590    26,3540   27720 1             STOVL   UXVECT
 3535   REF   2  LAST  590    26,3541   00015 0                     UXVECTPR
 3536                         26,3542   53361 0             VXSC    VAD
 3537   REF   1               26,3543   06520 0                     COS60DEG
 3538   REF   4  LAST  590    26,3544   03720 1                     UXVECT
 3539                         26,3545   77656 1             UNIT
 3540   REF   5  LAST  590    26,3546   27720 1             STOVL   UXVECT
 3541   REF   3  LAST  590    26,3547   00015 0                     UXVECTPR     UY=(-SIN60)UXPR +(COS 60)UYPR
 3542                         26,3550   77761 1             VXSC
 3543   REF   2  LAST  590    26,3551   15705 1                     SIN60DEG
 3544   REF   3  LAST  590    26,3552   27726 1             STOVL   UYVECT
 3545   REF   2  LAST  590    26,3553   00023 0                     UYVECTPR
 3546                         26,3554   52361 1             VXSC    VSU
 3547   REF   2  LAST  590    26,3555   06520 0                     COS60DEG
 3548   REF   4  LAST  590    26,3556   03726 1                     UYVECT
 3549                         26,3557   77656 1             UNIT
 3550   REF   5  LAST  590    26,3560   03726 1             STORE   UYVECT
 3551                         26,3561   53361 0  OFFCALC    VXSC    VAD          OFFSET VECTOR = K(UY)
 3552   REF   1               26,3562   15707 0                     OFFSTFAC     LOS VECTOR + OFFSET VECTOR DEFINES
 3553   REF   3  LAST  589    26,3563   03712 0                     LOSDESRD     DESIRED POINT IN SEARCH PATTERN
 3554                         26,3564   64256 1             UNIT    MXV
 3555   REF  14  LAST  589    26,3565   01734 0                     REFSMMAT     CONVERT TO STABLE MEMBER COORDINATES
 3556                         26,3566   77772 0             VSL1
 3557   REF  13  LAST  571    26,3567   25102 0  CONTDESG   STOVL   RRTARGET
 3558   REF   4  LAST  589    26,3570   03740 1                     SAVLEMV
 3559   REF   5  LAST  565    26,3571   01761 0             STORE   LOSVEL
 3560                         26,3572   77776 1             EXIT
 3561                         26,3573  0 0004 0             INHINT
 3562   REF   7  LAST  565    26,3574  0 6027 1             TC      KILLTASK     KILL ANY PRESENTLY WAITLISTED TASK
 3563   REF   4  LAST  565    26,3575   52602 1             CADR    DESLOOP +2   WHICH WOULD DESIGNATE TO THE LAST
A3564                                                                            POINT IN THE PATTERN
 3565   REF   1               26,3576  4 4735 0  CONTDES2   CS      CDESBIT
 3566   REF  98  LAST  589    26,3577  7 0110 0             MASK    RADMODES     SET BIT 15 OF RADMODES TO INDICATE
 3567   REF   2  LAST  590    26,3600  6 4735 1             AD      CDESBIT      A CONTINUOUS DESIGNATE WANTED.
 3568   REF  99  LAST  590    26,3601  54 110 0             TS      RADMODES
 3569   REF  56  LAST  589    26,3602  0 6037 0             TC      INTPRET

 3570                         26,3603   77624 1             CALL
 3571   REF   3  LAST  510   26,3604   52373 1                    RRDESSM     DESIGNATE RADAR TO RRTARGET VECTOR

 3572                        26,3605   77776 1           EXIT
 3573   REF   1              26,3606  0 3675 0           TC       LIMALARM    LOS NOT IN MODE 2 COVERAGE (P22)
 3574   REF   2  LAST  591   26,3607  0 3675 0           TC       LIMALARM    VEHICLE MANEUVER REQUIRED (P20)


A3575                                                                         COMPUTE OMEGA,ANGLE  BETWEEN RR LOS AND
A3576                                                                         SPACECRAFT +Z AXIS
 3577                        26,3610  0 0006 1  OMEGCALC EXTEND
 3578   REF  10  LAST  569   26,3611  3 0036 1           DCA      CDUT
 3579   REF   8  LAST  570   26,3612   53753 0           DXCH     TANGNB
 3580   REF  57  LAST  590   26,3613  0 6037 0           TC       INTPRET
 3581                        26,3614   77624 1           CALL
 3582   REF   3  LAST  570   26,3615   46041 0                    RRNB
 3583                        26,3616   65545 0           DLOAD    ACOS        OMEGA IS ARCCOSINE OF Z-COMPONENT OF
 3584                        26,3617   00045 0                    36D         VECTOR COMPUTED BY RRNB (LEFT AT 32D)
 3585   REF   3  LAST  144   26,3620   03735 0           STORE    OMEGDISP    STORE FOR DISPLAY IN R2
 3586                        26,3621   77776 1           EXIT
 3587   REF  95  LAST  589   26,3622  0 5155 0           TC       ENDOFJOB
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P3588   CALCULATE X AND Y VECTORS FOR SEARCH PATTERN COORDINATE SYSTEM


 3589                          26,3623  47375 0  CALCXY   VLOAD  VXV
 3590   REF   3  LAST  589     26,3624   03704 1                  VXRCM
 3591   REF   4  LAST  590     26,3625   03712 0                  LOSDESRD
 3592                          26,3626  77656 1           UNIT
 3593   REF   6  LAST  590     26,3627  27720 1           STOVL  UXVECT        UX = (VLM X RLM)X LOS
 3594   REF   5  LAST  592     26,3630  03712 0                  LOSDESRD
 3595                          26,3631  53435 0           VXV    UNIT
 3596   REF   7  LAST  592     26,3632  03720 1                  UXVECT
 3597   REF   6  LAST  590     26,3633  03726 1           STORE  UYVECT        UY = LOS X UX
 3598                          26,3634  77650 1           GOTO
 3599   REF   1                26,3635  55561 0                  OFFCALC


 3600                          26,3636  64375 1  DESGLOS  VLOAD  MXV           WHEN N= 0,DESIGNATE ALONG LOS
 3601   REF   6  LAST  592     26,3637  03712 0                  LOSDESRD
 3602   REF  15  LAST  590     26,3640  01734 0                  REFSMMAT      CONVERT LOS FROM REFERENCE TO SM COORDS
 3603                          26,3641  52172 1           VSL1   GOTO
 3604   REF   1                26,3642  55567 0                  CONTDESG


 3605   REF  24  LAST  498     26,3643  30 074 1  CALLDGCH CAE    FLAGWRD0      IS RENDEZVOUS FLAG SET
 3606   REF  10  LAST  539     26,3644  7 4745 1          MASK   RNDVZBIT
 3607                          26,3645  0 0006 1          EXTEND
 3608   REF  25  LAST  530     26,3646  1 5261 0          BZF    TASKOVER      NO-EXIT R24
 3609   REF   2  LAST  490     26,3647  3 7713 0          CAF    PRIO25        YES -SCHEDULE JOB TO DRIVE RADAR TO NEXT
 3610   REF  23  LAST  546     26,3650  0 5105 0          TC     FINDVAC       POINT IN SEARCH PATTERN
 3611   REF   6  LAST  589     E7,1675                    EBANK= RLMSRCH
 3612   REF   1                26,3651   03654 0          2CADR  DATGDCHK
 3612   REF   1                26,3652   54067 1
 3613   REF  26  LAST  592     26,3653  0 5261 1          TC     TASKOVER


 3614   REF  26  LAST  557     26,3654  3 4750 1  DATGDCHK CAF    BIT4
 3615                          26,3655  0 0006 1          EXTEND               CHECK IF DATA GOOD DISCRETE PRESENT
 3616   REF  19  LAST  569     26,3656  02 033 0          RAND   CHAN33
 3617                          26,3657  0 0006 1          EXTEND
 3618   REF   1                26,3660  1 3667 1          BZF    STORE1S       YES- GO TO STORE 11111 FOR DISPLAY IN R1
 3619   REF  14  LAST  433     26,3661  4 6242 1          CS     SIX
 3620   REF   4  LAST  590     26,3662  6 1736 1          AD     NSRCHPNT      IS N GREATER THAN 6
 3621                          26,3663  0 0006 1          EXTEND
 3622   REF   2  LAST  516     26,3664  1 3442 1          BZF    LRS24.1       YES - RESET N = 0 AND START AROUND AGAIN
 3623   REF   5  LAST  592     26,3665  25'736 1          INCR   NSRCHPNT      NO-SET N = N+1 AN GO TO
 3624   REF   1                26,3666  1 3444 1          TCF    CHKSRCH       NEXT POINT IN PATTERN


 3625   REF   1                26,3667  3 3703 0  STORE1S  CAF    ALL1S         STORE 11111 FOR DISPLAY IN R1
 3626   REF   5  LAST  515     26,3670  55'733 0          TS     DATAGOOD
 3627                           26,3671  0 0004 0            INHINT
 3628    REF    8  LAST  590    26,3672  0 6027 1            TC       KILLTASK        DELETE DESIGNATE TASK FROM
 3629    REF    5  LAST  590    26,3673   52602 1            CADR     DESLOOP +2      WAITLIST USING KILLTASK
 3630    REF   96  LAST  591    26,3674  0 5155 0            TC       ENDOFJOB

 3631    REF   26  LAST  556    26,3675  0 5567 0  LIMALARM  TC       ALARM           ISSUE ALARM 527-LOS NOT IN MODE2
 3632                           26,3676   00527 1            OCT      527             COVERAGE IN P22 OR VEHICLE MANEUVER
 3633                           26,3677  0 0004 0            INHINT                   REQUIRED IN P20
 3634    REF    9  LAST  593    26,3700  0 6027 1            TC       KILLTASK        KILL WAITLIST CALL FOR NEXT
 3635    REF    4  LAST  589    26,3701   55643 0            CADR     CALLDGCH        POINT IN SEARCH PATTERN
 3636    REF   97  LAST  593    26,3702  0 5155 0            TC       ENDOFJOB


 3637                           26,3703   25547 0  ALL1S     DEC      11111
 3638                           26,3704   33555 1  SIN60DEG  2DEC     .86603
 3638                           26,3705   01106 1
 3639    REF    7  LAST  362    23,2517            COS60DEG  =        DPHALF          (2DEC    .50)
 3640                              0014            UXVECTPR  EQUALS  12D              PREVIOUS
 3641                              0022            UYVECTPR  EQUALS  18D
 3642                              0014            RLMUNIT   EQUALS  12D
 3643                           26,3706   01642 0  OFFSTFAC  2DEC     0.05678         TANGENT OF 3.25 DEGREES
 3643                           26,3707   11045 0
 3644                           26,3710   00001 0  ONEOCT    OCT      00001           ****  NOTE-THESE TWO CONSTANTS MUST ****
 3645                           26,3711   00000 1  3SECONDS  2DEC     300             ****  BE IN THIS ORDER BECAUSE      ****
 3645                           26,3712   00454 1
A3646                                                                                 ****  ONEOCT NEEDS A LOWER ORDER    ****
A3647                                                                                 ****  WORD OF ZEROES                ****
 3648                           26,3713   01130 1  6SECONDS  DEC      600
 3649                           26,3714   00000 1  1.5SECS   2DEC     150
 3649                           26,3715   00226 1
 3650    REF    3  LAST  487    23,2521            ZERO/SP   EQUALS  HI6ZEROS
 3651                              4616                      BLOCK    02
 3652    REF    3  LAST  224       6000                      SETLOC   FFTAG5
 3653                              6022                      BANK
 3654    REF    1                                            COUNT*   $$/P20
 3655                              6022  0 0006 1  GOTOV56   EXTEND                   P20 TERMINATES BY GOTOV56 INSTEAD OF
 3656    REF    1                  6023  3 6026 0            DCA      VB56CADR        GOTOPOOH
 3657    REF    4  LAST  457       6024  1 5165 1            TCF      SUPDXCHZ
 3658    REF    2  LAST  486    E7,1471                      EBANK=   WHOCARES
 3659    REF    2  LAST  262       6025   03024 1  VB56CADR  2CADR    TRMTRACK
 3659                              6026   66107 1
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R3660    PROGRAM NAME: R29  (RENDEZVOUS RADAR DESIGNATE DURING POWERED FLIGHT)
R3661    MOD NO. 2        BY H. BLAIR-SMITH        JULY 2, 1968.

R3662    FUNCTIONAL DESCRIPTION:

R3663    DESIGNATES THE RENDEZVOUS RADAR TOWARD THE COMPUTED LOS TO THE CSM, WITH THE CHIEF OBJECTIVE OF OBTAINING RANGE
R3665    AND RANGE RATE DATA AT 2-SECOND INTERVALS FOR TRANSMISSION TO THE GROUND.  WHEN THE RR IS WITHIN .5 DEGREE OF
R3667    THE COMPUTED LOS, TRACKING IS ENABLED, AND DESIGNATION CONTINUES UNTIL THE DATA-GOOD DISCRETE IS RECEIVED.  AT
R3669    THAT POINT, DESIGNATION CEASES AND A RADAR-READING ROUTINE TAKES OVER, PREPARING A CONSISTENT SET OF DATA FOR
R3671    DOWN TELEMETRY.  THE SET INCLUDES RANGE, RANGE RATE, MARK TIME, TWO RR CDU ANGLES, THREE IMUCDU ANGLES, AND AN
R3673    INDICATOR WHICH IS 1 WHEN THE SET IS CONSISTENT AND 0 OTHERWISE.  THE INDICATOR IS IN TRKMKCNT.

R3676    CALLING SEQUENCE:  BEGUN EVERY 2 SECONDS AS AN INTEGRAL PART OF SERVICER

R3677    SUBROUTINES CALLED:

R3678    REMODE   RRTONLY
R3679    UNIT     MPACVBUF
R3680    QUICTRIG AX*SR*T
R3681    SPSIN    SPCOS
R3682    SETRRECR RROUT
R3683    RRRDOT   RRRANGE

R3684    EXIT:  TO NOR29NOW, IN SERVICER.

R3685    OUTPUT:  (ALL FOR DOWNLINK)

R3686    RM       RDOTM                    (RAW)
R3687    AIG      AMG
R3688    AOG      TRKMKCNT                 TRKMKCNT = 00001 IF SET IS CONSISTENT,
R3689    TANGNB   TANGNB +1                OTHERWISE TRKMKCNT = 00000.
R3690    MKTIME
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P3691    ERASABLE INITIALIZATION REQUIRED:

R3692    NOR29FLG READRFLG                  (TO 1 AND 0 BY FRESH START)  (RESET NOR29FLG TO LET SERVICER RUN R29)
R3694    PIPTIME  RADMODES (BIT 10)         (BIT SET TO 0 BY FRESH START)
R3695    R(CSM)   V(CSM)
R3696    R        V                         (PIPTIME THRU V BY AVE G IN SERVICER)


R3697    DEBRIS:

R3698    RADMODES (BIT 10)
R3699    LOSSM    LOSVDT/4         (= RRTARGET & LOSVEL)
R3700    SAVECDUT OLDESFLG         (SAVECDUT = MLOSV)
R3701    LOSCMFLG READRFLG


R3702    ALARMS:  NONE.


R3703    COMPONENT JOBS AND TASKS:

R3704    INITIALIZING, IF RR IS FOUND TO BE IN MODE 1:  JOB R29REMOJ AND TASK REMODE;  ALWAYS: TASK PREPOS29.
R3706    DESIGNATING:  TASK BEGDES29 & JOB R29DODES.
R3707    RADAR READING:  TASK R29READ AND JOB R29RDJOB.  ALL JOBS ARE NOVAC TYPE.


 3708                           33,2045                      BANK    33
 3709    REF    1               33,2000                      SETLOC R29/SERV
 3710                           33,2045                      BANK

 3711    REF    1                                            COUNT* $$/R29

 3712    REF    2  LAST  388       5314             NR29&RDR EQUALS EBANK5
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P3713   SERVICER COMES TO R29 FROM "R29?" IF NOR29FLG, READRFLG, RRREMODE, RRCDUZRO, PRREPOS, AND DISPLAY-INERTIAL-DATA
R3715   ARE ALL RESET, AND THE RR IS IN LGC MODE (OFTEN CONFUSINGLY CALLED AUTO MODE).


 3717   REF 100  LAST  590   33,2045  4 0110 0  R29       CS     RADMODES
 3718   REF   6  LAST  546   33,2046  7 4742 0            MASK   DESIGBIT
 3719                        33,2047  0 0006 1            EXTEND
 3720   REF   1              33,2050  1 2123 1            BZF    R29.LOS          BRANCH IF DESIGNATION IS ALREADY ON.

 3721                        33,2051  0 0004 0            INHINT
 3722   REF 101  LAST  596   33,2052  26 110 0            ADS    RADMODES         SHOW THAT DESIGNATION IS NOW ON.
 3723   REF  53  LAST  588   33,2053  4 4736 0            CS     BIT14
 3724                        33,2054  0 0006 1            EXTEND
 3725   REF  39  LAST  589   33,2055  03 012 1            WAND   CHAN12           REMOVE RR TRACK ENABLE DISCRETE.
 3726   REF   2  LAST  552   33,2056  4 4740 1            CS     LOSCMBIT
 3727   REF  11  LAST  589   33,2057  7 0076 1            MASK   FLAGWRD2
 3728   REF  12  LAST  596   33,2060  54 076 1            TS     FLAGWRD2         CLEAR LOSCMFLG TO SHOW DES. LOOP IS OFF.
 3729   REF   1              33,2061  4 4753 0            CS     OLDESBIT
 3730   REF  39  LAST  551   33,2062  7 0074 0            MASK   STATE
 3731   REF  40  LAST  596   33,2063  54 074 0            TS     STATE            SHOW THAT DES. LOOP IS NOT REQUESTED.
 3732   REF 147  LAST  576   33,2064  0 4616 1            TC     BANKCALL
 3733   REF   3  LAST  540   33,2065   52156 1            CADR   SETRRECR         ENABLE RR ERROR COUNTERS.
 3734   REF  12  LAST  544   33,2066  3 4740 0            CA     ANTENBIT
 3735   REF 102  LAST  596   33,2067  7 0110 0            MASK   RADMODES
 3736   REF 200  LAST  571   33,2070  10 000 0            CCS    A                TEST RR MODE BIT.
 3737   REF   1              33,2071  1 2104 1            TCF    SETPRPOS         MODE 2.

 3738   REF   2  LAST  328   33,2072  3 5031 0            CA     PRIO21           MODE 1; MUST REMODE.
 3739   REF  11  LAST  506   33,2073  0 5072 1            TC     NOVAC
 3740   REF  32  LAST  589   E7,1456                      EBANK= LOSCOUNT
 3741   REF   1              33,2074   02113 0            2CADR  R29REMOJ         NEEDS OWN JOB TO RADSTALL IN.
 3741   REF   1              33,2075   66067 0
 3742   REF   7  LAST  596   33,2076  4 4742 0            CS     DESIGBIT
 3743   REF 103  LAST  596   33,2077  7 0110 0            MASK   RADMODES         CLEAR DESIGNATE FLAG IN RADMODES
 3744   REF 104  LAST  596   33,2100  54 110 0            TS     RADMODES         BEFORE CALLING REMODE
 3745   REF   6  LAST  589   33,2101  3 4736 1            CA     REMODBIT
 3746   REF 105  LAST  596   33,2102  26 110 0            ADS    RADMODES          SHOW THAT REMODING IS ON.
 3747   REF   1              33,2103  1 2570 0            TCF    NOR29NOW         CONTINUE SERVICER FUNCTIONS.

 3748   REF  73  LAST  561   33,2104  3 4753 1  SETPRPOS  CA     ONE
 3749   REF  25  LAST  589   33,2105  0 5203 0            TC     WAITLIST
 3750   REF  33  LAST  596   E7,1456                      EBANK= LOSCOUNT
 3751   REF   1              33,2106   03601 0            2CADR  PREPOS29         TASK TO SET TRUNNION ANGLE TO -180 DEG.
 3751   REF   1              33,2107   52067 1
 3752   REF   7  LAST  557   33,2110  3 4741 1            CA     REPOSBIT
 3753   REF 106  LAST  596   33,2111  26 110 0            ADS    RADMODES         SHOW THAT REPOSITIONING IS ON.
 3754   REF   2  LAST  596   33,2112  1 2570 0            TCF    NOR29NOW
```

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P3755    FORCE RENDEZVOUS RADAR INTO MODE 2.


 3756    REF  74  LAST  596    33,2113  3 4753 1  R29REMOJ CA      ONE
 3757    REF  26  LAST  596    33,2114  0 5203 0           TC      WAITLIST
 3758    REF  34  LAST  596    E7,1456                     EBANK=  LOSCOUNT
 3759    REF   2  LAST  546    33,2115   02171 1           2CADR   REMODE            REMODE MUST RUN AS A TASK.
 3759                          33,2116   52067 1
 3760    REF 148  LAST  596    33,2117  0 4616 1           TC      BANKCALL          WAIT FOR END OF REMODING.
 3761    REF  10  LAST  570    33,2120   17714 0           CADR    RADSTALL

 3762    REF  98  LAST  593    33,2121  1 5155 1           TCF     ENDOFJOB          BAD EXIT CAN'T HAPPEN.
 3763    REF  99  LAST  597    33,2122  1 5155 1           TCF     ENDOFJOB

R3764    TASK TO PREPOSITION THE RR TRUNNION ANGLE TO -180 DEG.

 3765    REF   1               25,2000                     SETLOC  R29S1
 3766                          25,3601                     BANK

 3767    REF   2  LAST  367    25,3601  3 4735 1  PREPOS29 CA      NEGMAX            -180 DEG.
 3768    REF   5  LAST  532    25,3602  0 2241 1           TC      RRTONLY           DRIVE TRUNNION CDU.
 3769    REF   8  LAST  596    25,3603  4 4741 0           CS      REPOSBIT          SHOW THAT REPOSITIONING IS OFF.
 3770    REF 107  LAST  596    25,3604  7 0110 0           MASK    RADMODES
 3771    REF 108  LAST  597    25,3605  54 110 0           TS      RADMODES
 3772    REF  27  LAST  592    25,3606  1 5261 0           TCF     TASKOVER


R3773    COMPUTE LINE-OF-SIGHT AND LOS VELOCITY, AND PASS THEM TO THE R29DODES LOOP.


 3775    REF   1               33,2045                     SETLOC  R29
 3776                          33,2123                     BANK

 3777                          33,2123  0 0006 1  R29.LOS  EXTEND
 3778    REF   4  LAST  336    33,2124  4 1235 0           DCS     PIPTIME
 3779    REF 252  LAST  573    33,2125  52 155 1           DXCH    MPAC
 3780                          33,2126  0 0006 1           EXTEND
 3781    REF  16  LAST  569    33,2127  3 0025 0           DCA     TIME2
 3782    REF 253  LAST  597    33,2130  20 155 1           DAS     MPAC              (MPAC) = T-PIPTIME, SCALED B-28.
 3783    REF   4  LAST  336    33,2131  54 163 1           TS      MODE              SET MODE TO DOUBLE PRECISION.
 3784    REF 254  LAST  597    33,2132  3 0155 0           CA      MPAC +1
 3785                          33,2133  0 0006 1           EXTEND
 3786    REF  24  LAST  550    33,2134  7 4740 1           MP      BIT12
 3787    REF 255  LAST  597    33,2135  52 155 1           DXCH    MPAC              T-PIPTIME NOW SCALED B-17.
 3788    REF  58  LAST  591    33,2136  0 6037 0           TC      INTPRET
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P3789    LOSCMFLG=0 MEANS THAT THE DESIGNATION IS READY FOR NEW DATA.  SETTING LOSCMFLG MAKES IT GO AWAY SO SETUP29D CAN
R3791    START IT UP WHEN THE DATA IS IN PLACE.


 3792                            33,2137   52315 1            PDVL    VSU                PUSH DOWN T-PIPTIME.
 3793    REF   1                 33,2140   01726 0                    V(CSM)
 3794    REF   2  LAST   147     33,2141   03527 1                    V                  LOSVEL = V(CSM) - V.
 3795                            33,2142   74325 0            PDDL    VXSC               SWAP LOSVEL FOR T-PIPTIME, MULTIPLY THEM
 3796                            33,2143   52255 1            VAD     VSU                 AND ADD THE RESULT TO R(CSM) - R TO GET
 3797    REF   1                 33,2144   01720 0                    R(CSM)              AN UP-TO-DATE LOS VECTOR IN SM AXES.
 3798    REF   4  LAST   233     33,2145   03521 1                    R
 3799                            33,2146   77414 0            BOFSET  EXIT               (BOFSET DOES ITS THING INHINTED.)
 3800    REF   9  LAST   565     33,2147   01043 1                    LOSCMFLG           IF DESIGNATE LOOP IS OFF, CHANGE LOSCM-
 3801    REF   1                 33,2150   66152 1                    SETUP29D            FLG TO ON AND GO TO SET UP NEW DATA.
 3802    REF   3  LAST   596     33,2151   1 2570 0           TCF     NOR29NOW           IF DES. LOOP IS ON, LET IT USE OLD DATA.

 3803    REF   1                 33,2152   25102 0   SETUP29D STOVL   LOSSM              LINE-OF-SIGHT VECTOR, STABLE MEMBER AXES
 3804                            33,2153   00001 0                    0
 3805                            33,2154   77761 1            VXSC
 3806    REF   1                 33,2155   26177 1                    .5SECB17
 3807    REF   1                 33,2156   01761 0            STORE   LOSVDT/4           1/2 SECOND'S WORTH OF LOS VELOCITY.
 3808                            33,2157   77414 0            CLEAR   EXIT
 3809    REF  10  LAST   598     33,2160   01263 1                    LOSCMFLG           LET R29DLOOP USE NEW DATA.

 3810    REF  41  LAST   596     33,2161   4 0074 0           CS      STATE
 3811    REF   2  LAST   596     33,2162   7 4753 0           MASK    OLDESBIT
 3812                            33,2163   0 0006 1           EXTEND
 3813    REF   4  LAST   598     33,2164   1 2570 0           BZF     NOR29NOW           BRANCH IF R29 DES. LOOP IS REQUESTED.
 3814                            33,2165   0 0004 0           INHINT
 3815    REF  42  LAST   598     33,2166   26 0074 0          ADS     STATE              OTHERWISE REQUEST IT NOW.

 3816    REF   1                 33,2167   1 1056 1           CCS     PIPCTR             SEE IF TASK SHOULD BE OFFSET ONE SECOND.
 3817    REF   1                 33,2170   4 4776 1           CS      SUPER110           -96D +100D = 4.
 3818    REF   4  LAST   381     33,2171   6 4777 1           AD      1SEC               0 +100D = 100D.
 3819    REF  27  LAST   597     33,2172   0 5203 0           TC      WAITLIST
 3820    REF  35  LAST   597     E7,1456                      FBANK=  LOSCOUNT
 3821    REF   1                 33,2173   03356 1            2CADR   BEGDES29           START BEGDES29 TASK ASAP.
 3821    REF   1                 33,2174   50067 0
 3822    REF   5  LAST   598     33,2175   1 2570 0           TCF     NOR29NOW           RELINT AND CONTINUE SERVICER FUNCTIONS.

 3823                            33,2176   00006 1   .5SECB17 2DEC    50 B-17
 3823                            33,2177   10000 0
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P3824   R29 DESIGNATE JOB AND TASK MACHINERY.  TASK RECURS EVERY .5 SEC UNTIL DESIGNATE IS CALLED OFF; IT MAY WAIT FOR A
R3826   CENTISECOND OR TWO IF IT COMES UP WHILE SETUP29D IS SUPPLYING NEW DATA.


 3827                         24,3356                      BANK    24
 3828   REF   6  LAST  572    24,2000                      SETLOC  P20S
 3829                         24,3356                      BANK

 3830   REF   1                                            COUNT*  $$/R29

 3831   REF   3  LAST  596    24,3356  3 5031 0  BEGDES29  CAF     PRIO21
 3832   REF  12  LAST  596    24,3357  0 5072 1            TC      NOVAC
 3833   REF   2  LAST  598    E3,1760                      EBANK=  LOSVDT/4
 3834   REF   1               24,3360   02547 0            2CADR   R29DODES        START R29DODES JOB TWICE A SECOND.
 3834   REF   1               24,3361   64063 0

 3835   REF   2  LAST  516    24,3362  3 4774 1  R29DLOOP  CAF     .5SEC
 3836   REF   4  LAST  562    24,3363  0 5224 0            TC      VARDELAY

 3837   REF 109  LAST  597    24,3364  4 0110 0            CS      RADMODES
 3838   REF   8  LAST  596    24,3365  7 4742 0            MASK    DESIGBIT
 3839   REF 201  LAST  596    24,3366  10 000 0            CCS     A
 3840   REF  28  LAST  597    24,3367  1 5261 0            TCF     TASKOVER        QUIT IF DESIGNATION IS CALLED OFF.

 3841   REF  13  LAST  596    24,3370  4 0076 1            CS      FLAGWRD2
 3842   REF   3  LAST  596    24,3371  7 4740 1            MASK    LOSCMBIT
 3843                         24,3372  0 0006 1            EXTEND
 3844                         24,3373  1 3376 1            BZF     +3              BRANCH IF SETUP29D'S SUPPLYING NEW DATA.
 3845   REF  14  LAST  599    24,3374  26 076 1            ADS     FLAGWRD2        SET LOSCMFLG: SHOW THAT DES. LOOP IS ON.
 3846   REF   2  LAST  598    24,3375  1 3356 0            TCF     BEGDES29

 3847   REF  75  LAST  597    24,3376  3 4753 1            CA      ONE
 3848   REF   1               24,3377  1 3363 0            TCF     R29DLOOP +1     WAIT A CENTISECOND FOR NEW DATA.
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P3849    R29DODES:  RR DESIGNATION LOOP FOR R29

R3850    THIS ROUTINE DOES MUCH THE SAME THING AS DODES, BUT A GREAT DEAL FASTER.  IT TAKES THE NON-UNITIZED LOS VECTOR
R3852    IN STABLE MEMBER COORDINATES (LOSSM) AND A DELTA-LOS IN SM AXES (LOSVDT/4) WHICH IS 1/2 SEC TIMES LOS VELOCITY,
R3854    AND DEVELOPS THE SHAFT AND TRUNNION COMMANDS USING SINGLE PRECISION AS MUCH AS POSSIBLE, AND INTERPRETIVE NOT AT
R3856    ALL.  THE UNIT(LOSSM + LOSVEL * 1 SEC) IS COMPUTED IN DP AND TRANSFORMED TO NAV BASE COORDINATES IN DOUBLE PRE-
R3858    CISION (USING SP SINES AND COSINES OF CDU ANGLES), AND THE REST IS DONE IN SP.

R3860    THE FUNCTIONAL DIFFERENCE IS THAT R29DODES ALWAYS CLEARS LOSCMFLG WHEN IT ENDS, AND IT STARTS UP THE R29READ
R3862    TASK WHEN LOCK-ON IS ACHIEVED.

 3863                          32,2547                        BANK    32
 3864    REF   2  LAST   40    32,2000                        SETLOC  F2DPS*32
 3865                          32,2547                        BANK

 3866    REF   1                                              COUNT*  $$/R29
 3867    REF   3  LAST  599    E3,1760                        EBANK=  LOSVDT/4

 3868    REF  76  LAST  599    32,2547  3 4753 1  R29DODES CA      ONE
 3869    REF  25  LAST  570    32,2550  55'107 1           TS      TANG              INDICATE 1ST PASS THRU VECTOR LOOP.
 3870    REF  12  LAST  553    32,2551  3 4756 1           CA      FIVE

 3871    REF 202  LAST  599    32,2552  10 000 0  R29DVBEG CCS     A                 COUNT DOWN BY TWOS IN VECTOR LOOP.
 3872    REF 168  LAST  560    32,2553  54 002 1           TS      Q
 3873    REF  26  LAST  600    32,2554  11'107 1           CCS     TANG
 3874    REF   1               32,2555  1 2563 1           TCF     R29DPAS1          DO THIS ON 1ST PASS THRU LOOP.

 3875                          32,2556  0 0006 1           EXTEND                    (A "PASS" HERE MEANS 3 TIMES AROUND).
 3876    REF 169  LAST  600    32,2557  5 0002 0           INDEX   Q
 3877    REF   4  LAST  600    32,2560  3 1761 0           DCA     LOSVDT/4
 3878    REF 170  LAST  600    32,2561  50 002 0           INDEX   Q
 3879    REF   2  LAST  598    32,2562  21'102 1           DAS     LOSSM             ADVANCE LOS VECTOR 1/2 SECOND.

 3880                          32,2563  0 0006 1  R29DPAS1 EXTEND
 3881    REF 171  LAST  600    32,2564  5 0002 0           INDEX   Q
 3882    REF   3  LAST  600    32,2565  3 1102 0           DCA     LOSSM
 3883    REF 172  LAST  600    32,2566  50 002 0           INDEX   Q                 MOVE CURRENT LOS (1ST PASS) OR LOS PRO-
 3884    REF 256  LAST  597    32,2567  52 156 1           DXCH    MPAC +1           JECTED 1/2 SEC AHEAD (2ND PASS).
 3885    REF  27  LAST  600    32,2570  11'107 1           CCS     TANG
 3886    REF   1               32,2571  1 2577 1           TCF     R29DVEND          BUG OUT HERE IN 1ST PASS.

 3887                          32,2572  0 0006 1           EXTEND
 3888    REF 173  LAST  600    32,2573  5 0002 0           INDEX   Q
 3889    REF   5  LAST  600    32,2574  3 1761 0           DCA     LOSVDT/4
 3890    REF 174  LAST  600    32,2575  50 002 0           INDEX   Q
 3891    REF 257  LAST  600    32,2576  20 156 1           DAS     MPAC +1           PROJECT LOS 1 SECOND AHEAD (2ND PASS).

 3892    REF 175  LAST  600    32,2577  10 002 1  R29DVEND CCS     Q
 3893    REF   1               32,2600  1 2552 0           TCF     R29DVBEG          BRANCH TO CONTINUE VECTOR LOOP.
```

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P3894   UNITIZE AND TRANSFORM TO NAV BASE AXES THE PRESENT LOS (1ST PASS) OR THE 1-SEC PROJECTED LOS (2ND PASS).

 3896   REF 258  LAST  600   32,2601  52 156 1            DXCH    MPAC +1
 3897   REF 259  LAST  601   32,2602  52 155 1            DXCH    MPAC
 3898   REF   1              32,2603  3 2774 1            CA      R29FXLOC          = ADRES INTB15+ -34D
 3899   REF  18  LAST  356   32,2604  54 120 0            TS      FIXLOC
 3900   REF   1              32,2605  0 4713 0            TC      USPRCADR          WITH FIXLOC ARMED FOR LENGTH AND LENGTH
 3901   REF   1              32,2606   01023 1            CADR    UNIT              SQUARED, BORROW UNITIZING ROUTINE.
 3902   REF   1              32,2607  0 7532 1            TC      MPACVBUF          MOVE UNIT(LOS) TO AX*SP*T ARG AREA.

 3903   REF  28  LAST  600   32,2610  11'107 1            CCS     TANG
 3904                        32,2611  1 2613 0            TCF     +2
 3905   REF   1              32,2612  1 2627 1            TCF     GOTANGLS          GET CDU ANGLES ONLY AFTER 1ST PASS.
 3906                        32,2613  0 0004 0            INHINT                    ENSURE CONSISTENT CDU READINGS.
 3907                        32,2614  0 0006 1            EXTEND
 3908   REF  11  LAST  591   32,2615  3 0036 1            DCA     CDUT
 3909   REF   1              32,2616  53'767 1            DXCH    SAVECDUT          TRUNNION AND SHAFT ANGLES.
 3910   REF   3  LAST  569   32,2617  3 0033 1            CA      CDUY
 3911   REF  16  LAST  [illegible]  32,2620  54 766 1     TS      CDUSPOT
 3912   REF   6  LAST  357   32,2621  3 0034 0            CA      CDUZ
 3913   REF  17  LAST  601   32,2622  54 770 0            TS      CDUSPOT +2
 3914   REF  11  LAST  569   32,2623  3 0032 0            CA      CDUX
 3915   REF  18  LAST  601   32,2624  54 772 1            TS      CDUSPOT +4        CDU ANGLES IN FUNNY ORDER FOR AX*SP*T.
 3916   REF 149  LAST  597   32,2625  0 4616 1            TC      BANKCALL
 3917   REF   1              32,2626   47615 0            CADR    QUICTRIG          GET SINES AND COSINES OF CDU ANGLES.

 3918   REF  19  LAST  563   32,2627  4 6245 0  GOTANGLS CS      THREE
 3919   REF 150  LAST  601   32,2630  0 4616 1            TC      BANKCALL
 3920   REF   1              32,2631   47675 0            CADR    AX*SP*T           TRANSFORM UNIT LOS TO NB AXES (ULOSNB).

 3921   REF  29  LAST  601   32,2632  11'107 1            CCS     TANG
 3922                        32,2633  1 2635 1            TCF     +2
 3923   REF   1              32,2634  1 2702 1            TCF     R29DPAS2          GO TO FR COMMAND COMP. AFTER 2ND PASS.
```

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P3924    COMPUTE COSINE OF THE ANGLE BETWEEN THE PRESENT LOS AND THE RR BORESIGHT VECTOR, AND SET THE SELFTRACK ENABLE IF
R3926    THE COSINE IS APPROXIMATELY COS(.5 DEG) OR GREATER (I.E. SMALLER ANGLE).


  3927                          32,2635  0 0004 0            INHINT
  3928   REF  30  LAST  601     32,2636  55'107 1            TS       TANG                INDICATE 2ND PASS THRU VECTOR LOOP.
  3929   REF   2  LAST  601     32,2637  3 1766 1            CA       SAVECDUT
  3930   REF   3  LAST  189     32,2640  0 5032 0            TC       SPCOS
  3931   REF   2  LAST  252     32,2641  54 166 1            TS       PUSHLOC             PUSHLOC = COS T.
  3932   REF   3  LAST  602     32,2642  4 1766 0            CS       SAVECDUT
  3933   REF   3  LAST  188     32,2643  0 5033 1            TC       SPSIN
  3934   REF   5  LAST  597     32,2644  54 163 1            TS       MODE                MODE = -SIN T.
  3935                          32,2645  0 0006 1            EXTEND
  3936   REF  26  LAST  335     32,2646  7 0124 1            MP       VBUF +2             FORM - SIN T ULOSNBY.
  3937   REF 260  LAST  601     32,2647  52 155 1            DXCH     MPAC
  3938   REF   4  LAST  602     32,2650  3 1767 0            CA       SAVECDUT +1
  3939   REF   4  LAST  602     32,2651  0 5033 1            TC       SPSIN
  3940   REF   5  LAST  602     32,2652  55'766 0            TS       SAVECDUT            SAVECDUT NOW = SIN S.
  3941                          32,2653  0 0006 1            EXTEND
  3942   REF   3  LAST  602     32,2654  7 0166 1            MP       PUSHLOC
  3943                          32,2655  0 0006 1            EXTEND
  3944   REF  27  LAST  602     32,2656  7 0122 1            MP       VBUF                FORM SIN S COS T ULOSNBX.
  3945   REF 261  LAST  602     32,2657  20 155 1            DAS      MPAC
  3946   REF   6  LAST  602     32,2660  3 1767 0            CA       SAVECDUT +1
  3947   REF   4  LAST  602     32,2661  0 5032 0            TC       SPCOS
  3948   REF   7  LAST  602     32,2662  55'767 1            TS       SAVECDUT +1         SAVECDUT +1 NOW = COS S .
  3949                          32,2663  0 0006 1            EXTEND
  3950   REF   4  LAST  602     32,2664  7 0166 1            MP       PUSHLOC
  3951                          32,2665  0 0006 1            EXTEND
  3952   REF  28  LAST  602     32,2666  7 0126 0            MP       VBUF +4             FORM COS S COS T ULOSNBZ.
  3953   REF 262  LAST  602     32,2667  20 155 1            DAS      MPAC                COS(ERROR) = ULOSNB . (SIN S COS T,
  3954                          32,2670  0 0006 1            EXTEND                       - SIN T, COS S COS T).
  3955   REF 263  LAST  602     32,2671  3 0155 0            DCA      MPAC
  3956   REF 264  LAST  602     32,2672  20 155 1  TESTCOS   DAS      MPAC                (ULOSNB IN VBUF WAS A HALF-UNIT VECTOR).
  3957   REF 203  LAST  600     32,2673  10 000 0            CCS      A                   TEST FOR + OVERFLOW, NONE, OR MINUS.
  3958   REF  54  LAST  596     32,2674  3 4736 1            CA       BIT14
  3959                          32,2675  12 676 0            NOOP
  3960                          32,2676  0 0006 1            EXTEND
  3961   REF  40  LAST  596     32,2677  05 012 1            WOR      CHAN12              IF PLUS OVERFLOW, SET SELFTRACK ENABLE.
  3962                          32,2700  0 0003 1            RELINT
  3963   REF   2  LAST  600     32,2701  1 2551 0            TCF      R29DVBEG -1         MAKE 2ND PASS THRU VECTOR LOOP.
```

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R3964   COMPUTE SHAFT AND TRUNNION COMMANDS TO NULL HALF THE ERROR IN HALF A SECOND.

 3966   REF   8  LAST  602    32,2702   3 1767 0   R29DPAS2 CA      SAVECDUT +1
 3967                         32,2703   0 0006 1            EXTEND
 3968   REF  29  LAST  602    32,2704   7 0122 1            MP      VBUF               FORM COS S ULOSNB'X.
 3969   REF  31  LAST  602    32,2705   53'110 1            DXCH    TANG
 3970   REF   9  LAST  603    32,2706   4 1766 0            CS      SAVECDUT
 3971                         32,2707   0 0006 1            EXTEND
 3972   REF  30  LAST  603    32,2710   7 0126 0            MP      VBUF +4            FORM - SIN S ULOSNB'Z.
 3973   REF  32  LAST  603    32,2711   21'110 1            DAS     TANG                RAW SHAFT CMD = ULOSNB' . (COS S, 0,
 3974   REF   6  LAST  602    32,2712   4 0163 1            CS      MODE                - SIN S)
 3975                         32,2713   0 0006 1            EXTEND
 3976   REF  10  LAST  603    32,2714   7 1766 0            MP      SAVECDUT
 3977                         32,2715   0 0006 1            EXTEND
 3978   REF  31  LAST  603    32,2716   7 0122 1            MP      VBUF               FORM SIN T SIN S ULOSNB'X.
 3979   REF 265  LAST  602    32,2717   52 155 1            DXCH    MPAC
 3980   REF   5  LAST  602    32,2720   3 0166 0            CA      PUSHLOC
 3981                         32,2721   0 0006 1            EXTEND
 3982   REF  32  LAST  603    32,2722   7 0124 1            MP      VBUF +2            FORM COS T ULOSNB'Y.
 3983   REF 266  LAST  603    32,2723   20 155 1            DAS     MPAC
 3984   REF   7  LAST  603    32,2724   4 0163 1            CS      MODE
 3985                         32,2725   0 0006 1            EXTEND
 3986   REF  11  LAST  603    32,2726   7 1767 1            MP      SAVECDUT +1
 3987                         32,2727   0 0006 1            EXTEND
 3988   REF  33  LAST  603    32,2730   7 0126 0            MP      VBUF +4            FORM SIN T COS S ULOSNB'Z.
 3989   REF 267  LAST  603    32,2731   20 155 1            DAS     MPAC               RAW TRUNNION CMD = ULOSNB' .
 3990   REF 268  LAST  603    32,2732   3 0154 1            CA      MPAC               (SIN S SIN T, COS T, SIN S COS T).
 3991                         32,2733   0 0006 1            EXTEND
 3992   REF   1               32,2734   7 2775 1            MP      RR29GAIN
 3993   REF  33  LAST  603    32,2735   57'107 0            XCH     TANG               STORE REFINED T CMD, GET RAW S CMD.
 3994                         32,2736   0 0006 1            EXTEND
 3995   REF   2  LAST  603    32,2737   7 2775 1            MP      RR29GAIN
 3996   REF  34  LAST  603    32,2740   55'110 1            TS      TANG +1            STORE REFINED S CMD.
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P3997    WHETHER OR NOT TRACKING WAS ENABLED THIS TIME, CHECK ON RR DATA-GOOD.  IF PRESENT, STOP DESIGNATING AND START
R3999    READING DATA FROM THE RENDEZVOUS RADAR.

  4000   REF  27  LAST  592    32,2741  3 4750 1  DGOOD?   CAF      BIT4
  4001                         32,2742  0 0006 1           EXTEND
  4002   REF  20  LAST  592    32,2743  02 033 0           RAND     CHAN33              GET RR DATA-GOOD BIT.
  4003                         32,2744  0 0004 0           INHINT                       (MAINLY FOR RROUT).
  4004                         32,2745  0 0006 1           EXTEND
  4005   REF   1               32,2746  1 2752 1           BZF      R29LOKON            BRANCH IF DATA-GOOD IS PRESENT.

  4006   REF 151  LAST  601    32,2747  0 4616 1           TC       BANKCALL
  4007   REF   3  LAST  552    32,2750   52306 0           CADR     RROUT               DATA-GOOD IS ABSENT, SO SEND COMMANDS.
  4008   REF   1               32,2751  1 2770 1           TCF      END29DOD

  4009   REF   9  LAST  599    32,2752  4 4742 0  R29LOKON CS       DESIGBIT
  4010   REF 110  LAST  599    32,2753  7 0110 0           MASK     RADMODES
  4011   REF 111  LAST  604    32,2754  54 110 0           TS       RADMODES            SHOW THAT DESIGNATION IS OVER.
  4012   REF  34  LAST  571    32,2755  4 4752 1           CS       BIT2
  4013                         32,2756  0 0006 1           EXTEND
  4014   REF  41  LAST  602    32,2757  03 012 1           WAND     CHAN12              DISABLE RR ERROR COUNTERS.
  4015   REF   2  LAST  219    32,2760  3 4743 0           CA       READRBIT
  4016   REF  11  LAST  555    32,2761  26 077 0           ADS      FLAGWRD3            SHOW THAT READING HAS BEEN REQUESTED.
  4017   REF   2  LAST  598    32,2762  11 056 1           CCS      PIPCTR              SEE IF TASK SHOULD BE OFFSET 1 SEC.
  4018   REF   2  LAST  598    32,2763  4 4776 1           CS       SUPER110            - 96D + 100D = 4.
  4019   REF   5  LAST  598    32,2764  6 4777 1           AD       1SEC                0 + 100D = 100D.
  4020   REF  28  LAST  598    32,2765  0 5203 0           TC       WAITLIST
  4021   REF  36  LAST  598    E7,1456                     EBANK=   LOSCOUNT
  4022   REF   1               32,2766   03400 0           2CADR    R29READ             START READING TASK AND JOB.
  4022   REF   1               32,2767   50067 0

  4023   REF   4  LAST  599    32,2770  4 4740 1  END29DOD CS       LOSCMBIT
  4024   REF  15  LAST  599    32,2771  7 0076 1           MASK     FLAGWRD2
  4025   REF  16  LAST  604    32,2772  54 076 1           TS       FLAGWRD2            ALWAYS CLEAR LOSCMFLG.
  4026   REF 100  LAST  597    32,2773  1 5155 1           TCF      ENDOFJOB


  4027   REF   4  LAST   96    32,2774   00052 0  R29FXLOC ADRES    INTB15+ -34D
  4028                         32,2775   56655 1  R29GAIN  DEC      -.53624
  4029   REF   6  LAST  590    E3,1760            LOSVDT/4 EQUALS   LOSVEL
  4030   REF  14  LAST  590       1101            LOSSM    EQUALS   RRTARGET
  4031   REF   6  LAST  566    E3,1766            SAVECOUT EQUALS   MLOSV
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P4032   RR READING IS SET UP BY R29DODES WHEN IT DETECTS RR LOCK-ON.

 4033                         24,3400                          BANK    24
 4034   REF    7  LAST   599  24,2000                          SETLOC  P20S
 4035                         24,3400                          BANK

 4036   REF    2 LAST   599 TO  600:     18      18*           COUNT*  $$/P29

 4037   REF   37  LAST   604  E7,1456                          EBANK=  LOSCOUNT

 4038   REF   10  LAST   544  24,3400  3 7714 1   R29READ     CAF     PRIO26          CALLED BY WAITLIST.
 4039   REF   13  LAST   599  24,3401  0 5072 1               TC      NOVAC
 4040   REF   38  LAST   605  E7,1456                          EBANK=  LOSCOUNT
 4041   REF    1              24,3402   03413 1               2CADR   R29RDJOB        START JOB TO READ AND DOWNLINK FOR R29.
 4041   REF    1              24,3403   50067 0

 4042   REF    4  LAST   562  24,3404  3 5000 1               CA      2SECS
 4043   REF    5  LAST   599  24,3405  0 5224 0               TC      VARDELAY

 4044   REF   12  LAST   604  24,3406  3 0077 1               CA      FLAGWRD3        2 SECONDS LATER, SEE IF READING IS STILL
 4045   REF    3  LAST   604  24,3407  7 4743 1               MASK    READRBIT        ALLOWED (NO TRACKER FAIL ETC.)
 4046   REF  204  LAST   602  24,3410  10 000 0               CCS     A
 4047   REF    2  LAST   604  24,3411  1 3400 1               TCF     R29READ         IT'S OK; CALL IT AGAIN.
 4048   REF   29  LAST   599  24,3412  1 5261 0               TCF     TASKOVER        IT AIN'T: WAIT FOR REDESIGNATE.

 4049   REF   13  LAST   605  24,3413  3 0077 1   R29RDJOB    CA      FLAGWRD3        CALLED VIA NOVAC.
 4050   REF    3  LAST   280  24,3414  7 4741 0               MASK    NR29FBIT
 4051   REF  205  LAST   605  24,3415  10 000 0               CCS     A               TEST "NOR29FLG".
 4052   REF    1              24,3416  1 3475 0               TCF     ENDRRD29        R29 IS NOW OVER, STOP AT ONCE.

 4053   REF  112  LAST   604  24,3417  3 0110 1               CA      RADMODES
 4054   REF    5  LAST   537  24,3420  7 4752 1               MASK    AUTOMBIT
 4055   REF  206  LAST   605  24,3421  10 000 0               CCS     A               TEST RR-NOT-IN-AUTO-MODE BIT.
 4056   REF    2  LAST   605  24,3422  1 3475 0               TCF     ENDRRD29        ASTRO TOOK RR OUT OF AUTO MODE.

 4057   REF  152  LAST   604  24,3423  0 4616 1               TC      BANKCALL
 4058   REF    4  LAST   569  24,3424   53103 0               CADR    RRRDOT          INITIATE READING OF RANGE RATE.
 4059   REF  153  LAST   605  24,3425  0 4616 1               TC      BANKCALL
 4060   REF   11  LAST   597  24,3426   17714 0               CADR    RADSTALL        GO TO SLEEP UNTIL IT'S READY.
 4061   REF    3  LAST   605  24,3427  1 3475 0               TCF     ENDRRD29        BAD READ: REDESIGNATE.
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P4062    R29 RADAR READING CONTINUED.

 4063    REF   7  LAST  569    24,3430  53'106 0              DXCH    TIMEHOLD
 4064    REF 269  LAST  603    24,3431  52 155 1              DXCH    MPAC          TIME OF RR READING, FOR DOWNLINK.
 4065                          24,3432  0 0004 0              INHINT                BE SURE OF 5 CONSISTENT CDU ANGLES.
 4066                          24,3433  0 0006 1              EXTEND
 4067    REF  12  LAST  601    24,3434  3 0036 1              DCA     CDUT
 4068    REF 270  LAST  606    24,3435  52 157 0              DXCH    MPAC +2       RRCDU ANGLES AT RR READ, FOR DOWNLINK.
 4069                          24,3436  0 0006 1              EXTEND
 4070    REF   4  LAST  601    24,3437  3 0034 0              DCA     CDUY
 4071    REF 271  LAST  606    24,3440  52 161 0              DXCH    MPAC +4       MPAC'S 7 WORDS ARE BUFFER FOR COPYCYCLE.
 4072    REF  12  LAST  601    24,3441  3 0032 0              CA      CDUX
 4073    REF 272  LAST  606    24,3442  54 162 0              TS      MPAC +6       IMUCDU ANGLES AT RR READ, FOR DOWNLINK.

 4074    REF 154  LAST  605    24,3443  0 4616 1    R29RANGE  TC      BANKCALL
 4075    REF   3  LAST  570    24,3444   53105 0              CADR    RRRANGE       INITIATE READING OF RR RANGE.
 4076    REF 155  LAST  606    24,3445  0 4616 1              TC      BANKCALL
 4077    REF  12  LAST  605    24,3446   17714 0              CADR    RADSTALL      GO TO SLEEP UNTIL IT'S READY.
 4078    REF   1               24,3447  1 3466 1              TCF     R29RRR?       BAD READ OR SCALE CHANGE ... WHICH?

 4079                          24,3450  0 0004 0              INHINT
 4080    REF   6  LAST  570    24,3451  53'334 0              DXCH    DNRRANGE      COPYCYCLE TO LAY OUT NEW R29 DOWNLINK.
 4081    REF   6  LAST  577    24,3452  53'757 1              DXCH    RM
 4082    REF 273  LAST  606    24,3453  52 155 1              DXCH    MPAC
 4083    REF   7  LAST  584    24,3454  53'755 0              DXCH    MKTIME
 4084    REF 274  LAST  606    24,3455  52 157 0              DXCH    MPAC +2
 4085    REF   9  LAST  591    24,3456  53'753 0              DXCH    TANGNB
 4086    REF 275  LAST  606    24,3457  52 161 0              DXCH    MPAC +4
 4087    REF   8  LAST  585    24,3460  53'460 0              DXCH    AIG
 4088    REF 276  LAST  606    24,3461  3 0162 1              CA      MPAC +6
 4089    REF   6  LAST  579    24,3462  55'461 1              TS      AOG
 4090    REF  77  LAST  600    24,3463  3 4753 1              CA      ONE
 4091    REF   4  LAST  314    24,3464  55'462 1              TS      TRKMKCNT      SHOW THAT DOWNLINK DATA IS CONSISTENT.
 4092    REF 101  LAST  604    24,3465  1 5155 1              TCF     ENDOFJOB

 4093    REF  18  LAST  571    24,3466  4 0101 0    R29RRR?   CS      FLAGWRD5
 4094    REF  29  LAST  551    24,3467  7 4742 0              MASK    BIT10
 4095    REF 207  LAST  605    24,3470  10 000 0              CCS     A             WAS IT A SCALE CHANGE (REAL OR PHONY)?
 4096    REF   4  LAST  605    24,3471  1 3475 0              TCF     ENDRRD29      NO, A BAD READ: REDESIGNATE.
 4097    REF  52  LAST  569    24,3472  0 5516 0              TC      DOWNFLAG
 4098    REF   3  LAST  569    24,3473   00120 1              ADRES   RNGSCFLG
 4099    REF   1               24,3474  1 3443 0              TCF     R29RANGE      YES; CLEAR FLAG AND READ AGAIN.

 4100    REF 126  LAST  588    24,3475  3 4755 1    ENDRRD29  CA      ZERO          TROUBLE MADE US COME HERE TO LEAVE THE
 4101    REF   5  LAST  606    24,3476  55'462 1              TS      TRKMKCNT      RR-READING MODE.  DISCREDIT DOWNTEL.
 4102    REF  53  LAST  606    24,3477  0 5516 0              TC      DOWNFLAG
 4103    REF   1               24,3500   00063 1              ADRES   READRFLG
 4104    REF  55  LAST  602    24,3501  4 4736 0              CS      BIT14
 4105                          24,3502  0 0006 1              EXTEND
 4106    REF  42  LAST  604    24,3503  03 012 1           WAND    CHAN12          REMOVE TRACK-ENABLE DISCRETE.
 4107    REF 102  LAST  606    24,3504  1 5155 1           TCF     ENDOFJOB
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P4108    W-MATRIX MONITOR

 4109                              31,2007                           BANK     31
 4110    REF    1                  31,2000                           SETLOC  VB67
 4111                              31,2007                           BANK
 4112    REF    1                                                    COUNT*  $$/EXTVB

 4113    REF    3  LAST   317      E4,1600                           EBANK=  WWPOS

 4114    REF   59  LAST   597      31,2007   0 6037 0   V67CALL     TC       INTPRET
 4115                              31,2010    77624 1               CALL
 4116    REF    1                  31,2011    62120 0                        V67WW
 4117                              31,2012    77776 1               EXIT
 4118                              31,2013   0 0006 1               EXTEND                            SAVE THE PRESENT N99 VALUES FOR
 4119    REF    4  LAST   608      31,2014   3 1601 1               DCA      WWPOS                    COMPARISON AFTER THE DISPLAY
 4120    REF    2  LAST   317      31,2015   53'607 0               DXCH     WWBIAS +2
 4121                              31,2016   0 0006 1               EXTEND
 4122    REF    2  LAST   317      31,2017   3 1603 0               DCA      WWVEL
 4123    REF    3  LAST   608      31,2020   53'611 1               DXCH     WWBIAS +4
 41231                             31,2021   0 0006 1               EXTEND
 41232   REF    4  LAST   608      31,2022   3 1605 0               DCA      WWBIAS
 41233   REF    5  LAST   608      31,2023   53'613 0               DXCH     WWBIAS +6
 4124    REF    1                  31,2024   3 2143 0   V06N99DS    CAF      V06N99
 4125    REF  155  LAST   606      31,2025   0 4616 1               TC       BANKCALL
 4126    REF    7  LAST   290      31,2026    20334 1               CADR     GCXDSPF
 4127    REF   33  LAST   488      31,2027   1 5472 1               TCF      ENDEXT
 4128    REF    1                  31,2030   1 2032 0               TCF      V6N99PRO
 4129    REF    1                  31,2031   1 2024 1               TCF      V06N99DS
 4133                              31,2032   22 007 0   V6N99PRO    ZL
 4134    REF   13  LAST   600      31,2033   3 4756 1               CA       FIVE
 4135    REF  176  LAST   600      31,2034   54 002 1   N99LOOP     TS       Q
 4136    REF  177  LAST   608      31,2035   50 002 0               INDEX    Q
 4137    REF    5  LAST   608      31,2036   4 1600 1               CS       WWPOS
 4138    REF  178  LAST   608      31,2037   50 002 0               INDEX    Q
 4139    REF    6  LAST   608      31,2040   6 1606 0               AD       WWPOS +6
 4140    REF   88  LAST   569      31,2041   26 001 1               ADS      L
 4141    REF  179  LAST   608      31,2042   10 002 1               CCS      Q                        THE SUM OF ALL DIFFERENCES MUST BE ZERO.
 4142    REF    1                  31,2043   1 2034 0               TCF      N99LOOP
 4143    REF  208  LAST   606      31,2044   22 000 1               LXCH     A
 4144                              31,2045   0 0006 1               EXTEND
 4145    REF    1                  31,2046   1 2051 0               BZF      V06N9933
 4146    REF   31  LAST   558      31,2047   0 5504 0               TC       UPFLAG
 4147    REF    1                  31,2050    00160 0               ADRES    V67FLAG

 4148    REF   60  LAST   608      31,2051   0 6037 0   V06N9933    TC       INTPRET
 4149                              31,2052    77414 0               BON      EXIT
 4150    REF    2  LAST   608      31,2053    03707 1                        V67FLAG
 4151                              31,2054    62056 0                        +2
 4152    REF   34  LAST   608      31,2055   1 5472 1               TCF      ENDEXT
 4153                              31,2056    77745 1               DLOAD
 4154   REF   7  LAST  608   31,2057   02201 0                      WWPOS
 4156                        31,2060   72412 0            SL4       SL1
 4157                        31,2061   14001 0            STODL     0D
 4158   REF   3  LAST  608   31,2062   02203 1                      WWVEL
 4161                        31,2063   14003 1            STODL     2D
 41611  REF   6  LAST  608   31,2064   02205 1                      WWBIAS
 416113                      31,2065   77661 0            SL                          SHIFT FROM NOUN SCALING (B-5) TO
 416116                      31,2066   20213 0                      10D               INTERNAL SCALING (B+5)
 41612                       31,2067   00005 1            STORE     4D
 4162                        31,2070   72014 1            BON       LXA,1
 4163   REF  12  LAST  584   31,2071   04307 1                      SURFFLAG
 4164   REF   1              31,2072   62102 0                      V67SURF
 4165                        31,2073   00000 1                      0D
 4166                        31,2074   72130 0            SXA,1     LXA,1
 4167   REF   3  LAST  584   31,2075   02000 0                      WRENDPOS
 4168                        31,2076   00002 0                      2D
 4169                        31,2077   52130 1            SXA,1     GOTO
 4170   REF   2  LAST  584   31,2100   02001 1                      WRENDVEL
 4171   REF   1              31,2101   62110 0                      V67CLRF
 4172                        31,2102   66150 0  V67SURF   LXA,1     SXA,1
 4173                        31,2103   00000 1                      0D
 4174   REF   2  LAST  584   31,2104   02006 0                      WSURFPOS
 4175                        31,2105   66150 0            LXA,1     SXA,1
 4176                        31,2106   00002 0                      2D
 4177   REF   2  LAST  584   31,2107   02007 1                      WSURFVEL
 4178                        31,2110   66150 0  V67CLRF   LXA,1     SXA,1
 41781                       31,2111   00004 0                      4D
 41782  REF   2  LAST  585   31,2112   02003 0                      WTRUN
 41783                       31,2113   77730 0            SXA,1
 41784  REF   2  LAST  585   31,2114   02002 1                      WSHAFT
 41785                       31,2115   77414 0            CLEAR     EXIT
 4179   REF   9  LAST  585   31,2116   02676 1                      RENDWFLG
 4180   REF  35  LAST  608   31,2117  1 5472 1            TCF       ENDEXT
 4181                        31,2120   40020 1  V67WW     STQ       BOV
 4182   REF   5  LAST  380   31,2121   00051 0                      S2
 4183                        31,2122   52123 0                      +1
 4184                        31,2123   45014 0            CLEAR     CALL
 4185   REF   3  LAST  608   31,2124   03667 0                      V67FLAG
 4186   REF  17  LAST  583   31,2125   27414 0                      INTSTALL
 4187                        31,2126   71331 0            SSP       DLOAD
 4188   REF   6  LAST  385   31,2127   00051 0                      S1
 4189                        31,2130   00006 1            DEC       6
 4190   REF   6  LAST  591   31,2131   06522 1                      ZEROVECS
 4191   REF   8  LAST  609   31,2132   02201 0            STORE     WWPOS
 4192   REF   4  LAST  609   31,2133   02203 1            STORE     WWVEL
 41921  REF   7  LAST  609   31,2134   02205 1            STORE     WWBIAS
 4193                        31,2135   77770 1            AXT,1
 4194                        31,2136   00066 1            DEC       54
 4195                        31,2137   47573 0  NXPOSVEL  VLOAD*    VSQ
 4196   REF  15  LAST  585   31,2140   02467 0                      W  +54D,1
 41963                         31,2141   77650 1              GOTO
 41966   REF   1               31,2142   60002 0                      ADDPOS
 4197                          31,2143   01543 1   V06N99     VN      0699

 4198    REF   1               30,2000                        SETLOC  VB67A
 4199                          30,2002                        BANK
 4200    REF   1                                              COUNT*  $$/EXTVB

 4203                          30,2002   77615 0   ADDPOS     DAD
 4204    REF   9  LAST  609    30,2003   02201 0                      WWPOS
 4205    REF  10  LAST  610    30,2004   02201 0              STORE   WWPOS
 4206                          30,2005   47573 0              VLOAD*  VSQ
 4207    REF  16  LAST  609    30,2006   02555 0                      W +108D,1
 4208                          30,2007   77615 0              DAD
 4209    REF   5  LAST  609    30,2010   02203 1                      WWVEL
 4210    REF   6  LAST  610    30,2011   02203 1              STORE   WWVEL
 42101                         30,2012   47573 0              VLOAD*  VSQ
 42102   REF  17  LAST  610    30,2013   02643 1                      W +162D,1
 42103                         30,2014   77615 0              DAD
 42104   REF   8  LAST  609    30,2015   02205 1                      WWBIAS
 42105   REF   9  LAST  610    30,2016   02205 1              STORE   WWBIAS
 4211                          30,2017   75500 0              FIX,1   SQRT
 4212    REF   1               30,2020   62137 0                      NXPOSVEL
 421203                        30,2021   77661 0              SR                     SHIFT FROM INTERNAL SCALING (B+5) TO
 421206                        30,2022   20613 1                      10D            NOUN SCALING (B-5)
 42121   REF  10  LAST  610    30,2023   16205 1              STODL   WWBIAS
 42122   REF   7  LAST  610    30,2024   02203 1                      WWVEL
 42123                         30,2025   77766 0              SQRT
 4213    REF   8  LAST  610    30,2026   16203 1              STODL   WWVEL
 4214    REF  11  LAST  610    30,2027   02201 0                      WWPOS
 4215                          30,2030   77766 0              SQRT
 4216    REF  12  LAST  610    30,2031   02201 0              STORE   WWPOS
 4217                          30,2032   52000 0              BOV     GOTO
 4218                          30,2033   60035 1                      +2
 4219    REF   1               30,2034   60042 1                      V67XXX
 4220                          30,2035   77745 1              DLOAD
 4221    REF   4  LAST  378    30,2036   06530 1                      DPPOSMAX
 4222    REF  13  LAST  610    30,2037   02201 0              STORE   WWPOS
 4223    REF   9  LAST  610    30,2040   02203 1              STORE   WWVEL
 42231   REF  11  LAST  610    30,2041   02205 1              STORE   WWBIAS
 4224                          30,2042   45345 1   V67XXX     DLOAD   DSU
 42241   REF  14  LAST  610    30,2043   02201 0                      WWPOS
 42242   REF   1               30,2044   20060 0                      FT99999
 42243                         30,2045   71240 1              BMN     DLOAD
 42244                         30,2046   60051 0                      +3
 42245   REF   2  LAST  610    30,2047   20060 0                      FT99999
 42246   REF  15  LAST  610    30,2050   02201 0              STORE   WWPOS
 42247                         30,2051   66150 0              LXA,1   SXA,1
 4225    REF   6  LAST  609    30,2052   00051 0                      S2
 4226    REF   2  LAST  297    30,2053   00052 0                      QPRET
 4227                                30,2054   77776 1           EXIT
 4228    REF   39  LAST  563   30,2055  0 4635 0           TC       POSTJUMP
 4229    REF    2  LAST  297   30,2056   27425 1           CADR     INTWAKE

 4230                                30,2057   01670 1  FT99999  2DEC     30479 B-19
 4230                                30,2060   17000 1
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P4231
 4232                          25,3607                      BANK     25
 4233    REF   3  LAST  555    25,2000                      SETLOC   RADARUPT
 4234                          25,3607                      BANK
 4235    REF   3 LAST   555 TO  561:    209    212*         COUNT*   $$/RRUPT

 4236    REF  39  LAST  605    E7,1456                      EBANK=   LOSCOUNT

 4237    REF  78  LAST  606    25,3607  3 4753 1  R12LITES  CA       ONE
 4238    REF  26  LAST  524    25,3610  7 1303 1            MASK     IMODES33
 4239    REF 209  LAST  608    25,3611  10 000 0            CCS      A
 4240    REF   1               25,3612  1 4707 1            TCF      ISWRETRN

 4241    REF   1               25,3613  0 3630 1            TC       HLIGHT
 4242    REF   2  LAST  612    25,3614  0 3625 0            TC       HLIGHT -3
 4243    REF   2  LAST  612    25,3615  1 4707 1            TCF      ISWRETRN

 4244    REF  33  LAST  572    25,3616  3 4753 1  RADLITES  CA       BIT1
 4245    REF  27  LAST  612    25,3617  7 1303 1            MASK     IMODES33
 4246    REF 210  LAST  612    25,3620  10 000 0            CCS      A
 4247    REF 180  LAST  608    25,3621  0 0002 0            TC       Q

 4248    REF  26  LAST  557    25,3622  4 4747 0            CS       BIT5
 4249    REF  28  LAST  560    25,3623  6 0061 0            AD       ITEMP1
 4250    REF 211  LAST  612    25,3624  10 000 0            CCS      A
 4251    REF  79  LAST  612    25,3625  4 4753 0            CS       ONE
 4252    REF   1               25,3626  1 3664 1            TCF      VLIGHT

 4253    REF   1               25,3627  1 4570 0            TCF      RRTRKF

 4254    REF   4  LAST  258    25,3630  54 065 0  HLIGHT    TS       ITEMP5             ZERO ITEMP5 FOR H INDEX

 4255    REF   1               25,3631  3 4747 1            CA       HLITE
 4256    REF  89  LAST  608    25,3632  54 001 1            TS       L

 4257    REF   8  LAST  559    25,3633  3 0107 1            CA       FLGWRD11
 4258    REF   3  LAST  559    25,3634  7 4751 1            MASK     SCABBIT
 4259    REF 212  LAST  612    25,3635  10 000 0            CCS      A
 4260    REF   1               25,3636  1 3656 0            TCF      ONLITES
 4261    REF   1               25,3637  3 4747 1            CA       LRALTBIT
 4262    REF 113  LAST  605    25,3640  7 0110 0  BOTHLITS  MASK     RADMODES
 4263    REF 213  LAST  612    25,3641  10 000 0            CCS      A
 4264    REF   2  LAST  612    25,3642  1 3656 0            TCF      ONLITES

 4265    REF   9  LAST  612    25,3643  3 0107 1            CA       FLGWRD11
 4266    REF   5  LAST  612    25,3644  50 065 1            INDEX    ITEMP5
 4267    REF   1               25,3645  7 4753 0            MASK     HFLSHBIT
 4268    REF 214  LAST  612    25,3646  10 000 0            CCS      A
 4269    REF   2  LAST  612    25,3647  1 4570 0            TCF      RRTRKF
 4270                          25,3650  0 0006 1  LITIT     EXTEND
 4271   REF    3  LAST  180    25,3651  22 066 1            QXCH     ITEMP6
 4272   REF    2  LAST  524    25,3652  0 4602 1            TC       TRKFLON +1

 4273                          25,3653  0 0006 1            EXTEND
 4274   REF    4  LAST  613    25,3654  22 066 1            QXCH     ITEMP6
 4275   REF    3  LAST  612    25,3655  1 4570 0            TCF      RRTRKF


 4276   REF    6  LAST  612    25,3656  50 065 1  ONLITES   INDEX    ITEMP5
 4277   REF    2  LAST  612    25,3657  4 4753 0            CS       HFLSHBIT
 4278   REF   10  LAST  612    25,3660  7 0107 0            MASK     FLGWRD11
 4279   REF   11  LAST  613    25,3661  54 107 0            TS       FLGWRD11

 4280   REF   90  LAST  612    25,3662  3 0001 0            CA       L
 4281   REF    1               25,3663  1 3650 0            TCF      LITIT
 4282   REF    7  LAST  613    25,3664  54 065 0  VLIGHT    TS       ITEMP5
 4283   REF    1               25,3665  3 4751 0            CA       VLITE
 4284   REF   91  LAST  613    25,3666  54 001 1            TS       L
 4285   REF   26  LAST  556    25,3667  3 4744 1            CA       BIT8
 4286   REF    1               25,3670  1 3640 1            TCF      BOTHLITS


 4287   REF   27  LAST  612       4747                HLITE     EQUALS BIT5
 4288   REF   29  LAST  569       4751                VLITE     EQUALS BIT3



*** END OF LEMP20S .127 ***
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P0023    PROGRAM DESCRIPTION  P30     DATE 3-6-67

R0024    MOD.1  BY  RAMA AIYAWAR
R0025    FUNCTIONAL DESCRIPTION
R0026       ACCEPT ASTRONAUT INPUTS OF TIG,DELV(LV)
R0027       CALL IMU STATUS CHECK ROUTINE (R02)
R0028       DISPLAY TIME TO GO, APOGEE, PERIGEE, DELV(MAG), MGA AT IGN
R0029       REQUEST BURN PROGRAM

R0030    CALLING SEQUENCE VIA JOB FROM V37

R0031    EXIT VIA V37 CALL OR TO GOTOPOOH (V34E)

R0032    SUBROUTINE CALLS-FLAGUP, PHASCHNG, BANKCALL, ENDOFJOB, GOFLASH, GOFLASHR
R0033                     GOPERF3R, INTPRET, BLANKET, GOTOPOOH, R02BOTH, S30.1,
R0034                     TTG/N35, MIDGIM, DISPMGA

R0035    ERASABLE INITIALIZATION- STATE VECTOR

R0036    OUTPUT-RINIT, VINIT, +MGA, VTIG, RTIG, DELVSIN, DELVSAB, DELVSLV, HAPO,
R0037           HPER, TTOGO

R0038    DEBRIS- A,L, MPAC, PUSHLIST

 00381                           32,2776                          BANK    32
 00382  REF    1                 35,2000                          SETLOC  P30S
 00383                           35,2000                          BANK
 00384  REF    2  LAST   314     E4,1652                          EBANK=  +MGA
 0039   REF    1                                                  COUNT*  $$/P30
 0040   REF   32  LAST   608     35,2000  0 5504 0   P30          TC      UPFLAG          SET UPDATE FLAG
 0041   REF    3  LAST   495     35,2001   00027 1                ADRES   UPDATFLG
 00411  REF   33  LAST   614     35,2002  0 5504 0                TC      UPFLAG          SET TRACK FLAG
 00412  REF    4  LAST   502     35,2003   00031 0                ADRES   TRACKFLG

 0042   REF    1                 35,2004  3 2025 1   P30N33       CAF     V06N33          T OF IGN
 0043   REF    1                 35,2005  0 3712 0                TC      VNPOOH          RETURNS ON PROCEED, POOH ON TERMINATE

 0051   REF    1                 35,2006  3 3727 0                CAF     V06N81          DISPLAY DELTA V (LV)
 0052   REF    2  LAST   614     35,2007  0 3712 0                TC      VNPOOH              REDISPLAY ON RECYCLE

 0057   REF   54  LAST   606     35,2010  0 5516 0                TC      DOWNFLAG        RESET UPDATE FLAG
 0058   REF    4  LAST   614     35,2011   00027 1                ADRES   UPDATFLG
 0059   REF   61  LAST   608     35,2012  0 6037 0                TC      INTPRET
 0060                            35,2013   77624 1                CALL
 0061   REF    1                 35,2014   70000 0                        S30.1
 0067                            35,2015   77414 0                SET     EXIT
 00675  REF    5  LAST   614     35,2016   00470 1                        UPDATFLG
 0068   REF    1                 35,2017  3 2026 1   PARAM30      CAF     V06N42          DISPLAY APOGEE,PERIGEE ,DELTA V
 0069   REF    3  LAST   614     35,2020  0 3712 0                TC      VNPOOH
 0070   REF  62  LAST  614   35,2021  0 6037 0              TC       INTPRET
 0071                        35,2022   77614 1              SETGO
 0072   REF   1              35,2023   01027 0                       XDELVFLG        FOR P40'S:  EXTERNAL DELTA-V GUIDANCE.
 0073   REF   1              35,2024   72540 0                       REVN1645        TRKMKCNT, TGO, +MGA  DISPLAY

 0100                        35,2025   01441 1  V06N33      VN       0633
 0102                        35,2026   01452 0  V06N42      VN       0642
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R0105    PROGRAM DESCRIPTION S30.1       DATE 9NOV66

R0106    MOD NO 1          LOG SECTION  P30,P37
R0107    MOD  BY  RAMA AIYAWAR **
R0108    FUNCTIONAL DESCRIPTION
R0109             BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0110             IGNITION(VTIG),TIME OF IGNITION (TIG)),COMPUTE PERIGEE ALTITUDE
R0111             APOGEE ALTITUDE AND DELTAV REQUIRED(DELVSIN).
R0112    CALLING SEQUENCE
R0113        L     CALL
R0114        L+1          S30.1
R0115    NORMAL EXIT MODE
R0116        AT L+2 OR CALLING SEQUENCE (GOTO L+2)
R0117    SUBROUTINES CALLED
R0118             LEMPREC
R0119             PERIAPO
R0120    ALARM OR ABORT EXIT MODES
R0121                    NONE
R0122    ERASABLE INITIALIZATION REQUIRED
R0123             TIG        TIME OF IGNITION                       DP      B28CS
R0124             DELVSLV    SPECIFIED DELTA-V IN LOCAL VERT.
R0125                        COORDS. OF ACTIVE VEHICLE AT
R0126                    TIME OF IGNITION       VECTOR  B+7  METERS/CS
R0127    OUTPUT
R0128             RTIG   POSITION AT TIG        VECTOR  B+29 METERS
R0129             VTIG   VELOCITY AT TIG        VECTOR  B+29 METERS/CS
R0130             PDL 4D APOGEE ALTITUDE        DP      B+29 M ,  B+27 METERS.
R01301            HAPO   APOGEE ALTITUDE        DP      B+29 METERS
R0131             PDL 8D PERIGEE ALTITUDE       DP      B+29 M ,  B+27 METERS.
R01311            HPER   PERIGEE ALTITUDE       DP      B+29 METERS
R0132             DELVSIN    SPECIFIED DELTA-V IN INERTIAL
R0133                        COORD. OF ACTIVE VEHICLE AT
R0134                    TIME OF IGNITION       VECTOR  B+7  METERS/CS
R0135             DELVSAB MAG. OF DELVSIN       VECTOR  B+7  METERS/CS
R0136    DEBRIS QTEMP    TEMP. ERASABLE
R0137           QPRET,MPAC
R0138           PUSHLIST

 0139    REF    1              34,2000                         SETLOC P30S1
 0140                          34,2000                         BANK

 0141    REF    1                                              COUNT* $$/S30S

 0142                          34,2000   71220 1  S30.1        STQ    DLOAD
 0143    REF    1              34,2001   03632 0                      QTEMP
 0144    REF    9  LAST  493   34,2002   03442 0                      TIG             TIME IGNITION SCALED AT 2(+28)CS
 0145    REF   21  LAST  589   34,2003   34041 0               STCALL TDEC1
 0146    REF    3  LAST  207   34,2004   27057 0                      LEMPREC         ENCKE ROUTINE FOR LEM

 0147                          34,2005   67175 0               VLOAD  SXA,2
 01471  REF  10  LAST  589   34,2006   00001 0            RATT
 0148   REF   1              34,2007   02777 1            RTX2
 0150   REF   2  LAST  142   34,2010   03642 1   STORE    RTIG            RADIUS VECTOR AT IGNITION TIME
 0153                        34,2011   57456 1   UNIT     VCOMP
 0154   REF   3  LAST  143   34,2012   27656 1   STOVL    DELVSIN         ZRF/LV IN DELVSIN SCALED AT 2
 0155   REF   6  LAST  589   34,2013   00007 0            VATT            VELOCITY VECTOR AT TIG, SCALED 2(7) M/CS
 0156   REF   2  LAST  142   34,2014   03650 1   STORE    VTIG
 0158                        34,2015   53435 0   VXV      UNIT
 0159   REF   3  LAST  617   34,2016   03642 1            RTIG
 0160                        34,2017   66001 0   SETPD    SXA,1
 0161                        34,2020   00001 0            0
 01611  REF   2  LAST  124   34,2021   02776 0            RTX1
 0162                        34,2022   47206 0   PUSH     VXV             YRF/LV PDL 0  SCALED AT 2
 0163   REF   4  LAST  617   34,2023   03656 1            DELVSIN
 0164                        34,2024   63372 1   VSL1     PDVL
 0165                        34,2025   63315 0   PDVL     PDVL            YRF/LV PDL 6   SCALED AT 2
 0166   REF   5  LAST  617   34,2026   03656 1            DELVSIN         ZRF/LV PDL 12D SCALED AT 2
 0167   REF   2  LAST  198   34,2027   03434 1            DELVSLV
 0168                        34,2030   76505 0   VXM      VSL1
 0169                        34,2031   00001 0            0
 0170   REF   6  LAST  617   34,2032   03656 1   STORE    DELVSIN         DELTAV IN INERT. COOR. SCALED TO B+7M/CS
 0172                        34,2033   77646 0   ABVAL
 0173   REF   2  LAST  142   34,2034   27664 0   STOVL    DELVSAB         DELTA V MAG.
 0174   REF   4  LAST  617   34,2035   03642 1            RTIG            (FOR PERIAPO)
 0175                        34,2036   53315 0   PDVL     VAD             VREQUIRED = VTIG + DELVSIN (FOR PERIAPO)
 0176   REF   3  LAST  617   34,2037   03650 1            VTIG
 0177   REF   7  LAST  617   34,2040   03656 1            DELVSIN
 01771                       34,2041   77624 1   CALL
 0178   REF   1              34,2042   46316 1            PERIAPO1
 01781                       34,2043   77624 1   CALL
 01782  REF   1              34,2044   46426 0            SHIFTR1         RESCALE IF NEEDED
 017822                      34,2045   77624 1   CALL                     LIMIT DISPLAY TO 9999.9 N. MI.
 017824 REF   1              34,2046   45636 0            MAXCHK
 01783  REF   2  LAST  314   34,2047   16321 0   STODL    HPER            PERIGEE ALT 2(29) METERS, FOR DISPLAY
 01784                       34,2050   00005 1            4D
 01785                       34,2051   77624 1   CALL
 01786  REF   2  LAST  617   34,2052   46426 0            SHIFTR1         RESCALE IF NEEDED
 01787                       34,2053   77624 1   CALL                     LIMIT DISPLAY TO 9999.9 N. MI.
 01788  REF   2  LAST  617   34,2054   45636 0            MAXCHK
 0179   REF   4  LAST  314   34,2055   36317 1   STCALL   HAPO            APOGEE  ALT 2(29) METERS, FOR DISPLAY
 0180   REF   2  LAST  616   34,2056   03632 0            QTEMP
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P0010    COELLIPTIC SEQUENCE INITIATION (CSI) PROGRAMS (P32 AND P72)

R0011    MOD NO -1         LOG SECTION - P32-P35, P72-P75
R0012    MOD BY WHITE.P   DATE  1JUNE67

R0013    PURPOSE

R0014             (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE FOLLOWING
R0015                 CONCENTRIC FLIGHT PLAN MANEUVERS - THE CO-ELLIPTIC SEQUENCE
R0016                 INITIATION (CSI) MANEUVER AND THE CONSTANT DELTA ALTITUDE
R0017                 (CDH) MANEUVER.

R0018             (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0019                 APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0020             (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0021                 ASSOCIATED WITH THE CONCENTRIC FLIGNT PLAN MANEUVERS FOR
R0022                 APPROVAL BY THE ASTRONAUT/GROUND.

R0023             (4) TO STORE THE CSI TARGET PARAMETERS FOR USE BY THE DESIRED
R0024                 THRUSTING PROGRAM.

R0025    ASSUMPTIONS

R0026             (1) AT A SELECTED TPI TIME THE LINE OF SIGHT BETWEEN THE ACTIVE
R0027                 AND PASSIVE VEHICLES IS SELECTED TO BE A PRESCRIBED ANGLE (E)
R0028                 FROM THE HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE
R00285                POSITION.

R0029             (2) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION MUST BE
R0030                 COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0031                 COMPLETION OF THE PROGRAM.

R0032             (3) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION MUST BE
R0033                 COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0034                 COMPLETION OF THE PROGRAM.

R0035             (4) CDH DELTA V IS SELECTED TO MINIMIZE THE VARIATION OF THE
R0036                 ALTITUDE DIFFERENCE BETWEEN THE ORBITS.

R0037             (5) CSI BURN IS DEFINED SUCH THAT THE IMPULSIVE DELTA V IS IN THE
R0038                 HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION AT CSI
R00385                IGNITION.

R0039             (6) THE PERICENTER ALTITUDE OF THE ORBIT FOLLOWING CSI AND CDH
R0040                 MUST BE GREATER THAN 35,000 FT (LUNAR ORBIT) OR 85 NM (EARTH
R0041                 ORBIT) FOR SUCCESSFUL COMPLETION OF THIS PROGRAM.

R0042             (7) THE CSI AND CDH MANEUVERS ARE ORIGINALLY ASSUMED TO BE
R0043                 PARALLEL TO THE PLANE OF THE CSM ORBIT.  HOWEVER CREW
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R0044             MODIFICATION OF DELTA V (LV) COMPONENTS MAY RESULT IN AN
R0045             OUT-OF-PLANE CSI MANEUVER.

R0046         (8) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0047             STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 10).

R0048         (9) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
R0049             THE GROUND.  THESE STORAGE CAPABILITIES ARE NORMALLY LIMITED
R0050             ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
R0051             EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

R0052        (10) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0053             OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0054             DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0055             PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0056             AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0057             TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0058             MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0059             THRUSTING MANEUVER.

R0060        (11) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0061        (12) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0062                 ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0063                 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0064                 CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0065                 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0066                 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0067                 COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
R0068                 CYCLE.

R0069                 EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
R0070                 STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
R0071                 THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
R0072                 PROGRAM.

R0073        (13) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO
R0074             A THRUSTING MANEUVER.

R0075        (14) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0076                 P32 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0077                 P72 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0110     INPUT

R0111         (1) TCSI     TIME OF THE CSI MANEUVER
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R0112          (2) NN       NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R0113                       VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0114                       MANEUVER POINT
R0115          (3) ELEV     DESIRED LOS ANGLE AT TPI
R0116          (4) TTPI     TIME OF THE TPI MANEUVER
R0130    OUTPUT

R0131          (1) TRKMKCNT NUMBER OF MARKS
R0132          (2) TTOGO    TIME TO GO
R0133          (3) +MGA     MIDDLE GIMBAL ANGLE
R0134          (4) DIFFALT  DELTA ALTITUDE AT CDH
R0135          (5) T1TOT2   DELTA TIME FROM CSI TO CDH
R0136          (6) T2TOT3   DELTA TIME FROM CDH TO TPI
R0137          (7) DELVLVC  DELTA VELOCITY AT CSI - LOCAL VERTICAL COORDINATES
R0138          (8) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R0139    DOWNLINK

R01391         (1) TCSI     TIME OF THE CSI MANEUVER
R01392         (2) TCDH     TIME OF THE CDH MANEUVER
R01393         (3) TTPI     TIME OF THE TPI MANEUVER
R01394         (4) TIG      TIME OF THE CSI MANEUVER
R01395         (5) DELVEET1 DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01396         (6) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R01397         (7) DIFFALT  DELTA ALTITUDE AT CDH
R01398         (8) NN       NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R01399                      VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0140                       MANEUVER POINT
R01401         (9) ELEV     DESIRED LOS ANGLE AT TPI

R01402   COMMUNICATION TO THRUSTING PROGRAMS

R01403    .    (1) TIG      TIME OF THE CSI MANEUVER
R01404         (2) RTIG     POSITION OF ACTIVE VEHICLE AT CSI - BEFORE ROTATION
R01405                      INTO PLANE OF PASSIVE VEHICLE
R01406         (3) VTIG     VELOCITY OF ACTIVE VEHICLE AT CSI - BEFORE ROTATION
R01407                      INTO PLANE OF PASSIVE VEHICLE
R01408         (4) DELVSIN  DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01409         (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CSI
R0141          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R0150    SUBROUTINES USED

R0151          AVFLAGA
R0152          AVFLAGP
R01525         P20FLGON
R0153          VARALARM
R0154          BANKCALL
R0155          GOFLASH
R0156          GOTOPOOH
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R01562        VNPOOH
R01564        GOFLASHR
R0157         BLANKET
R0158         ENDOFJOB
R0159         SELECTMU
R0160         ADVANCE
R0161         INTINT
R0162         PASSIVE
R0163         CSI/A
R0164         S32/33.1
R0165         DISDVLVC
R0166         VN1645

 0400                             35,2027                      BANK    35
 0401    REF   1                  35,2000                      SETLOC  CSI/CDH
 0402                             35,2027                      BANK
 0403    REF   1                  E7,1470                      EBANK=  SUBEXIT
 0404    REF   1                                               COUNT*  $$/P3272
 0500    REF   1                  35,2027  0 2347 0  P32       TC      AVFLAGA
 0502    REF   1                  35,2030  0 2032 1            TC      P32STRT
 0503    REF   1                  35,2031  0 2354 1  P72       TC      AVFLAGP
 050305                           35,2032  0 0006 1  P32STRT   EXTEND
 050306  REF   1                  35,2033  3 2420 0            DCA     P30ZERO
 050307  REF   3  LAST   315      35,2034  53'621 1            DXCH    CENTANG
 05031   REF   1                  35,2035  0 2053 0            TC      P32/P72A
 05032                            35,2036   77734 1  ALMXITA   SXA,2
 05033   REF   2  LAST   141      35,2037   03613 0                    CSIALRM
 05034                            35,2040   77740 1  ALMXIT    LXC,1
 05035   REF   3  LAST   621      35,2041   03613 0                    CSIALRM
 05038                            35,2042   77533 1            SLOAD*  EXIT
 05039   REF   1                  35,2043   32423 0                    ALARM/TB -1,1
 0504    REF 277  LAST   606      35,2044  3 0154 1            CA      MPAC
 05041   REF   3  LAST   388      35,2045  0 5744 0            TC      VARALARM
 05042   REF   1                  35,2046  3 5006 1            CAF     V05N09
 05043   REF 157  LAST   608      35,2047  0 4616 1            TC      BANKCALL
 05044   REF   8  LAST   493      35,2050   20476 0            CADR    GOFLASH
 05045   REF   6  LAST   493      35,2051  0 6001 0            TC      GOTOPOOH
 05046                            35,2052  0 2046 1            TC      -4
 0505    REF   1                  35,2053  0 2361 1  P32/P72A  TC      P20FLGON
 05051   REF   2  LAST   621      35,2054  3 2417 1            CAF     P30ZERO
 0506    REF   3  LAST   315      35,2055  55'467 1            TS      NN +1
 05061 *REF    4  LAST   305      35,2056  55'633 1            TS      TCSI
 05062 *REF    5  LAST   621      35,2057  55'634 0            TS      TCSI +1
 0507  *REF    1                  35,2060  3 2410 0  VN0611    CAF     V06N11              TCSI
 0508    REF   4  LAST   614      35,2061  0 3712 0            TC      VNPOOH
 050801*REF   63  LAST   615      35,2062  0 6037 0            TC      INTPRET
 050802*                          35,2063   57545 1            DLOAD   DCOMP
 050803*REF    6  LAST   621      35,2064   03634 0                    TCSI
 050804*                          35,2065   71240 1            BMN     DLOAD
 050805*REF    1                  35,2066   72113 1                    VN0655
 050806*REF    3  LAST  500    35,2067    01643 1                      TETLEM
 050807*REF   22  LAST  616    35,2070    34041 0              STCALL  TDEC1
 050808*REF    1               35,2071    46360 0                      PRECSET
 050809*                       35,2072    53775 1              VLOAD   VSR*
 050810*REF    1               35,2073    03536 1                      RACT3
 050811*                       35,2074    57176 0                      0,2
 050812*REF    2  LAST  494    35,2075    26655 0              STOVL   RVEC
 050813*REF    2  LAST  141    35,2076    03544 1                      VACT3
 050814*                       35,2077    43057 1              VSR*    SET
 050815*                       35,2100    57176 0                      0,2
 050816*REF    2  LAST  494    35,2101    03466 0                      RVSW
 050817*REF    3  LAST  494    35,2102    16744 1              STODL   VVEC
 050818*REF    5  LAST  610    35,2103    06530 1                      DPPOSMAX
 050819*REF    2  LAST  125    35,2104    36756 0              STCALL  RDESIRED
 050820*REF    1               35,2105    25547 0                      TIMERAD
 050821*                       35,2106    77615 0              DAD
 050822*REF    1               35,2107    03574 1                      TDEC2
 050823*REF    7  LAST  621    35,2110    03634 0              STORE   TCSI
 050824*                       35,2111    77776 1              EXIT
 050825*REF    1               35,2112  0 2060 0               TC      VN0611
 050826*                       35,2113    77776 1   VN0655     EXIT
 0509    REF   1               35,2114  3 3724 0               CAF     V06N55          NN, ELEV(PGLOS)
 0510    REF 158  LAST  621    35,2115  0 4616 1               TC      BANKCALL
 0511    REF   9  LAST  621    35,2116    20476 0              CADR    GOFLASH
 0512    REF   7  LAST  621    35,2117  0 6001 0               TC      GOTOPOOH
 0513                          35,2120  0 2122 1               TC      +2
 0514                          35,2121  0 2114 1               TC      -5
 0518    REF   1               35,2122  3 3723 1               CAF     V06N37          TTPI
 0519    REF   5  LAST  621    35,2123  0 3712 0               TC      VNPOOH
 0520    REF  64  LAST  621    35,2124  0 6037 0               TC      INTPRET
 0521                          35,2125    77745 1              DLOAD
 0522    REF   8  LAST  622    35,2126    03634 0                      TCSI
 0523    REF  10  LAST  616    35,2127    37442 1              STCALL  TIG
 0524    REF   1               35,2130    20000 0                      SELECTMU
 0525                          35,2131    77624 1   P32/P72B   CALL
 0526    REF   1               35,2132    71016 0                      ADVANCE
 0527                          35,2133    77201 1              SETPD   VLOAD
 0528                          35,2134    00001 0                      0D
 0529    REF   3  LAST  144    35,2135    03506 1                      VPASS1
 0530                          35,2136    65315 0              PDVL    PDDL
 0531    REF   2  LAST  141    35,2137    03500 1                      RPASS1
 0532    REF   9  LAST  622    35,2140    03634 0                      TCSI
 0533                          35,2141    65325 0              PDDL    PDDL
 0534    REF   4  LAST  306    35,2142    03636 1                      TTPI
 0535    REF   1               35,2143    33732 1                      TWOPI
 0536                          35,2144    45006 0              PUSH    CALL
 0537    REF   1               35,2145    73466 1                      INTINT
 0538                          35,2146    77624 1              CALL
 0539    REF   1               35,2147    46412 1                      PASSIVE
 0540                          35,2150    77624 1              CALL
 0541   REF    1                35,2151   70113 0                   CSI/A
 0542                           35,2152   43014 0  P32/P72C BON     SET
 0543   REF    1                35,2153   01311 0                   FINALFLG
 0544   REF    1                35,2154   72156 0                   P32/P72D
 0545   REF    6  LAST   614    35,2155   00470 1                   UPDATFLG
 0546                           35,2156   77745 1  P32/P72D DLOAD
 0547   REF    3  LAST   316    35,2157   02253 1                   T1TOT2
 0548   REF    4  LAST   623    35,2160   02253 1  P32/P72E STORE   T1TOT2
 0549                           35,2161   51025 1           DSU     BPL
 0550   REF    1                35,2162   32422 1                   60MIN
 0551   REF    1                35,2163   72160 0                   P32/P72E
 0552                           35,2164   77745 1           DLOAD
 0553   REF    2  LAST   316    35,2165   02255 1                   T2TOT3
 0554   REF    3  LAST   623    35,2166   02255 1  P32/P72F STORE   T2TOT3
 0555                           35,2167   51025 1           DSU     BPL
 0556   REF    2  LAST   623    35,2170   32422 1                   60MIN
 0557   REF    1                35,2171   72166 0                   P32/P72F
 0558                           35,2172   77776 1           EXIT
 0559   REF    1                35,2173  3 2412 1           CAF     V06N75
 0560   REF    6  LAST   622    35,2174  0 3712 0           TC      VNPOOH
 0561   REF   65  LAST   622    35,2175  0 6037 0           TC      INTPRET
 0562                           35,2176   45175 0           VLOAD   CALL
 0563   REF    3  LAST   198    35,2177   02267 0                   DELVEET1
 0566   REF    1                35,2200   71100 0                   S32/33.1
 0567   REF    4  LAST   623    35,2201   26267 0           STOVL   DELVEET1
 05671  REF    2  LAST   117    35,2202   02311 0                   RACT2
 05672  REF    2  LAST   117    35,2203   26303 0           STOVL   RACT1
 0568   REF    3  LAST   198    35,2204   02275 0                   DELVEET2
 0569                           35,2205   45170 0           AXT,1   CALL
 05691                          35,2206   01522 0           VN      0682
 0572   REF    1                35,2207   72370 0                   DISDVLVC
 0573                           35,2210   77745 1           DLOAD
 05731  REF    5  LAST   622    35,2211   03636 1                   TTPI
 05732  REF    1                35,2212   37640 1           STCALL  TTPIO
 0574   REF    1                35,2213   73606 0                   VN1645
 0575                           35,2214   77650 1           GOTO
 0576   REF    1                35,2215   72131 1                   P32/P72B
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P1010   CONSTANT DELTA HEIGHT (CDH) PROGRAMS (P33 AND P73)

R1011   MOD NO -1         LOG SECTION - P32-P35, P72-P75
R1012   MOD BY WHITE.P    DATE  1JUNE67
R1013   PURPOSE

R1014           (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE CONSTANT DELTA
R1015               ALTITUDE MANEUVER (CDH).

R1016           (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R1017               APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R1018           (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R1019               ASSOCIATED WITH THE CDH MANEUVER FOR APPROVAL BY THE
R1020               ASTRONAUT/GROUND.

R1021           (4) TO STORE THE CDH TARGET PARAMETERS FOR USE BY THE DESIRED
R1022               THRUSTING PROGRAM.

R1023   ASSUMPTIONS

R1024           (1) THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF THE
R1025               CO-ELLIPTIC SEQUENCE INITIATION (CSI) PROGRAM (P32/P72).
R1026               THEREFORE -

R1027               (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R1028                   BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R1029                   A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R1030                   HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R1031               (B) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION WAS
R1032                   COMPUTED TO BE GREATER THAN 10 MINUTES.

R1033               (C) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R1034                   COMPUTED TO BE GREATER THAN 10 MINUTES.

R1035               (D) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R1036                   ORBITS WAS MINMIZED.

R1037               (E) CSI BURN WAS DEFINED SUCH THAT THE IMPULSIVE DELTA V WAS
R1038                   IN THE HORIZONTAL PLANE DEFINED BY ACTIVE VEHICLE

R10385                  POSITION AT CSI IGNITION.

R1039               (F) THE PERICENTER ALTITUDES OF THE ORBITS FOLLOWING CSI AND
R1040                   CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
R1041                   ORBIT OR 85 NM FOR EARTH ORBIT.

R1042               (G) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R1043                   THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
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R1044                   MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R1045                   IN AN OUT-OF-PLANE MANEUVER.

R1046           (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R1047               STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 4).

R1048           (3) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
R1049               THE GROUND.  THESE STORAGE CAPABILITES ARE NORMALLY LIMITED
R1050               ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
R1051               EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

R1052           (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R1053               OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R1054               DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R1055               PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R1056               AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R1057               TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R1058               MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R1059               THRUSTING MANEUVER.

R1060           (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R1061           (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R1062                   ACTIVE VEGICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R1063                   DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R1064                   CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R1065                   EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R1066                   FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R1067                   COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
R1068                   CYCLE.

R1069                   EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
R1070                   STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
R1071                   THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
R1072                   PROGRAM.

R1073           (7) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO
R1074               A THRUSTING MANEUVER.

R1075           (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R1076                   P33 IF THIS VEHICLE IS ACTIVE VEHICLE.

R1077                   P73 IF THIS VEHICLE IS PASSIVE VEHICLE.

R1110       INPUT

R1111           (1) TTPIO     TIME OF THE TPI MANEUVER - SAVED FROM P32/P72
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R1112          (2) ELEV     DESIRED LOS ANGLE AT TPI - SAVED FROM P32/P72
R1113          (3) TCDH     TIME OF THE CDH MANEUVER

R1130   OUTPUT

R1131          (1) TRKMKCNT NUMBER OF MARKS
R1132          (2) TTOGO    TIME TO GO
R1133          (3) +MGA     MIDDLE GIMBAL ANGLE
R1134          (4) DIFFALT  DELTA ALTITUDE AT CDH
R1135          (5) T2TOT3   DELTA TIME FROM CDH TO COMPUTED TPI
R1136          (6) NOMTPI   DELTA TIME FROM NOMINAL TPI TO COMPUTED TPI
R1137          (7) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R1139   DOWNLINK

R11391         (1) TCDH     TIME OF THE CDH MANEUVER
R11392         (2) TTPI     TIME OF THE TPI MANEUVER
R11393         (3) TIG      TIME OF THE CDH MANEUVER
R11394         (4) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R11395         (5) DIFFALT  DELTA ALTITUDE AT CDH
R11396         (6) ELEV     DESIRED LOS ANGLE AT TPI
R11402  COMMUNICATION TO THRUSTING PROGRAMS

R11403         (1) TIG      TIME OF THE CDH MANEUVER
R11404         (2) RTIG     POSITION OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R11405                      INTO PLANE OF PASSIVE VEHICLE
R11406         (3) VTIG     VELOCITY OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R11407                      INTO PLANE OF PASSIVE VEHICLE
R11408         (4) DELVSIN  DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R11409         (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CDH
R1141          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R1150   SUBROUTINES USED

R1151              AVFLAGA
R1152              AVFLAGP
R11525             P20FLGON
R1153              VNPOOH
R1154              SELECTMU
R1155              ADVANCE
R1156              CDHMVR
R1157              INTINT3P
R1158              ACTIVE
R1159              PASSIVE
R1160              S33/34.1
R1161              ALARM
R1162              BANKCALL
R1163              GOFLASH
R1164              GOTOPOOH
R1165              S32/33.1
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R1167          VN1645

 1499   REF    1                                                COUNT* $$/P3373
 1500   REF    2  LAST   621    35,2216   0 2347 0  P33         TC     AVFLAGA
 1502   REF    1                35,2217   0 2221 1              TC     P33/P73A
 1503   REF    2  LAST   621    35,2220   0 2354 1  P73         TC     AVFLAGP
 1505   REF    2  LAST   621    35,2221   0 2361 1  P33/P73A    TC     P20FLGON
 15051  REF    1                35,2222   3 2411 1              CAF    V06N13             TCDH
 1506   REF    7  LAST   623    35,2223   0 3712 0              TC     VNPOOH
 1507   REF   66  LAST   623    35,2224   0 6037 0              TC     INTPRET
 1508                           35,2225    77745 1              DLOAD
 15081  REF    2  LAST   623    35,2226    03640 0                     TTPIO
 15082  REF    6  LAST   623    35,2227    17636 1              STODL  TTPI
 1509   REF    4  LAST   305    35,2230    01777 1                     TCDH
 1510   REF   11  LAST   622    35,2231    37442 1              STCALL TIG
 1511   REF    2  LAST   622    35,2232    20000 0                     SELECTMU
 1512                           35,2233    77624 1  P33/P73B    CALL
 1513   REF    2  LAST   622    35,2234    71016 0                     ADVANCE
 1514                           35,2235    77624 1              CALL
 1515   REF    1                35,2236    71133 0                     CDHMVR
 1516                           35,2237    77201 1              SETPD  VLOAD
 1517                           35,2240    00001 0                     0D
 1518   REF    3  LAST   622    35,2241    03544 1                     VACT3
 1519                           35,2242    45115 0              PDVL   CALL
 1520   REF    3  LAST   623    35,2243    02311 0                     RACT2
 1521   REF    1                35,2244    71071 1                     INTINT3P
 1522                           35,2245    77624 1              CALL
 1523   REF    1                35,2246    46402 0                     ACTIVE
 1524                           35,2247    77201 1              SETPD  VLOAD
 1525                           35,2250    00001 0                     0D
 1526   REF    2  LAST   141    35,2251    03530 1                     VPASS2
 1527                           35,2252    45115 0              PDVL   CALL
 1528   REF    2  LAST   141    35,2253    03522 1                     RPASS2
 1529   REF    2  LAST   627    35,2254    71071 1                     INTINT3P
 1530                           35,2255    77624 1              CALL
 1531   REF    2  LAST   622    35,2256    46412 1                     PASSIVE
 1532                           35,2257    43145 0              DLOAD  SET
 1533   REF    3  LAST   621    35,2260    32420 0                     P30ZERO
 1534   REF    1                35,2261    03460 0                     ITSWICH
 1535   REF    1                35,2262    36317 1              STCALL NOMTPI
 1536   REF    1                35,2263    72764 1                     S33/34.1
 1537                           35,2264    77454 1              BZE    EXIT
 1538   REF    1                35,2265    72302 0                     P33/P73C
 1539   REF   27  LAST   593    35,2266   0 5567 0              TC     ALARM
 1540                           35,2267    00611 1              OCT    611
 1541   REF    2  LAST   621    35,2270   3 5006 1              CAF    V05N09
 1542   REF  159  LAST   622    35,2271   0 4616 1              TC     BANKCALL
 1543   REF   10  LAST   622    35,2272    20476 0              CADR   GOFLASH
 1544   REF    8  LAST   622    35,2273   0 6001 0              TC     GOTOPOOH
 1545                           35,2274   0 2276 0              TC     +2
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  1546    REF    2  LAST   627    35,2275   0 2221 1               TC      P33/P73A
  1547    REF   67  LAST   627    35,2276   0 6037 0               TC      INTPRET
  1548                            35,2277    77745 1               DLOAD
  1549    REF    4  LAST   627    35,2300    32420 0                       P30ZERO
  1550    REF    2  LAST   627    35,2301    02317 0               STORE   NOMTPI
  1551                            35,2302    43014 0    P33/P73C BON     SET
  1552    REF    2  LAST   623    35,2303    01311 0                       FINALFLG
  1553    REF    1                35,2304    72306 1                       P33/P73D
  1554    REF    7  LAST   623    35,2305    00470 1                       UPDATFLG
  1557                            35,2306    43345 1    P33/P73D DLOAD   DAD
  1558    REF    3  LAST   628    35,2307    02317 0                       NOMTPI
  1559    REF    7  LAST   627    35,2310    03636 1                       TTPI
  1560    REF    8  LAST   628    35,2311    03636 1               STORE   TTPI
  1561                            35,2312    77625 0               DSU
  1562    REF    5  LAST   627    35,2313    01777 1                       TCDH
  1563                            35,2314    51025 1    P33/P73E DSU     BPL
  1564    REF    3  LAST   623    35,2315    32422 1                       60MIN
  1565    REF    1                35,2316    72314 1                       P33/P73F
  1566                            35,2317    77615 0               DAD
  1567    REF    4  LAST   628    35,2320    32422 1                       60MIN
  1568    REF    5  LAST   623    35,2321    16253 1               STODL   T1TOT2
  1569    REF    9  LAST   628    35,2322    03636 1                       TTPI
  1570                            35,2323    41425 1               DSU     PUSH
  1571    REF    3  LAST   627    35,2324    03640 0                       TTPIO
  1572                            35,2325    45246 0    P33/P73F ABS     DSU
  1573    REF    5  LAST   628    35,2326    32422 1                       60MIN
  1574                            35,2327    43244 1               BPL     DAD
  1575    REF    1                35,2330    72325 0                       P33/P73F
  15751   REF    6  LAST   628    35,2331    32422 1                       60MIN
  15753                           35,2332    45565 0               SIGN    STADR
  15755   REF    4  LAST   623    35,2333    75522 0               STORE   T2TOT3
  1576                            35,2334    77776 1               EXIT
  1577    REF    2  LAST   623    35,2335   3 2412 1               CAF     V06N75
  1578    REF    8  LAST   627    35,2336   0 3712 0               TC      VNPOOH
  1579    REF   68  LAST   628    35,2337   0 6037 0               TC      INTPRET
  1580                            35,2340    45175 0               VLOAD   CALL
  1581    REF    4  LAST   623    35,2341    02275 0                       DELVEET2
  1584    REF    2  LAST   623    35,2342    71100 0                       S32/33.1
  1585    REF    5  LAST   628    35,2343    36275 1               STCALL  DELVEET2
  1589    REF    2  LAST   623    35,2344    73606 0                       VN1645
  1590                            35,2345    77650 1               GOTO
  1591    REF    1                35,2346    72233 0                       P33/P73B
```

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P3800    ..... AVFLAGA/P .....

R3850    SUBROUTINES USED

R3851             UPFLAG
R3852             DOWNFLAG

 3900                             35,2347  0 0006 1  AVFLAGA  EXTEND                    AVFLAG = LEM
 3901    REF   2  LAST  621       35,2350  23'470 0           QXCH     SUBEXIT
 3902    REF  34  LAST  614       35,2351  0 5504 0           TC       UPFLAG
 3903    REF   1                  35,2352   00050 1           ADRES    AVFLAG
 3904    REF   3  LAST  629       35,2353  0 1470 0           TC       SUBEXIT
 3905                             35,2354  0 0006 1  AVFLAGP  EXTEND                    AVFLAG = CSM
 3906    REF   4  LAST  629       35,2355  23'470 0           QXCH     SUBEXIT
 3907    REF  55  LAST  614       35,2356  0 5516 0           TC       DOWNFLAG
 3908    REF   2  LAST  629       35,2357   00050 1           ADRES    AVFLAG
 3909    REF   5  LAST  629       35,2360  0 1470 0           TC       SUBEXIT
 39091                            35,2361  0 0006 1  P20FLGON EXTEND
 39092   REF   6  LAST  629       35,2362  23'470 0           QXCH     SUBEXIT
 39093   REF  35  LAST  629       35,2363  0 5504 0           TC       UPFLAG
 3910    REF   8  LAST  628       35,2364   00027 1           ADRES    UPDATFLG           SET UPDATFLG
 39101   REF  36  LAST  629       35,2365  0 5504 0           TC       UPFLAG
 39102   REF   5  LAST  614       35,2366   00031 0           ADRES    TRACKFLG           SET TRACKFLG
 3911    REF   7  LAST  629       35,2367  0 1470 0           TC       SUBEXIT
```

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P4600     ..... DISDVLVC  .....

R4650     SUBROUTINES USED

R4651                S32/33.X
R4652                 VNPOOH

 4700    REF  11  LAST  316    35,2370    03434 1  DISDVLVC STORE   DELVLVC
 4701                          35,2371    45020 1           STQ     CALL
 4702    REF   2  LAST  140    35,2372    03463 0                   NORMEX
 47021   REF   1               35,2373    71120 1                   S32/33.X
 47022                         35,2374    64375 1           VLOAD   MXV
 47023   REF  12  LAST  630    35,2375    03434 1                   DELVLVC
 47024                         35,2376    00001 0                   0D
 470241                        35,2377    66172 0           VSL1    SXA,1
 470243 REF    1               35,2400    03615 0                   VERBNOUN
 47025   REF  13  LAST  630    35,2401    03434 1           STORE   DELVLVC
 47026                         35,2402    77776 1           EXIT
 4703    REF   2  LAST  630    35,2403  3 1615 1            CA      VERBNOUN
 4704    REF   9  LAST  628    35,2404  0 3712 0            TC      VNPOOH
 4705    REF  69  LAST  628    35,2405  0 6037 0            TC      INTPRET
 4706                          35,2406    77650 1           GOTO
 4707    REF   3  LAST  630    35,2407    03463 0                   NORMEX
```

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P4800    ..... CONSTANTS .....

 4901                              35,2410   01413 0  V06N11   VN       0611
 4902                              35,2411   01415 0  V06N13   VN       0613
 4903                              35,2412   01513 1  V06N75   VN       0675
 4914                              35,2413   77776 1  SN359+   2DEC     -.000086601
 4914                              35,2414   62460 1
 4915                              35,2415   17777 0  CS359+   2DEC     +.499999992
 4915                              35,2416   37776 0
 4916                              35,2417   00000 1  P30ZERO  2DEC     0
 4916                              35,2420   00000 1
 4917                              35,2421   00025 0  60MIN    2DEC     360000
 4917                              35,2422   37100 1
 4919                              35,2423   00600 1  ALARM/TB OCT      00600           NO 1
 4920                              35,2424   00601 0           OCT      00601              2
 4921                              35,2425   00602 0           OCT      00602              3
 4922                              35,2426   00603 1           OCT      00603              4
 4923                              35,2427   00604 0           OCT      00604              5
 4924                              35,2430   00605 1           OCT      00605              6
 4925                              35,2431   00606 1           OCT      00606              7
```

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P5000      ..... CSI/A       .....

R5150      SUBROUTINES USED

R5152              VECSHIFT
R5153              TIMETHET
R5154              PERIAPO
R5155              SHIFTR1
R5156              INTINT2C
R5157              CDHMVR
R5158              PERIAPO1
R5159              INTINT
R5160              ACTIVE

 5400                              34,2057                              BANK     34
 5401      REF     1               34,2000                              SETLOC   CSI/CDH1
 5402                              34,2057                              BANK
 5403      REF     [illegible]  LAST   629    E7,1470                              EBANK=   SUBEXIT
 5404      REF     1                                                    COUNT*   $$/CSI
 5413                              34,2057     00000 1    LOOPMX        2DEC     16
 5413                              34,2060     00020 0
 5414                              34,2061     00003 1    INITST        2DEC     .03048 B-7              INITIAL DELDV = 10 FPS
 5414                              34,2062     34661 1
 5415                              34,2063     00606 1    DVMAX1        2DEC     3.0480 B-7              MAXIMUM DV1 = 1000 FPS
 5415                              34,2064     04467 0
 5416                              34,2065     00601 0    DVMAX2        2DEC     3.014472 B-7                            989 FPS
 5416                              34,2066     33216 1
 5417                              34,2067     10000 0    1DPB2         2DEC     1.0B-2
 5417                              34,2070     00000 1
 5418                              34,2071     00000 1    1DPB2=        2DEC     1
 5418                              34,2072     00001 0
 5419                              34,2073     00004 0    PMINE         2DEC     157420 B-29      85 NM     - MUST BE 8 WORDS BEFORE PMINM
 5419                              34,2074     31566 0
 5420                              34,2075     00000 1    EPSILN1       2DEC     .0003048 B-7            .1 FPS
 5420                              34,2076     01177 1
 5421                              34,2077     00002 0    NICKELDP      2DEC     .021336 B-7      7 FPS (CHANGED FROM .05 FPS)
 5421                              34,2100     27311 1
 5422                              34,2101     77754 1    FIFPSDP       2DEC     -.152400 B-7            50  FPS
 5422                              34,2102     57611 0
 5423                              34,2103     00000 1    PMINM         2DEC     10668 B-29       35000 FT - MUST BE 8 WORDS AFTER PMINE
 5423                              34,2104     12326 0
 5424                              34,2105     00116 1    DELMAX1       2DEC     .6096000 B-7            200 FPS
 5424                              34,2106     00730 0
 5425                              34,2107     00000 1    ONETHTH       2DEC     .0001 B-3
 5425                              34,2110     06433 0
 5426                              34,2111     00003 1    TMIN          2DEC     60000            10 MIN
 5426                              34,2112     25140 0
 5500                              34,2113     43014 0    CSI/A         CLEAR    SET              INITIALIZE INDICATORS
 5501      REF     1               34,2114     03260 0                           S32.1F1          DVT1 HAS EXCEEDED MAX INDICATOR
 5502      REF     1               34,2115     03061 0                           S32.1F2          FIRST PASS FOR NEWTON ITERATION INDICATR
 5503                          34,2116   43014 0            CLEAR   SET
 5504   REF   1                34,2117   03262 1                    S32.1F3A         00=1ST 2 PASSES 2ND CYCLE 01=FIRST CYCLE
 5505   REF   1                34,2120   03063 1                    S32.1F3B         10=2ND CYCLE 11=50FPS STAGE 2ND CYCLE
 5506                          34,2121   77745 1            DLOAD
 5507   REF   5  LAST   628    34,2122   32420 0                    P30ZERO
 5508   REF   1                34,2123   03606 1            STORE   LOOPCT
 5509   REF   4  LAST   621    34,2124   03614 1            STORE   CSIALRM
 5510                          34,2125   77201 1  CSI/B     SETPD   VLOAD
 5511                          34,2126   00001 0                    0D
 5512   REF   3  LAST   623    34,2127   02303 0                    RACT1
 5513                          34,2130   41446 1            ABVAL   PUSH             RAI                                B29 PL02D
 5514                          34,2131   70501 1            NORM    SP1
 5515   REF   2  LAST   487    34,2132   00050 1                    X2                                         B29-N2+ B1 PL04D
 5516                          34,2133   51515 1            PDVL    ABVAL
 5517   REF   1                34,2134   03552 0                    RPASS3
 5518                          34,2135   55301 0            NORM    BDDV             RA1/RP3                             B1 PL02D
 5519   REF   5  LAST   586    34,2136   00047 1                    X1
 5520                          34,2137   53664 0            XSU,2   SR*                                                  B2
 5521   REF   6  LAST   633    34,2140   00046 0                    X1
 5522                          34,2141   57175 0                    1,2
 5523                          34,2142   41215 1            DAD     DMP              (1+(RA1/RP3))RA1          B29+B2=B31 PL00D
 5524   REF   1                34,2143   30070 0                    1DPB2
 5525                          34,2144   65301 0            NORM    PDDL                                                    PL02D
 5526   REF   7  LAST   633    34,2145   00047 1                    X1
 5527   REF   1                34,2146   02321 0                    RTMU
 5528                          34,2147   56342 1            SR1     DDV                                      B38-B31= B7 PL00D
 5529                          34,2150   75457 0            SL*     SQRT                                                 B7
 5530                          34,2151   20172 1                    0 -7,1
 5531                          34,2152   53515 0            PDVL    UNIT                                                    PL02D
 5532   REF   4  LAST   633    34,2153   02303 0                    RACT1
 5533                          34,2154   47315 0            PDVL    VXV
 5534   REF   2  LAST   117    34,2155   02261 0                    UP1
 5535                          34,2156   77656 1            UNIT                     UNIT(URP1 X UVP1 X URA1) = UH1
 5536                          34,2157   72441 0            DOT     SL1              VA1 . UH1                           B7
 5537   REF   2  LAST   144    34,2160   03472 0                    VACT1
 5538                          34,2161   45421 1            BDSU    STADR                                                   PL00D
 5539   REF   3  LAST   141    34,2162   60203 0            STODL   DELVCSI
 5540   REF   1                34,2163   30062 0                    INITST           10 FPS
 5541   REF   4  LAST   142    34,2164   03612 1            STORE   DELDV
 5542                          34,2165   43345 1  CSI/B1    DLOAD   DAD              IF LOOPCT = 16
 5543   REF   2  LAST   633    34,2166   03606 1                    LOOPCT
 5544   REF   1                34,2167   30072 1                    1DPB28
 5545   REF   3  LAST   633    34,2170   03606 1            STORE   LOOPCT
 5546                          34,2171   77025 0            DSU     AXT,2
 5547   REF   1                34,2172   30060 1                    LOOPMX
 5548                          34,2173   00006 1                    6
 5549                          34,2174   77644 1            BPL
 5550   REF   1                34,2175   70776 0                    SCNDSOL
 5551                          34,2176   77601 0  CSI/B2    SETPD
 5552                          34,2177   00001 0                    0D
 5553                            34,2200   51545 1             DLOAD   ABS
 5554   REF    4  LAST   633     34,2201   03574 1                     DELVCSI
 5555                            34,2202   50025 0             DSU     BMN
 5556   REF    1                 34,2203   30064 0                     DVMAX1
 5557   REF    1                 34,2204   70224 1                     CSI/B23
 5558                            34,2205   43174 1             AXT,2   BON
 5559                            34,2206   00007 0                     7
 5560   REF    2  LAST   632     34,2207   03300 1                     S32.1F1
 5561   REF    2  LAST   633     34,2210   70776 0                     SCNDSOL
 5562                            34,2211   43014 0             BOFF    BON
 5563   REF    2  LAST   633     34,2212   03342 1                     S32.1F3A
 5564   REF    1                 34,2213   70216 0                     CSI/B22          FLAG 3 NEQ 3
 5565   REF    2  LAST   633     34,2214   03303 1                     S32.1F3B
 5566   REF    3  LAST   634     34,2215   70776 0                     SCNDSOL
 5567                            34,2216   71214 0   CSI/B22   SET     DLOAD
 5568   REF    3  LAST   634     34,2217   03060 1                     S32.1F1
 5569   REF    1                 34,2220   30066 1                     DVMAX2
 5570                            34,2221   77765 0             SIGN
 5571   REF    5  LAST   634     34,2222   03574 1                     DELVCSI
 5572   REF    6  LAST   634     34,2223   03574 1             STORE   DELVCSI
 5573                            34,2224   41575 0   CSI/B23   VLOAD   PUSH
 5574   REF    5  LAST   633     34,2225   02303 0                     RACT1
 5575                            34,2226   63256 0             UNIT    RDVL
 5576   REF    3  LAST   633     34,2227   02261 0                     UP1
 5577                            34,2230   53435 0             VXV     UNIT             UNIT(URP1 X UVP1 X URA1) = UH1
 5578                            34,2231   76561 1             VXSC    VSL1
 5579   REF    7  LAST   634     34,2232   03574 1                     DELVCSI
 5580   REF    5  LAST   523     34,2233   02267 0             STORE   DELVEET1
 5581                            34,2234   40055 0             VAD     BOV
 5582   REF    3  LAST   633     34,2235   03472 0                     VACT1
 5583   REF    1                 34,2236   70237 0                     CSI/B23D
 5584   REF    2  LAST   142     34,2237   37566 0   CSI/B23D  STCALL  VACT4
 5585   REF    1                 34,2240   46416 0                     VECSHIFT
 5586   REF    4  LAST   622     34,2241   26744 1             STOVL   VVEC
 5587                            34,2242   77614 1             SET
 5588   REF    3  LAST   622     34,2243   03466 0                     RVSW
 5589   REF    3  LAST   622     34,2244   26655 0             STOVL   RVEC
 5590   REF    1                 34,2245   32414 1                     SN359+
 5591   REF    3  LAST   494     34,2246   36730 0             STCALL  SNTH             ALSO CSTH
 5592   REF    2  LAST   494     34,2247   24732 1                     TIMETHET
 5593                            34,2250   72142 0             SR1     LXA,1
 5594   REF    3  LAST   617     34,2251   02776 0                     RTX1
 5595   REF    1                 34,2252   37604 1             STCALL  HAFPA1
 5596   REF    1                 34,2253   46326 1                     PERIAPO
 5597                            34,2254   77624 1             CALL
 5598   REF    3  LAST   617     34,2255   46426 0                     SHIFTR1
 5599   REF    1                 34,2256   17602 0             STODL   POSTCSI
 5600   REF    4  LAST   621     34,2257   03621 1                     CENTANG
 560001                          34,2260   52054 1             BZE     GOTO
 560002                          34,2261   70263 1                     +2
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                  3:15 DEC.  2,1970  LEMP30S .103  PAGE  635

L        P32-P35, P72-P75                                                            USER'S PAGE NO.  18       E7 S3

 560003 REF    1                34,2262   70372 0                 CIRCL
 560004                         34,2263   77745 1          DLOAD
 560005 REF    2  LAST  125     34,2264   02752 0                 ECC
 5601                           34,2265   50025 0          DSU    BMN
 5602   REF    1                34,2266   30110 1                 ONETHTH
 5603   REF    2  LAST  635     34,2267   70372 0                 CIRCL
 5604                           34,2270   45145 0          DLOAD  CALL
 5605   REF    1                34,2271   00041 1                 R1
 5606   REF    4  LAST  634     34,2272   46426 0                 SHIFTR1
 5607                           34,2273   60201 1          SETPD  NORM
 5608                           34,2274   00003 1                 2D
 5609   REF    8  LAST  633     34,2275   00047 1                 X1
 5610                           34,2276   50315 0          PDVL   DOT                                                   PL04D
 5611   REF    6  LAST  634     34,2277   02303 0                 RACT1
 5612   REF    3  LAST  634     34,2300   03566 1                 VACT4
 5613                           34,2301   55246 1          ABS    DDV
 5614                           34,2302   00003 1                 02D               (/RDOTV/)/R1            B36-B29=  B7
 5615                           34,2303   45257 0          SL*    DSU
 5616                           34,2304   20201 0                 0,1
 5617   REF    1                34,2305   30100 0                 NICKELDP
 5618                           34,2306   71240 1          BMN    DLOAD
 5619   REF    3  LAST  635     34,2307   70372 0                 CIRCL
 5620   REF    2  LAST  125     34,2310   02740 0                 P
 5621                           34,2311   45312 0          SL2    DSU
 5622   REF    2  LAST  633     34,2312   30070 0                 1DPB2
 5623                           34,2313   14017 1          STODL  14D
 5624   REF    3  LAST  117     34,2314   02317 0                 RTSR1/MU
 5625                           34,2315   56342 1          SR1    DDV               (1/ROOTMU)/R1        B-16-B29 = B-45  PL02D
 5626                           34,2316   41325 0          PDDL   DMP
 5627   REF    3  LAST  635     34,2317   02740 0                 P
 5628   REF    2  LAST  635     34,2320   00041 1                 R1
 5629                           34,2321   77624 1          CALL
 5630   REF    5  LAST  635     34,2322   46426 0                 SHIFTR1
 5631                           34,2323   72412 0          SL4    SL1
 5632                           34,2324   41366 1          SQRT   DMP               ((P/MU)**.5)/R1      B14+B-45 = B-31  PL02D
 5633                           34,2325   52414 1          BOFF   SL3
 5634   REF    2  LAST   37     34,2326   04343 1                 CMOONFLG
 5635   REF    1                34,2327   70330 0                 CSI/B3
 5636                           34,2330   50315 0  CSI/B3  PDVL   DOT
 5637   REF    7  LAST  635     34,2331   02303 0                 RACT1
 5638   REF    4  LAST  635     34,2332   03566 1                 VACT4
 5639   REF    2  LAST  142     34,2333   03617 1          STORE  RDOTV
 5640                           34,2334   77646 0          ABS
 5641                           34,2335   41301 0          NORM   DMP               ((P/MU)**.5)RDOTV/R1                   PL02D
 5642   REF    3  LAST  633     34,2336   00050 1                 X2
 5643                           34,2337   53660 1          XSU,1  SL*                                B-31+B36-B3=  B2
 5644   REF    4  LAST  635     34,2340   00047 1                 X2
 5645                           34,2341   20204 0                 3,1
 5646                           34,2342   14015 0          STODL  12D
 5647   REF    6  LAST  633     34,2343   32420 0                 P30ZERO
 5648                                  34,2344   00021 1                   STORE  16D
 5649                                  34,2345   53575 0                   VLOAD  UNIT
 5650                                  34,2346   00015 0                          12D
 5651    REF    4  LAST   634          34,2347   26730 1                   STOVL  SNTH                   ALSO STORES CSTH AND 0
 5652    REF    8  LAST   635          34,2350   02303 0                          RACT1
 5653                                  34,2351   75315 1                   PDVL   SIGN
 5654    REF    5  LAST   635          34,2352   03566 1                          VACT4
 5655    REF    3  LAST   635          34,2353   03617 1                          RDOTV
 5656                                  34,2354   45076 1                   VCOMP  CALL
 5657    REF    2  LAST   634          34,2355   46416 0                          VECSHIFT
 5658    REF    5  LAST   634          34,2356   26744 1                   STOVL  VVEC
 5659                                  34,2357   77614 1                   SET
 5660    REF    4  LAST   634          34,2360   03466 0                          RVSW
 5661    REF    4  LAST   634          34,2361   36655 1                   STCALL RVEC
 5662    REF    3  LAST   634          34,2362   24732 1                          TIMETHET
 5663                                  34,2363   51125 0                   PDDL   BPL
 5664    REF    4  LAST   636          34,2364   03617 1                          RDOTV
 5665    REF    1                      34,2365   70376 1                          NTP/2
 5666                                  34,2366   45345 1                   DLOAD  DSU
 5667    REF    2  LAST   634          34,2367   03604 0                          HAFPA1
 5668                                  34,2370   52006 0                   PUSH   GOTO
 5669    REF    2  LAST   636          34,2371   70376 1                          NTP/2
 5670                                  34,2372   71201 1   CIRCL           SETPD  DLOAD
 5671                                  34,2373   00001 0                          00D
 5672    REF    7  LAST   635          34,2374   32420 0                          P30ZERO
 5673                                  34,2375   77606 1                   PUSH
 5674                                  34,2376   41345 0   NTP/2           DLOAD  DMP
 5675    REF    4  LAST   621          34,2377   03467 1                          NN
 5676    REF    3  LAST   636          34,2400   03604 0                          HAFPA1
 5677                                  34,2401   45261 0                   SL     DSU
 5678                                  34,2402   20217 1                          14D
 5679                                  34,2403   77615 0                   DAD
 5680    REF   10  LAST   622          34,2404   03634 0                          TCSI
 5681    REF    6  LAST   628          34,2405   01777 1                   STORE  TCDH
 5682                                  34,2406   77021 1                   BDSU   AXT,2
 5683    REF   10  LAST   628          34,2407   03636 1                          TTPI
 5684                                  34,2410   00005 1                          5D
 5685                                  34,2411   40240 0                   BMN    SETPD
 5686    REF    4  LAST   634          34,2412   70776 0                          SCNDSOL
 5687                                  34,2413   00001 0                          0D
 5688                                  34,2414   63375 0                   VLOAD  PDVL
 5689    REF    6  LAST   636          34,2415   03566 1                          VACT4
 5690    REF    9  LAST   636          34,2416   02303 0                          RACT1
 5691                                  34,2417   77624 1                   CALL
 5692    REF    1                      34,2420   71062 0                          INTINT2C
 5693    REF    4  LAST   627          34,2421   26311 0                   STOVL  RACT2
 5694    REF    7  LAST   617          34,2422   00007 0                          VATT
 5695    REF    1                      34,2423   27514 1                   STOVL  VACT2
 5696    REF    4  LAST   622          34,2424   03506 1                          VPASS1
 5697                                  34,2425   63201 1                   SETPD  PDVL
 5698                            34,2426   00001 0                OD
 5699   REF   3  LAST  622       34,2427   03500 1                RPASS1
 5700                            34,2430   77624 1         CALL
 5701   REF   2  LAST  636       34,2431   71062 0                INTINT2C
 5702   REF   3  LAST  627       34,2432   27522 1         STOVL  RPASS2
 5703   REF   8  LAST  636       34,2433   00007 0                VATT
 5704   REF   3  LAST  627       34,2434   37530 0         STCALL VPASS2
 5705   REF   2  LAST  627       34,2435   71133 0                CDHMVF
 5706                            34,2436   40375 1         VLOAD  SETPD
 5707   REF   5  LAST  636       34,2437   02311 0                RACT2
 5708                            34,2440   00001 0                OD
 5709                            34,2441   45115 0         PDVL   CALL
 5710   REF   4  LAST  627       34,2442   03544 1                VACT3
 5711   REF   2  LAST  617       34,2443   46316 1                PERIAPO1
 5712                            34,2444   77624 1         CALL
 5713   REF   6  LAST  635       34,2445   46426 0                SHIFTR1
 5714   REF   2  LAST  141       34,2446   27604 0         STOVL  POSTCDH
 5715   REF   6  LAST  637       34,2447   03544 1                VACT3
 5716                            34,2450   63201 1         SETPD  PDVL
 5717                            34,2451   00001 0                OD
 5718   REF   6  LAST  637       34,2452   02311 0                RACT2
 5719                            34,2453   65325 0         PDDL   PDDL
 5720   REF   7  LAST  636       34,2454   01777 1                TCDH
 5721   REF  11  LAST  636       34,2455   03636 1                TTPI
 5722                            34,2456   41525 0         PDDL   PUSH
 5723   REF   2  LAST  622       34,2457   33732 1                TWOPI
 5724                            34,2460   77624 1         CALL
 5725   REF   2  LAST  522       34,2461   73466 1                INTINT
 5726                            34,2462   77624 1         CALL
 5727   REF   2  LAST  627       34,2463   46402 0                ACTIVE
 5728                            34,2464   77745 1         DLOAD
 5738   REF   4  LAST  315       34,2465   02257 0                ELEV
 5739                            34,2466   73401 0         SETPD  SINE
 5740                            34,2467   00007 0                6D
 5741                            34,2470   53515 0         PDVL   UNIT
 5742   REF   2  LAST  622       34,2471   03536 1                RACT3
 5743                            34,2472   00001 0         STORE  00D             URA3 AT 00D
 5744                            34,2473   47315 0         PDVL   VXV             PL14D,PL08D
 5745   REF   4  LAST  634       34,2474   02261 0                UP1
 5746                            34,2475   77656 1         UNIT
 5747                            34,2476   71525 0         PDDL   COSINE          UNIT(URA3XUVA3XURA3) = UH3       B1 PL14D
 5748   REF   5  LAST  637       34,2477   02257 0                ELEV
 5749                            34,2500   45561 1         VXSC   STADR           (COSLOS)(UH3)                    B2 PL08D
 5750                            34,2501   77754 1         STORE  18D                 PLUS
 5751                            34,2502   74345 0         DLOAD  VXSC            (SINLOS)(URA3) = U               B2 PL00D
 5752                            34,2503   76455 1         VAD    VSL1
 5753                            34,2504   00023 0                18D                                              B1
 5754                            34,2505   50206 0         PUSH   DOT                                                  PL06D
 5755   REF   3  LAST  637       34,2506   03536 1                RACT3           (U . RA3) = TEMP1         B1  +B29=B30
 5756                            34,2507   41552 0         SL1    PUSH                                            B29 PL08D
 5757                            34,2510   72316 0              DSQ     TLOAD           TEMP1**2                            B58
 5758   REF 278  LAST  621       34,2511   00155 0                      MPAC
 5759                            34,2512   50315 0              PDVL    DOT                                                     PL11D
 5760   REF   4  LAST  637       34,2513   03536 1                      RACT3
 5761   REF   5  LAST  638       34,2514   03536 1                      RACT3
 5762                            34,2515   57551 1              TLOAD   DCOMP           RA3.RA3
 5763   REF 279  LAST  638       34,2516   00155 0                      MPAC
 5764                            34,2517   50315 0              PDVL    DOT             RP3.RP3                             B58 PL14D
 5765   REF   2  LAST  633       34,2520   03552 0                      RPASS3
 5766   REF   3  LAST  638       34,2521   03552 0                      RPASS3                                                  PL11D
 5767                            34,2522   76371 0              TAD     TAD             TEMP1**2+RA3.RA3+RP3.RP3=TEMP2          PL08D
 5768                            34,2523   71244 0              BPL     DLOAD
 5769   REF   1                  34,2524   70542 0                      K1ORK2
 5770   REF   4  LAST  633       34,2525   03606 1                      LOOPCT
 5771                            34,2526   77025 0              DSU     AXT,2
 5772   REF   2  LAST  633       34,2527   30072 1                      1DPB28
 5773                            34,2530   00001 0                      1D
 5774                            34,2531   77654 0              BZE
 5775   REF   1                  34,2532   72036 1                      ALMXITA
 5776                            34,2533   70545 1              DLOAD   SR1
 5777   REF   5  LAST  633       34,2534   03612 1                      DELDV
 5778   REF   6  LAST  638       34,2535   03612 1              STORE   DELDV
 5779                            34,2536   77621 1              BDSU
 5780   REF   1                  34,2537   03576 0                      DVPREV
 5781   REF   8  LAST  634       34,2540   37574 0              STCALL  DELVCSI
 5782   REF   1                  34,2541   70155 1                      CSI/B1
 5783                            34,2542   41566 1   K1ORK2     SQRT    PUSH            TEMP3 = TEMP2**.5                   B29 PL10D
 5784                            34,2543   45276 0              DCOMP   DSU
 5785                            34,2544   00007 0                      06D             -TEMP1-TEMP3 =K2 AT 10D
 5786                            34,2545   14013 0              STODL   10D                                                     PL08D
 5787                            34,2546   45425 0              DSU     STADR                                                   PL06D
 5788                            34,2547   77762 1              STORE   12D             -TEMP1+TEMP3 =K1 AT 12D
 5789                            34,2550   77646 0              ABS
 5790                            34,2551   14017 1              STODL   14D
 5791                            34,2552   00013 0                      10D
 5792                            34,2553   45246 0              ABS     DSU
 5793                            34,2554   00017 1                      14D
 5794                            34,2555   71240 1              BMN     DLOAD
 5795   REF   1                  34,2556   70561 1                      K2.
 5796                            34,2557   00015 0                      12D
 5797                            34,2560   00013 0              STORE   10D             K=K1
 5798                            34,2561   77745 1   K2.        DLOAD
 5799                            34,2562   00013 0                      10D
 5800                            34,2563   76561 1              VXSC    VSL1
 5801                            34,2564   53455 0              VAD     UNIT            V=RA3+KU  UNIT                      B1
 5802   REF   6  LAST  638       34,2565   03536 1                      RACT3
 5803                            34,2566   53515 0              PDVL    UNIT                                                    PL06D
 5804   REF   4  LAST  638       34,2567   03552 0                      RPASS3
 5805                            34,2570   53515 0              PDVL    UNIT                                                    PL12D
 5806   REF   1                  34,2571   03560 1                      VPASS3
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5807                          34,2572   63235 0             VXV     PDVL        UVP3 X URP3                          PL18D
5808                          34,2573   00007 0                     06D
5809                          34,2574   00007 0                     06D
5810                          34,2575   50235 0             VXV     DOT
5811                          34,2576   00001 0                     00D
5812                          34,2577   77626 0             STADR                                                    PL12D
5813                          34,2600   53762 1             STOVL   12D         (URP3XV).(UVP3XURP3)=TEMP            PL06D
5814                          34,2601   72441 0             DOT     SL1                                              PL00D
5815                          34,2602   75326 1             ARCCOS  SIGN
5816                          34,2603   00015 0                     12D                                         B0
5817                          34,2604   41542 1             SR1     PUSH        GAMMA=SIGN(TEMP)ARCOS(UNITV.URP3)    PL02D
5818                          34,2605   71214 0             BON     DLOAD
5819  REF   2  LAST  632      34,2606   03301 0                     S32.1F2
5820  REF   1                 34,2607   70644 0                     FRSTPAS
5821                          34,2610   00001 0                     00D         NOT THE FIRST PASS OF A CYCLE
5822                          34,2611   65225 1             DSU     PDDL        GAMMA-GAMPREV                       B1 PL04D
5823  REF   2  LAST  142      34,2612   03610 0                     GAMPREV
5824  REF   9  LAST  638      34,2613   03574 1                     DELVCSI
5825                          34,2614   60225 1             DSU     NORM                                            B7
5826  REF   2  LAST  638      34,2615   03576 0                     DVPREV
5827  REF   3  LAST  635      34,2616   00047 1                     X1
5828                          34,2617   65265 0             BDDV    PDDL        (GAM-GAMPREV)/(DV-DVPREV)    B-6+N1 PL06D
5829                          34,2620   00003 1                     02D              = SLOPE
5830  REF  10  LAST  639      34,2621   03574 1                     DELVCSI
5831  REF   3  LAST  639      34,2622   03576 0             STORE   DVPREV
5832                          34,2623   43014 0             BOFF    BOFF
5833  REF   3  LAST  634      34,2624   03342 1                     S32.1F3A
5834  REF   1                 34,2625   70656 0                     THRDCHK
5835  REF   3  LAST  634      34,2626   03343 0                     S32.1F3B
5836  REF   2  LAST  639      34,2627   70656 0                     THRDCHK
5837                          34,2630   41345 0             DLOAD   DMP
5838                          34,2631   00003 1                     02D
5839  REF   3  LAST  639      34,2632   03610 0                     GAMPREV
5840                          34,2633   71244 0             BPL     DLOAD
5841  REF   1                 34,2634   70663 0                     FIFTYFPS
5842  REF   2  LAST  633      34,2635   30062 0                     INITST
5843                          34,2636   77765 0             SIGN
5844  REF   7  LAST  638      34,2637   03612 1                     DELDV
5845  REF   8  LAST  639      34,2640   03612 1             STORE   DELDV
5846                          3 ,2641   43014 0             SET     CLEAR
5847  REF   4  LAST  639      34,2642   03062 0                     S32.1F3A
5848  REF   4  LAST  639      34,2643   03263 0                     S32.1F3B
5849                          34,2644   77745 1   FRSTPAS   DLOAD
5850                          34,2645   00001 0                     00D
5851  REF   4  LAST  639      34,2646   17610 0             STODL   GAMPREV
5852  REF  11  LAST  639      34,2647   03574 1                     DELVCSI
5853  REF   4  LAST  639      34,2650   03576 0             STORE   DVPREV
5854                          34,2651   43025 1             DSU     CLEAR
5855  REF   9  LAST  639      34,2652   03612 1                     DELDV
5856  REF   3  LAST  639      34,2653   03261 1                     S32.1F2
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 5857    REF  12  LAST  639    34,2654    37574 0             STCALL DELVCSI
 5858    REF   2  LAST  638    34,2655    70165 1                    CSI/B1
 5859                          34,2656    43014 0  THRDCHK    BON    BON
 5860    REF   5  LAST  639    34,2657    03302 0                    S32.1F3A
 5861    REF   1               34,2660    70702 0                    NEWTN
 5862    REF   5  LAST  639    34,2661    03303 1                    S32.1F3B
 5863    REF   2  LAST  640    34,2662    70702 0                    NEWTN
 5864                          34,2663    75345 1  FIFTYFPS   DLOAD  SIGN
 5865    REF   1               34,2664    30102 1                    FIFPSDP
 5866                          34,2665    00005 1                    04D
 5867                          34,2666    77765 0             SIGN
 5868    REF   5  LAST  639    34,2667    03610 0                    GAMPREV
 5869    REF  10  LAST  639    34,2670    03612 1             STORE  DELDV
 5870                          34,2671    43276 0             DCOMP  DAD
 5871    REF  13  LAST  640    34,2672    03574 1                    DELVCSI
 5872    REF  14  LAST  640    34,2673    17574 1             STODL  DELVCSI
 5873                          34,2674    00001 0                    00D
 5874                          34,2675    43014 0             SET    SET
 5875    REF   6  LAST  640    34,2676    03063 1                    S32.1F3B
 5876    REF   6  LAST  640    34,2677    03062 0                    S32.1F3A
 5877    REF   6  LAST  640    34,2700    37610 1             STCALL GAMPREV
 5878    REF   1               34,2701    70176 0                    CSI/B2
 5879                          34,2702    60345 0  NEWTN      DLOAD  NORM
 5880                          34,2703    00005 1                    04D
 5881    REF   5  LAST  635    34,2704    00050 1                    X2
 5882                          34,2705    54065 0             BDDV   XSU,1
 5883                          34,2706    00001 0                    00D
 5884    REF   6  LAST  640    34,2707    00047 1                    X2
 5885                          34,2710    77657 0             SR*
 5886                          34,2711    20601 1                    0,1
 5887    REF  11  LAST  640    34,2712    17612 1             STODL  DELDV
 5888                          34,2713    00001 0                    00D
 5889    REF   7  LAST  640    34,2714    03610 0             STORE  GAMPREV
 5890                          34,2715    51545 1             DLOAD  ABS
 5891    REF  12  LAST  640    34,2716    03612 1                    DELDV
 5892                          34,2717    45206 1             PUSH   DSU                                      PL08D
 5893    REF   1               34,2720    30076 0                    EPSILN1
 5894                          34,2721    71240 1             BMN    DLOAD
 5895    REF   1               34,2722    70737 0                    CSI/SOL
 5896                          34,2723    50025 0             DSU    BMN
 5897    REF   1               34,2724    30106 0                    DELMAX1
 5898    REF   1               34,2725    70732 0                    CSISTEP
 5899                          34,2726    75345 1             DLOAD  SIGN
 5900    REF   2  LAST  640    34,2727    30106 0                    DELMAX1
 5901    REF  13  LAST  640    34,2730    03612 1                    DELDV
 5902    REF  14  LAST  640    34,2731    03612 1             STORE  DELDV
 5903                          34,2732    45345 1  CSISTEP    DLOAD  DSU
 5904    REF  15  LAST  640    34,2733    03574 1                    DELVCSI
 5905    REF  15  LAST  640    34,2734    03612 1                    DELDV
 5906    REF  16  LAST  640    34,2735    37574 0             STCALL DELVCSI
 5907   REF    3  LAST  640   34,2736   70165 1                      CSI/B1
 5908                         34,2737   77145 1   CSI/SOL   DLOAD    AXT,2
 5909   REF    2  LAST  634   34,2740   03602 0                      POSTCSI
 5910                         34,2741   00002 0                      2
 5911                         34,2742   77750 0             LXA,1
 5912   REF    4  LAST  634   34,2743   02776 0                      PTX1
 5913                         34,2744   50023 0             DSU*     BMN
 5914   REF    1              34,2745   30072 1                      PMINE -2,1
 5915   REF    5  LAST  636   34,2746   70776 0                      SCNDSOL
 5916                         34,2747   71374 1             AXT,2    DLOAD
 5917                         34,2750   00003 1                      3
 5918   REF    3  LAST  637   34,2751   03604 0                      POSTCDH
 5919                         34,2752   50023 0             DSU*     BMN
 5920   REF    2  LAST  641   34,2753   30072 1                      PMINE -2,1
 5921   REF    6  LAST  641   34,2754   70776 0                      SCNDSOL
 5922                         34,2755   45345 1             DLOAD    DSU
 5923   REF    8  LAST  637   34,2756   01777 1                      TCDH
 5924   REF   11  LAST  636   34,2757   03634 0                      TCSI
 5925   REF    6  LAST  628   34,2760   02253 1             STORE    T1TOT2
 5926                         34,2761   45374 0             AXT,2    DSU
 5927                         34,2762   00004 0                      4
 5928   REF    1              34,2763   30112 0                      TMIN
 5929                         34,2764   77040 0             BMN      AXT,2
 5930   REF    7  LAST  641   34,2765   70776 0                      SCNDSOL
 5931                         34,2766   00005 1                      5
 5932                         34,2767   45345 1             DLOAD    DSU
 5933   REF   12  LAST  637   34,2770   03636 1                      TTPI
 5934   REF    9  LAST  641   34,2771   01777 1                      TCDH
 5935   REF    5  LAST  628   34,2772   02255 1             STORE    T2TOT3
 5936                         34,2773   51025 1             DSU      BPL
 5937   REF    2  LAST  641   34,2774   30112 0                      TMIN
 5938   REF    1              34,2775   72152 1                      P32/P72C
 5939                         34,2776   43014 0   SCNDSOL   BON      BOFF
 5940   REF    7  LAST  640   34,2777   03302 0                      S32.1F3A
 5941   REF    1              34,3000   72040 0                      ALMXIT
 5942   REF    7  LAST  640   34,3001   03343 0                      S32.1F3B
 5943   REF    2  LAST  641   34,3002   72040 0                      ALMXIT
 5944                         34,3003   71334 0             SXA,2    DLOAD
 5945   REF    5  LAST  633   34,3004   03613 0                      CSIALRM
 5946   REF    8  LAST  636   34,3005   32420 0                      P30ZERO
 5947                         34,3006   43014 0             CLEAR    SET
 5948   REF    4  LAST  634   34,3007   03260 0                      S32.1F1
 5949   REF    4  LAST  639   34,3010   03061 0                      S32.1F2
 5950                         34,3011   43014 0             CLEAR    CLEAR
 5951   REF    8  LAST  641   34,3012   03262 1                      S32.1F3A
 5952   REF    8  LAST  641   34,3013   03263 0                      S32.1F3B
 5953   REF    5  LAST  638   34,3014   37606 0             STCALL   LOOPCT
 5954   REF    1              34,3015   70125 0                      CSI/B
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P6000     ..... ADVANCE     .....

R6050     SUBROUTINES USED

R6051            PRECSET
R6052            ROTATE

 6100                                34,3016   71220 1  ADVANCE   STQ      DLOAD
 6101     REF   9  LAST  632         34,3017   03470 1                     SUBEXIT
 6102     REF  12  LAST  627         34,3020   03442 0                     TIG
 6103     REF  23  LAST  622         34,3021   34041 0            STCALL   TDEC1
 6104     REF   2  LAST  622         34,3022   46360 0                     PRECSET
 6105                                34,3023   77214 0            SET      VLOAD
 61055    REF   2  LAST  615         34,3024   01067 1                     XDELVFLG
 6106     REF   2  LAST  638         34,3025   03560 1                     VPASS3
 6107     REF   4  LAST  637         34,3026   03530 1            STORE    VPASS2
 6108     REF   5  LAST  636         34,3027   27506 1            STOVL    VPASS1
 6109     REF   5  LAST  638         34,3030   03552 0                     RPASS3
 6110     REF   4  LAST  637         34,3031   03522 1            STORE    RPASS2
 6111     REF   4  LAST  637         34,3032   03500 1            STORE    RPASS1
 6112                                34,3033   47256 0            UNIT     VXV
 6113     REF   6  LAST  642         34,3034   03506 1                     VPASS1
 6114                                34,3035   77656 1            UNIT
 6115     REF   5  LAST  637         34,3036   26261 0            STOVL    UP1
 6116     REF   7  LAST  638         34,3037   03536 1                     RACT3
 6117     REF   5  LAST  617         34,3040   37642 0            STCALL   RTIG
 6118     REF   1                    34,3041   71052 0                     ROTATE
 6119     REF   7  LAST  637         34,3042   02311 0            STORE    RACT2
 6120     REF  10  LAST  636         34,3043   26303 0            STOVL    RACT1
 6121     REF   6  LAST  637         34,3044   03544 1                     VACT3
 6122     REF   4  LAST  617         34,3045   37650 0            STCALL   VTIG
 6123     REF   2  LAST  642         34,3046   71052 0                     ROTATE
 6124     REF   2  LAST  636         34,3047   03514 1            STORE    VACT2
 6125     REF   4  LAST  634         34,3050   37472 1            STCALL   VACT1
 6126     REF  10  LAST  642         34,3051   03470 1                     SUBEXIT
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P6200     ..... ROTATE     .....

 6300                            34,3052    41406 0  ROTATE    PUSH     PUSH
 6301                            34,3053    74241 0            DOT      VXSC
 6302    REF    6  LAST   642    34,3054    02261 0                     UP1
 6303    REF    7  LAST   643    34,3055    02261 0                     UP1
 6304                            34,3056    51352 1            VSL2     BVSU
 6305                            34,3057    63256 0            UNIT     PDVL
 6306                            34,3060    74246 1            ABVAL    VXSC
 6307                            34,3061    43572 0            VSL1     RVQ
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P7000    ..... INTINTNA  .....

 7100                           34,3062    65325 0  INTINT2C PDDL    PDDL
 7101   REF  12  LAST  641      34,3063    03634 0                   TCSI
 7102   REF  10  LAST  641      34,3064    01777 1                   TCDH
 7103                           34,3065    41525 0           PDDL    PUSH
 7104   REF   3  LAST  637      34,3066    33732 1                   TWOPI
 7105                           34,3067    77650 1           GOTO
 7106   REF   3  LAST  637      34,3070    73466 1                   INTINT
 7107                           34,3071    65325 0  INTINT3P PDDL    PDDL
 7108   REF  11  LAST  644      34,3072    01777 1                   TCDH
 7109   REF  13  LAST  641      34,3073    03636 1                   TTPI
 7110                           34,3074    41525 0           PDDL    PUSH
 7111   REF   9  LAST  641      34,3075    32420 0                   P30ZERO
 7112                           34,3076    77650 1           GOTO
 7113   REF   4  LAST  644      34,3077    73466 1                   INTINT
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P7400    ..... S32/33.1  .....

R7450    SUBROUTINES USED

R7451           S32/33.X

 7500             .              34,3100    76020 1   S32/33.1 STQ     AXT,1
 75001  REF  11  LAST   642      34,3101    03470 1                    SUBEXIT
 75002                           34,3102    01521 0            VN      0681
 75003                           34,3103    77624 1            CALL
 75004  REF   2  LAST   623      34,3104    72370 0                    DISDVLVC
 7501                            34,3105    77624 1            CALL
 7502   REF   2  LAST   630      34,3106    71120 1                    S32/33.X
 7503                            34,3107    61375 1            VLOAD   VXM
 7504   REF  14  LAST   630      34,3110    03434 1                    DELVLVC
 7505                            34,3111    00001 0                    0D
 75051                           34,3112    77772 0            VSL1
 7506   REF   8  LAST   617      34,3113    03656 1            STORE   DELVSIN
 7507                            34,3114    51406 1            PUSH    ABVAL
 7508   REF   3  LAST   617      34,3115    27664 0            STOVL   DELVSAB
 7509                            34,3116    77650 1            GOTO
 7510   REF  12  LAST   645      34,3117    03470 1                    SUBEXIT
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P7800    ..... S32/33.X  .....

 7900                              34,3120   77201 1   S32/33.X SETPD   VLOAD
 7901                              34,3121   00007 0                    6D
 7902    REF    8   LAST   643     34,3122   02261 0                    UP1
 7903                              34,3123   63276 1            VCOMP   PDVL
 7904    REF   11   LAST   642     34,3124   02303 0                    RACT1
 7905                              34,3125   57456 1            UNIT    VCOMP
 7906                              34,3126   47206 0            PUSH    VXV
 7907    REF    9   LAST   646     34,3127   02261 0                    UP1
 7908                              34,3130   77772 0            VSL1
 7909                              34,3131   00001 0            STORE   0D
 7910                              34,3132   77616 0            RVQ
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P8000    ..... CDHMVR    .....

R8050    SUBROUTINES USED

R8051            VECSHIFT
R8052            TIMETHET
R8053            SHIFTR1

 8100                           34,3133    77220 1  CDHMVR    STQ      VLOAD
 8101    REF  13  LAST   645    34,3134    03470 1                     SUBEXIT
 8102    REF   8  LAST   642    34,3135    02311 0                     RACT2
 8103                           34,3136    53406 0            PUSH     UNIT
 8104    REF   1                34,3137    27544 1            STOVL    UNVEC                  UR SUB A
 8105    REF   5  LAST   642    34,3140    03522 1                     RPASS2
 8106                           34,3141    50256 0            UNIT     DOT
 8107    REF   2  LAST   647    34,3142    03544 1                     UNVEC
 8108                           34,3143    72406 0            PUSH     SL1
 8109    REF   3  LAST   404    34,3144    16732 0            STODL    CSTH
 8110                           34,3145    65316 0            DSQ      PDDL
 8111    REF   4  LAST   586    34,3146    06512 1                     DP1/4TH
 8112                           34,3147    45302 1            SR2      DSU
 8113                           34,3150    72566 1            SQRT     SL1
 8114                           34,3151    57515 1            PDVL     VCOMP
 8115                           34,3152    77635 1            VXV
 8116    REF   6  LAST   647    34,3153    03522 1                     RPASS2
 8117                           34,3154    65241 0            DOT      PDDL
 8118    REF  10  LAST   646    34,3155    02261 0                     UP1
 8119                           34,3156    45565 0            SIGN     STADR
 8120    REF   5  LAST   636    34,3157    51047 0            STOVL    SNTH
 8121    REF   7  LAST   647    34,3160    03522 1                     RPASS2
 8122                           34,3161    45115 0            PDVL     CALL
 8123    REF   5  LAST   642    34,3162    03530 1                     VPASS2
 8124    REF   3  LAST   636    34,3163    46416 0                     VECSHIFT
 8125    REF   5  LAST   636    34,3164    26744 1            STOVL    VVEC
 8126                           34,3165    77614 1            CLEAR
 8127    REF   5  LAST   636    34,3166    03666 1                     RVSW
 8128    REF [illegible]  LAST   636    34,3167    36655 1            STCALL   RVEC
 8129    REF   4  LAST   636    34,3170    24732 1                     TIMETHET
 8130                           34,3171    53754 1            LXA,2    VSL*
 8131    REF   2  LAST   617    34,3172    02777 1                     RTX2
 8132                           34,3173    57576 1                     0,2
 8133                           34,3174    00023 0            STORE    18D
 8134                           34,3175    76441 1            DOT      SL1R
 8135    REF   3  LAST   647    34,3176    03544 1                     UNVEC
 8136                           34,3177    51515 1            PDVL     ABVAL               0D = V SUB PV
 8137                           34,3200    63257 1            SL*      PDVL
 8138                           34,3201    57576 1                     0,2
 8139    REF   9  LAST   647    34,3202    02311 0                     RACT2
 8140                           34,3203    65246 1            ABVAL    PDDL                2D = LENGTH OF R SUB A
 8141                           34,3204    77625 0            DSU
 8142                              34,3205   00003 1             02D
 8143   REF   4  LAST  316   34,3206   17600 1      STODL  DIFFALT        DELTA H IN METERS            B+29
 8144   REF   2  LAST  125   34,3207   02742 1             1A
 8145                              34,3210   65301 0      NORM   PDDL           2 - R V**/MU                          04D
 8146   REF  10  LAST  639   34,3211   00047 1             X1
 8147   REF   3  LAST  635   34,3212   00041 1             S1
 8148                              34,3213   77624 1      CALL
 8149   REF   7  LAST  637   34,3214   46426 0             SHIFTR1
 8150                              34,3215   56362 0      SR1R   DDV
 8151                              34,3216   41457 1      SL*    PUSH
 8152                              34,3217   20174 1             0 -5,1
 8153                              34,3220   65225 1      DSU    PDDL           A SUB A                      B+29       04D
 8154   REF   5  LAST  648   34,3221   03600 1             DIFFALT
 8155                              34,3222   56302 0      SR2    DDV            A SUB P                     B+31
 8156                              34,3223   00005 1             04D                                         B+2
 8157                              34,3224   75406 1      PUSH   SQRT              A SUB P/A SUB A            06D
 8158                              34,3225   41275 1      DMPR   DMP
 8159                              34,3226   00007 0             06D
 8160                              34,3227   00001 0             00D
 8161                              34,3230   65272 0      SL3R   PDDL           V SUB AV METERS/CS           B+7        08D
 8162                              34,3231   00003 1             02D            R SUB A MAGNITUDE    B+29
 8163                              34,3232   65301 0      NORM   PDDL
 8164   REF  11  LAST  648   34,3233   00047 1             X1
 8165   REF   2  LAST  633   34,3234   02321 0             RTMU
 8166                              34,3235   56342 1      SR1    DDV            2MU   B+38
 8167                              34,3236   65257 1      SL*    PDDL              2 MU/R SUBAA      B+14      10D
 8168                              34,3237   20174 1             0 -5,1
 8169                              34,3240   00005 1             04D            ASUBA                       B+29
 8170                              34,3241   65301 0      NORM   PDDL
 8171   REF   7  LAST  640   34,3242   00050 1             X2
 8172   REF   3  LAST  648   34,3243   02321 0             RTMU
 8173                              34,3244   56342 1      SR1    DDV
 8174                              34,3245   44257 1      SL*    BDSU
 8175                              34,3246   57604 1             0 -6,2           2U/R - U/A   B+14 (METERS/CS)SQ
 8176                              34,3247   63525 0      PDDL   DSQ                                                  10D
 8177                              34,3250   00011 1             08D
 8178                              34,3251   75421 1      BDSU   SQRT
 8179                              34,3252   47315 0      PDVL   VXV              SQRT(MU(2/R SUB A-1/A SUB A)-VSUBA2)10D
 8180   REF  11  LAST  647   34,3253   02261 0             UP1
 8181   REF   4  LAST  647   34,3254   03544 1             UNVEC
 8182                              34,3255   74256 0      UNIT   VXSC
 8183                              34,3256   00013 0             10D
 8184                              34,3257   74315 0      PDVL   VXSC
 8185   REF   5  LAST  648   34,3260   03544 1             UNVEC
 8186                              34,3261   00011 1             08D
 8187                              34,3262   76455 1      VAD    VSL1
 8188                              34,3263   77626 0      STADR
 8189   REF   7  LAST  642   34,3264   74233 0      STORE  VACT3
 8190                              34,3265   77651 0      VSU
 8191   REF   3  LAST  642   34,3266   03514 1             VACT2
 8199     REF    6  LAST  628     34,3267    36275 1            STCALL  DELVEET2           DELTA VCDH - REFERENCE COORDINATES
 8200     REF   14  LAST  647     34,3270    03470 1                    SUBEXIT
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P8201    ..... COMPTGO    .....

R8202    SUBROUTINES USED

R8203                 CLOKTASK
R8204                 2PHSCHNG

 8205                          35,2432                        BANK    35
 8206    REF   2  LAST  621    35,2000                        SETLOC  CSI/CDH
 8207                          35,2432                        BANK

 8208    REF   1               E7,1465                        EBANK=  RTRN

 8209    REF   1                                              COUNT*  $$/P3575

 8210                          35,2432  0 0006 1  COMPTGO     EXTEND
 8211    REF   2  LAST  650    35,2433  23'465 1              QXCH    RTRN
 8212    REF 127  LAST  606    35,2434  3 4755 1              CAF     ZERO
 8213    REF   2  LAST  106    35,2435  55'163 0              TS      DISPDEX
 8214    REF  35  LAST  604    35,2436  3 4752 0              CAF     BIT2
 8215                          35,2437  0 0004 0              INHINT
 8216    REF  29  LAST  604    35,2440  0 5203 0              TC      WAITLIST
 8217    REF   2  LAST  242    E7,1455                        EBANK=  WHICH
 8218    REF   2  LAST  243    35,2441   02717 1              2CADR   CLOKTASK
 8218                          35,2442   74067 0
 8219    REF   3  LAST  502    35,2443  0 5327 1              TC      2PHSCHNG
 8220                          35,2444   40036 0              OCT     40036
 8221                          35,2445   05024 1              OCT     05024
 8222                          35,2446   13000 0              OCT     13000
 8223    REF   3  LAST  650    35,2447  0 1465 1              TC      RTRN
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P0001    GENERAL  LAMBERT AIMPOINT GUIDANCE **

R0002    WRITTEN  BY RAMA M AIYAWAR

R0003    PROGRAM P-31 DESCRIPTION **

R0004    1.         TO ACCEPT TARGETING PARAMETERS OBTAINED FROM A SOURCE EXTERNAL
R0005               TO THE LEM AND COMPUTE THERE FROM THE REQUIRED-VELOCITY AND
R0006               OTHER INITIAL CONDITIONS REQUIRED BY LM FOR DESIRED MANEUVER.
R0007               THE TARGETING PARAMETERS ARE TIG (TIME OF IGNITION), TARGET
R0008               VECTOR (RTARG), AND THE TIME FROM TIG UNTIL THE TARGET IS
R0009               REACHED(DELLT4),DESIRED TIME OF FLIGHT FROM  RINIT TO RTARG..

R0010    ASSUMPTIONS **

R0011    1.         THE TARGET PARAMETERS MAY HAVE BEEN LOADED PRIOR TO THE
R0012               EXECUTION OF THIS PROGRAM.
R0013    2.         THIS PROGRAM IS APPLICABLE IN EITHER EARTH OR LUNAR ORBIT.
R0014    3.         THIS PROGRAM IS DESIGNED FOR ONE-MAN OPERATION, AND SHOULD
R0015               BE SELECTED BY THE ASTRONAUT BY DSKY ENTRY  V37 E31.

R0016    SUBROUTINES USED **

R0017    MANUPARM, TTG/N35, R02BOTH, MIDGIM, DISPMGA, FLAGDOWN, BANKCALL,
R0018    GOTOPOOH, ENDOFJOB, PHASCHNG, GOFLASHR, GOFLASH.

R0019    MANUPARM           CALCULATES APOGEE, PERIGEE ALTITUDES AND DELTAV DESIRED
R0020                       FOR THE MANEUVER.

R0021    TTG/N35            CLOCKTASK - UPDATES CLOCK.

R0022    MIDGIM             CALCULATES MIDDLE GIMBAL ANGLE FOR DISPLAY.

R0023    R02BOTH            IMU - STATUS CHECK ROUTINE.

R0024    DISPLAYS USED IN P-31LM **

R0025    V06N33             DISPLAY SOTRED  TIG (IN HRS. MINS. SECS)
R0026    V06N42             DISPLAY APOGEE, PERIGEE, DELTAV.
R0027    V16N35             DISPLAY TIME FROM TIG.
R0028    V06N45             TIME FROM IGNITION AND MIDDLE GIMBAL ANGLE.

R0029    ERASABLE INITIALIZATION REQUIRED **

R0030    TIG                TIME OF IGNITION     DP     (B+28) CS.

R0031    DELLT4             DESIRED TIME OF FLIGHT    DP  (B+28) CS
R0032                       FROM RINIT TO RTARG .
R0033    RTARG              RADIUS VECTOR OF TARGET POSITION VECTOR
R0034                       RADIUS VECTOR    SCALED TO  (B+29)METERS IF EARTH ORBIT
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R0035                       RADIUS VECTOR SCALED TO    (B+27)METERS IF MOON  ORBIT

R0036    OUTPUT   **

R0037    HAPO               APOGEE ALTITUDE
R0038    HPER               PERIGEE ALTITUDE
R0039    VGDISP             MAG.OF DELTAV FOR DISPLAY ,SCALING       B+7 M/CS EARTH
R0040                       MAG.OF DELTAV FOR DISPLAY,SCALING        B+5 M/CS MOON

R0041    MIDGIM             MIDDLE GIMBAL ANGLE
R0042    XDELVFLG           RESETS XDELVFLG FOR LAMBERT VG COMPUTATIONS

R0043    ALARMS OR ABORTS  NONE **

R0044    RESTARTS  ARE VIA GROUP 4 **

 0045    REF   1                35,2000                          SETLOC GLM
 0046                           35,2450                          BANK

 0047    REF  15  LAST  649     E7,1470                          EBANK= SUBEXIT

 0048    REF   1                                                 COUNT* $$/P31
 0049    REF   3  LAST  627     35,2450  0 2361 1  P31           TC     P20FLGON
 0051    REF   2  LAST  614     35,2451  3 2025 1                CAF    V06N33          TIG
 0052    REF  10  LAST  630     35,2452  0 3712 0                TC     VNPOOH
 0053    REF  70  LAST  630     35,2453  0 6037 0                TC     INTPRET
 0054                           35,2454   71214 0                CLEAR  DLOAD
 0055    REF   9  LAST  629     35,2455   00670 0                       UPDATFLG
 0056    REF  13  LAST  642     35,2456   03442 0                       TIG
 0057    REF  24  LAST  642     35,2457   34041 0                STCALL TDEC1           INTEGRATE STATE VECTORS TO TIG
 0058    REF   4  LAST  616     35,2460   27057 0                       LEMPREC
 0059                           35,2461   40375 1                VLOAD  SETPD
 0060    REF  11  LAST  617     35,2462   00001 0                       RATT
 0061                           35,2463   00001 0                       0D
 0062    REF   6  LAST  642     35,2464   03642 1                STORE  RTIG
 0063    REF   1                35,2465   26323 1                STOVL  RINIT
 0064    REF   9  LAST  637     35,2466   00007 0                       VATT
 0065    REF   5  LAST  642     35,2467   03650 1                STORE  VTIG
 0066    REF   1                35,2470   16331 1                STODL  VINIT
 0067    REF  10  LAST  644     35,2471   32420 0                       P30ZERO
 0068                           35,2472   65206 0                PUSH   PDDL            E4 AND NUMIT = 0
 0069    REF   3  LAST  198     35,2473   03452 1                       DELLT4
 0070                           35,2474   66015 0                DAD    SXA,1
 0071    REF  14  LAST  652     35,2475   03442 0                       TIG
 0072    REF   5  LAST  641     35,2476   02776 0                       RTX1
 0073    REF   4  LAST  198     35,2477   03631 0                STORE  TPASS4
 0074                           35,2500   45134 0                SXA,2  CALL
 0075    REF   3  LAST  647     35,2501   02777 1                       RTX2
 0076    REF   1                35,2502   22000 1                       INITVEL
 0077                           35,2503   41575 0                VLOAD  PUSH
 0078   REF   3  LAST  198   35,2504   02366 0                     DELVEET3
 0079   REF   9  LAST  645   35,2505   03656 1            STORE    DELVSIN
 0080                        35,2506   43046 1            ABVAL    CLEAR
 0081   REF   3  LAST  642   35,2507   01267 0                     XDELVFLG
 0082   REF   3  LAST  314   35,2510   37664 1            STCALL   VGDISP
 0083   REF   1              35,2511   15733 1                     GET.LVC
 0084                        35,2512   63375 0            VLOAD    PDVL
 0085   REF   7  LAST  652   35,2513   03642 1                     RTIG
 0086   REF   1              35,2514   02337 1                     VIPRIME
 0087                        35,2515   77624 1            CALL
 0088   REF   3  LAST  637   35,2516   46316 1                     PERIAPO1
 0089                        35,2517   77624 1            CALL
 0090   REF   8  LAST  648   35,2520   46426 0                     SHIFTR1
 00902                       35,2521   77624 1            CALL                  LIMIT DISPLAY TO 9999.9 N. MI.
 00904  REF   3  LAST  617   35,2522   45636 0                     MAXCHK
 0091   REF   3  LAST  617   35,2523   16321 0            STODL    HPER
 0092                        35,2524   00005 1                     4D
 0093                        35,2525   77624 1            CALL
 0094   REF   9  LAST  653   35,2526   46426 0                     SHIFTR1
 00942                       35,2527   77624 1            CALL                  LIMIT DISPLAY TO 9999.9 N. MI.
 00944  REF   4  LAST  653   35,2530   45636 0                     MAXCHK
 0095   REF   5  LAST  617   35,2531   02317 0            STORE    HAPO
 0096                        35,2532   77776 1            EXIT
 0097   REF   2  LAST  614   35,2533 3 3727 0             CAF      V06N81               DELVLVC
 0098   REF  11  LAST  652   35,2534 0 3712 0             TC       VNPOOH
 0099   REF   2  LAST  614   35,2535 3 2026 1             CAF      V06N42               HAPO, HPER, VGDISP
 0100   REF  12  LAST  653   35,2536 0 3712 0             TC       VNPOOH
 0101   REF  71  LAST  652   35,2537 0 6037 0             TC       INTPRET
 0102                        35,2540   45014 0  REVN1645  SET      CALL                 TRKMKCNT, TTOGO, +MGA
 0103   REF   3  LAST  628   35,2541   01071 0                     FINALFLG
 0104   REF   3  LAST  628   35,2542   73606 0                     VN1645
 0105                        35,2543   77650 1            GOTO
 0106   REF   2  LAST  615   35,2544   72540 0                     REVN1645

*** END OF LEMP30S .103 ***
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R0001   GROUND TRACKING DETERMINATION PROGRAM P21
R0002   PROGRAM DESCRIPTION
R0003   MOD NO - 1
R0004   MOD BY - N.M.NEVILLE
R0005   FUNCTIONAL DECRIPTION-
R0006
R0007   TO PROVIDE THE ASTRONAUT DETAILS OF THE LM OR CSM GROUND TRACK WITHOUT
R0008   THE NEED FOR GROUND COMMUNICATION (REQUESTED BY DSKY).
R0009   CALLING SEQUENCE -
R0010
R0011   ASTRONAUT REQUEST THROUGH DSKY V37E21E
R0012   SUBROUTINES CALLED-
R0013
R0014   GOPERF4
R0015   GOFLASH
R0016   THISPREC
R0017   OTHPREC
R0018   LAT-LONG
R0019   NORMAL EXIT MODES-
R0020
R0021   ASTRONAUT REQUEST TROUGH DSKY TO TERMINATE PROGRAM V34E
R0022   ALARM OR ABORT EXIT MODES-
R0023
R0024   NONE
R0025   OUTPUT -
R0026
R0027   OCTAL DISPLAY OF OPTION CODE AND VEHICLE WHOSE GROUND TRACK IS TO BE
R0028   COMPUTED
R0029             OPTION CODE  00002
R0030             THIS         00001
R0031             OTHER        00002
R0032   DECIMAL DISPLAY OF TIME TO BE INTEGRATED TO HOURS , MINUTES , SECONDS
R0033   DECIMAL DISPLAY OF LAT,LONG,ALT
R0034   ERASABLE INITIALIZATION REQUIRED
R0035
R0036   AXO       2DEC    4.652459653 E-5   RADIANS        %68-69 CONSTANTS"
R0037
R0038   -AYO      2DEC    2.147535898 E-5   RADIANS
R0039
R0040   AZO       2DEC    .7753206164       REVOLUTIONS
R0041   FOR LUNAR ORBITS 504LM VECTOR IS NEEDED
R0042
R0043   504LM     2DEC    -2.700340600 E-5  RADIANS
R0044
R0045   504LM _2  2DEC    -7.514128400 E-4  RADIANS
R0046
R0047   504LM _4  2DEC    _2.553198641 E-4  RADIANS
R0048
R0049   NONE
R0050   DEBRIS
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R0051
R0052   CENTRALS-A,Q,L
R0053   OTHER-THOSE USED BY THE ABOVE LISTED SUBROUTINES
R0054   SEE LEMPREC,LAT-LONG
 0055   REF   8  LAST  492   30,2000                         SBANK= LOWSUPER          FOR LOW 2CADR'S.

 0056                        33,2200                         BANK    33
 0057   REF   8  LAST  605   24,2000                         SETLOC  P20S
 0058                        24,3505                         BANK

 0059   REF   4  LAST  240   E7,1762                         EBANK=  P21TIME
 0060   REF   1                                              COUNT*  $$/P21
 0061   REF  80  LAST  612   24,3505  3 4753 1  PROG21       CAF     ONE
 0062   REF   3  LAST  493   24,3506  55'145 1               TS      OPTION2          ASSUMED VEHICLE IS LM , R2 = 00001
 0063   REF  36  LAST  650   24,3507  3 4752 0               CAF     BIT2              OPTION 2
 0064   REF 160  LAST  627   24,3510  0 4616 1               TC      BANKCALL
 0065   REF   2  LAST  493   24,3511   20633 0               CADR    GOPERF4
 0066   REF   9  LAST  627   24,3512  0 6001 0               TC      GOTOPOOH         TERMINATE
 0067                        24,3513  0 3515 0               TC      +2               PROCEED VALUE OF ASSUMED VEHICLE OK
 0068                        24,3514  0 3507 0               TC      -5               R2 LOADED THROUGH DSKY
 0069   REF   1              24,3515  3 3665 1  P21PROG1     CAF     V6N34            LOAD DESIRED TIME OF LAT-LONG.
 0070   REF 161  LAST  655   24,3516  0 4616 1               TC      BANKCALL
 0071   REF  11  LAST  627   24,3517   20476 0               CADR    GOFLASH
 0072   REF  10  LAST  655   24,3520  0 6001 0               TC      GOTOPOOH         TERM
 0073                        24,3521  0 3523 0               TC      +2               PROCEED VALUES OK
 0074                        24,3522  0 3515 0               TC      -5               TIME LOADED THROUGH DSKY
 0075   REF  72  LAST  653   24,3523  0 6037 0               TC      INTPRET
 0076                        24,3524   77745 1               DLOAD
 0077   REF  23  LAST  571   24,3525   01046 1                       DSPTEM1
 0078   REF  25  LAST  652   24,3526   34041 0               STCALL  TDEC1            INTEGRATE TO TIME SPECIFIED IN TDEC
 0079   REF  18  LAST  609   24,3527   27414 0                       INTSTALL
 0080                        24,3530   43014 0               BON     CLEAR
 0081   REF   1              24,3531   00304 0                       P21FLAG
 0082   REF   1              24,3532   51550 0                       P21CONT          ON---RECYCLE USING BASE VECTOR
 0083   REF  17  LAST  583   24,3533   01674 0                       VINTFLAG         OFF--1ST PASS CALL BASE VECTOR
 0084                        24,3534   70535 0               SLOAD   SR1
 0085   REF   4  LAST  655   24,3535   01146 0                       OPTION2
 0086                        24,3536   43030 0               BHIZ    SET
 0087                        24,3537   51541 0                       +2               ZERO--THIS VEHICLE(LM)
 0088   REF  18  LAST  655   24,3540   01474 1                       VINTFLAG         ONE--OTHER VEHICLE(CM)
 0089                        24,3541   43014 0               CLEAR   CLEAR
 0090   REF  12  LAST  583   24,3542   01676 1                       DIMOFLAG
 0091   REF   6  LAST  583   24,3543   01673 1                       INTYPFLG         PRECISION
 0092                        24,3544   77624 1               CALL
 0093   REF   9  LAST  584   24,3545   27134 1                       INTEGRV          CALCULATE
 0094                        24,3546   77650 1               GOTO                     -AND
 0095   REF   1              24,3547   51571 0                       P21VSAVE         -SAVE BASE VECTOR
 0096                        24,3550   77775 1  P21CONT      VLOAD
 0097   REF   2  LAST  148   24,3551   03676 0                       P21BASER         RECYCLE--INTEG FROM BASE VECTOR
 0098   REF   5  LAST  495   24,3552   25535 0               STOVL   RCV              --POS
 0099   REF   2  LAST  148    24,3553   03704 1                     P21BASEV
 0100   REF   4  LAST  321    24,3554   15543 1            STODL    VCV               --VEL
 0101   REF   5  LAST  655    24,3555   03763 0                     P21TIME
 0102   REF   5  LAST  495    24,3556   01517 0            STORE    TET               --TIME
 0103                         24,3557   43014 0            CLEAR    CLEAR
 0104   REF  13  LAST  655    24,3560   01676 1                     DIMOFLAG
 0105   REF   1               24,3561   00263 0                     MOONFLAG
 0106                         24,3562   53135 0            SLOAD    BZE
 0107   REF   1               24,3563   01164 0                     P21ORIG
 0108                         24,3564   51567 1                     +3                ZERO=EARTH
 0109                         24,3565   77614 1            SET                        ---2=MOON
 0110   REF   2  LAST  656    24,3566   00063 1                     MOONFLAG
 0111                         24,3567   77624 1    +3      CALL
 0112   REF   1               24,3570   27107 1                     INTEGRVS
 0113                         24,3571   77745 1  P21VSAVE  CLOAD                      SAVE CURRENT BASEVECTOR
 0114   REF   7  LAST  589    24,3572   00015 0                     TAT
 0115   REF   6  LAST  656    24,3573   27763 0            STOVL    P21TIME           --TIME
 0116   REF   4  LAST  494    24,3574   00017 1                     RATT1
 0117   REF   3  LAST  655    24,3575   27676 0            STOVL    P21BASER          --POS B-29 OR B-27
 0118   REF   7  LAST  494    24,3576   00025 0                     VATT1
 0119   REF   3  LAST  656    24,3577   03704 1            STORE    P21BASEV          --VEL B-07 OR B-05
 01191                        24,3600   53646 0            ABVAL    SL*
 01192                        24,3601   57576 1                     0,2
 01193  REF   3  LAST  317    24,3602   27712 0            STOVL    P21VEL            VEL/ FOR N91 DISP
 01194  REF  12  LAST  652    24,3603   00001 0                     RATT
 01195                        24,3604   50256 0            UNIT     DOT
 01196  REF  10  LAST  652    24,3605   00007 0                     VATT               U(R).V
 01197                        24,3606   57471 1            DDV      ASIN              U(R).U(V)
 01198  REF   4  LAST  656    24,3607   03712 0                     P21VEL
 01199  REF   3  LAST  317    24,3610   03714 0            STORE    P21GAM            SIN-1 U(R).U(V) , -90 TO +90
 0120                         24,3611   67334 1            SXA,2    SLOAD
 0121   REF   2  LAST  656    24,3612   01163 1                     P21ORIG           0=EARTH
 0122   REF   5  LAST  655    24,3613   01146 0                     OPTION2
 0123                         24,3614   46142 1            SR1      BHIZ
 0124                         24,3615   51620 1                     +3
 0125                         24,3616   77650 1            GOTO
 0126                         24,3617   51623 1                     +4
 0127                         24,3620   77614 1    +3      BON
 0128   REF  13  LAST  609    24,3621   04307 1                     SURFFLAG
 0129   REF   1               24,3622   51625 1                     P21DSP
 0130                         24,3623   77614 1    +4      SET
 0131   REF   2  LAST  655    24,3624   00064 0                     P21FLAG
 0132                         24,3625   67214 1  P21DSP    CLEAR    SLOAD             GENERATE DISPLAY DATA
 0133   REF   1               24,3626   01663 0                     LUNAFLAG
 0134   REF   8  LAST  648    24,3627   00050 1                     X2
 0135                         24,3630   43054 1            BZE      SET
 0136                         24,3631   51633 0                     +2                0=EARTH
 0137   REF   2  LAST  656    24,3632   01463 1                     LUNAFLAG
 0138                         24,3633   77775 1            VLOAD
 0139   REF  13  LAST  656    24,3634   00001 0                     RATT
 0140   REF    2  LAST  114   24,3635   16032 1             STODL   ALPHAV
 0141   REF    8  LAST  656   24,3636   00015 0                     TAT
 0142                         24,3637   45014 0             CLEAR   CALL
 0143   REF    1              24,3640   00662 0                     ERADFLAG
 0144   REF    1              24,3641   26351 1                     LAT-LONG
 01442                        24,3642   77605 1             DMP                         MPAC = ALT,METERS B-29
 01443  REF    1              24,3643   11667 0                     K.01
 01445  REF    2  LAST  317   24,3644   03716 1             STORE   P21ALT              ALT/100 FOR N91 DISP
 0145                         24,3645   77776 1             EXIT
 0146   REF    1              24,3646  3 3664 0             CAF     V06N43              DISPLAY LAT,LONG,ALT
 0147   REF  162  LAST  655   24,3647  0 4616 1             TC      BANKCALL            LAT,LONG = 1/2 REVS B0
 0148   REF   12  LAST  655   24,3650   20476 0             CADR    GOFLASH             ALT = KM  B14
 0149   REF   11  LAST  655   24,3651  0 6001 0             TC      GOTOPOOH            TERM
 0150   REF   12  LAST  657   24,3652  0 6001 0             TC      GOTOPOOH
 0151   REF   73  LAST  655   24,3653  0 6037 0             TC      INTPRET             V32E RECYCLE
 0152                         24,3654   43345 1             DLOAD   DAD
 0153   REF    7  LAST  656   24,3655   03763 0                     P21TIME
 0154   REF    1              24,3656   11663 1                     600SEC              600 SECONDS OR 10 MIN
 0155   REF   24  LAST  655   24,3657   01046 1             STORE   DSPTEM1
 0156                         24,3660   77634 0             RTB
 0157   REF    1              24,3661   51515 1                     P21PROG1
 0158                         24,3662   00003 1   600SEC    2DEC    60000               10 MIN
 0158                         24,3663   25140 0
 0159                         24,3664   01453 1   V06N43    VN      00643
 0160                         24,3665   01442 1   V06N34    VN      00634
 01602                        24,3666   00243 1   K.01      2DEC    .01
 01602                        24,3667   32703 1
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L          P34-P35, P74-P75                                                                  USER'S PAGE NO.   1       EQ S3

R0010      TRANSFER PHASE INITIATION (TPI) PROGRAMS (P34 AND P74)

R0011      MOD NO -1         LOG SECTION - P32-P35, P72-P75
R0012      MOD BY WHITE.P   DATE 1JUNE67

R0013      PURPOSE

R0014              (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0015                  REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE TRANSFER
R0016                  PHASE INITIATION (TPI) MANEUVER, GIVEN -

R0017                  (A) TIME OF IGNITION TIG (TPI) OR THE ELEVATION ANGLE (E) OF
R0018                      THE ACTIVE/PASSIVE VEHICLE LOS AT TIG (TPI).

R0019                  (B) CENTRAL ANGLE OF TRANSFER (CENTANG) FROM TIG (TPI) TO
R0020                      INTERCEPT TIME (TIG (TPF)).

R0021              (2) TO CALCULATE TIG (TPI) GIVEN E OR E GIVEN TIG (TPI).

R0022              (3) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0023                  APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0024              (4) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0025                  VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0026                  ASTRONAUT/GROUND.

R0027              (5) TO STORE THE TPI TARGET PARAMETERS FOR USE BY THE DESIRED
R0028                  THRUSTING PROGRAM.

R0029      ASSUMPTIONS

R0030              (1) LM ONLY - THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF
R0031                  THE CONSTANT DELTA ALTITUDE (CDH) PROGRAM (P33/P73).
R0032                  THEREFORE -

R0033                  (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0034                      BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0035                      A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0036                      HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0037                  (B) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0038                      COMPUTED TO BE GREATER THAN 10 MINUTES.

R0039                  (C) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0040                      ORBITS WAS MINIMIZED.

R0041                  (D) THE PERICENTER ALTITUDES OF ORBITS FOLLOWING CSI AND

R0042                      CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
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R0043                ORBIT OR 85 NM FOR EARTH ORBIT.

R0044             (E) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R0045                 THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
R0046                 MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R0047                 IN AN OUT-OF-PLANE MANEUVER.

R0048         (2) STATE VECTOR UPDATED BY P27 ARE DISALLOWED DURING AUTOMATIC
R0049             STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (4)).

R0050         (3) THIS PROGRAM MUST BE DONE OVER A TRACKING STATION FOR REAL
R0051             TIME GROUND PARTICIPATION IN DATA INPUT AND OUTPUT.  COMPUTED
R0052             VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND.
R0053             THESE STORAGE CAPABILITIES ARE LIMITED ONLY TO THE PARAMETERS
R0054             FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC
R0055             FLIGHT PLAN MANEUVER SEQUENCES.

R0056         (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0057             OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0058             DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0059             PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0060             AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0061             TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0062             MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0063             THRUSTING MANEUVER.

R0064         (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0065         (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0066                 ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0067                 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0068                 CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0069                 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0070                 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0071                 SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0072                 EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0073                 REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0074                 PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0075         (7) ONCE THE PARAMETWRS REQUIRED FOR COMPUTION OF THE MANEUVER
R0076             HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0077             VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0078             THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0079             THROUGH THE USE OF V06N52.

R0080             THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0081             CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
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R0082                 170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0083                 ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0084                 UPON DELTA V AND EXPECTED MANEUVER TIME.

R0085            (6) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0086                     P34 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0087                     P74 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0088     INPUT

R0089            (1) TTPI      TIME OF THE TPI MANEUVER
R0090            (2) ELEV      DESIRED LOS ANGLE AT TPI
R0091            (3) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0092                          TRANSFER FROM TPI TO TIME OF INTERCEPT

R0093     OUTPUT

R0094            (1) TRKMKCNT NUMBER OF MARKS
R0095            (2) TTOGO     TIME TO GO
R0096            (3) +MGA      MIDDLE GIMBAL ANGLE
R0097            (4) TTPI      COMPUTED TIME OF TPI MANEUVER
R0098                 OR
R0099                ELEV      COMPUTED LOS ANGLE AT TPI
R0100            (5) POSTTPI   PERIGEE ALTITUDE AFTER THE TPI MANEUVER
R0101            (6) DELVTPI   MAGNITUDE OF DELTA V AT TPI
R0102            (7) DELVTPF   MAGNITUDE OF DELTA V AT INTERCEPT
R0103            (8) DVLOS     DELTA VELOCITY AT TPI - LINE OF SIGHT
R0104            (9) DELVLVC   DELTA VELOCITY AT TPI - LOCAL VERTICAL COORDINATES

R0105     DOWNLINK

R0114            (1) TTPI      TIME OF THE TPI MANEUVER
R0115            (2) TIG       TIME OF THE TPI MANEUVER
R0116            (3) ELEV      DESIRED LOS ANGLE AT TPI
R0117            (4) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0118                          TRANSFER FROM TPI TO TIME OF INTERCEPT
R0119            (5) DELVEET3 DELTA VELOCITY AT TPI - REFERENCE COORDINATES
R0120            (6) TPASS4    TIME OF INTERCEPT
R0121     COMMUNICATION TO THRUSTING PROGRAMS

R0122            (1) TIG       TIME OF THE TPI MANEUVER
R0123            (2) RTARG     OFFSET TARGET POSITION
R0124            (3) TPASS4    TIME OF INTERCEPT
R0125            (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0126     SUBROUTINES USED

R0127            AVFLAGA
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R0128           AVFLAGP
R0129           VNPOOH
R0130           DISPLAYE
R0131           SELECTMU
R0132           PRECSET
R0133           S33/34.1
R0134           ALARM
R0135           BANKCALL
R0136           GOFLASH
R0137           GOTOPOOH
R0138           TIMETHET
R0139           S34/35.2
R0140           PERIAPO1
R0141           SHIFTR1
R0142           S34/35.5
R0143           VN1645

 0144   REF   3  LAST  650   35,2000                        SETLOC CSI/CDH
 0145                        35,2545                        BANK
 0146   REF  16  LAST  652   E7,1470                        FBANK= SUBEXIT
 0147   REF   1                                             COUNT* $$/P3474
 0148   REF   3  LAST  627   35,2545  0 2347 0  P34         TC     AVFLAGA
 0149   REF   1              35,2546  0 2550 0              TC     P34/P74A
 0150   REF   3  LAST  627   35,2547  0 2354 1  P74         TC     AVFLAGP
 0151   REF   4  LAST  652   35,2550  0 2361 1  P34/P74A    TC     P20FLGON         SET UPDATFLG, TRACKFLG
 01515  REF   2  LAST  622   35,2551  3 3723 1              CAF    V06N37           TTPI
 0152   REF  13  LAST  653   35,2552  0 3712 0              TC     VNPOOH
 01521                       35,2553  0 0006 1              EXTEND
 01522  REF   1              35,2554  3 3746 1              DCA    130DEG
 01523  REF   5  LAST  634   35,2555  53'621 1              DXCH   CENTANG
 01528  REF  11  LAST  652   35,2556  3 2417 1              CAF    P30ZERO
 01529  REF   5  LAST  636   35,2557  55'466 0              TS     NN
 0153   REF   1              35,2560  0 3674 1              TC     DISPLAYE         ELEV AND CENTANG
 0154   REF  74  LAST  657   35,2561  0 6037 0              TC     INTPRET
 0155                        35,2562   71214 0              CLEAR  DLOAD
 0156   REF   2  LAST   69   35,2563   01270 0                     ETPIFLAG
 0157   REF  14  LAST  644   35,2564   03636 1                     TTPI
 0158   REF  15  LAST  652   35,2565   17442 0              STODL  TIG
 0159   REF   6  LAST  637   35,2566   02257 0                     ELEV
 0160                        35,2567   43054 1              BZE    SET
 0161   REF   1              35,2570   72572 1                     P34/P74B
 0162   REF   3  LAST  661   35,2571   01070 1                     ETPIFLAG
 0163                        35,2572   77624 1  P34/P74B    CALL
 0164   REF   3  LAST  627   35,2573   20000 0                     SELECTMU
 0165                            0032           DELELO      EQUALS 26D
 0166                        35,2574   43145 0  P34/P74C    DLOAD  SET
 0167   REF   7  LAST  609   35,2575   06522 1                     ZEROVECS
 0168   REF   2  LAST  627   35,2576   03460 0                     ITSWICH
 0169                        35,2577   43014 0              BON    CLEAR
 0170   REF   4  LAST  661   35,2600   01310 1                     ETPIFLAG
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0171   REF   1              35,2601   72603 1                     SWCHSET
0172   REF   3  LAST  661   35,2602   03660 1                     ITSWICH
0173   REF   4  LAST  628   35,2603   02317 0  SWCHSET   STORE    NOMTPI
0174                        35,2604   43345 1  INTLOOP   DLOAD    DAD
0175   REF  15  LAST  661   35,2605   03636 1                     TTPI
0176   REF   5  LAST  662   35,2606   02317 0                     NOMTPI
0177   REF  26  LAST  655   35,2607   34041 0            STCALL   TDEC1
0178   REF   3  LAST  642   35,2610   46360 0                     PRECSET
0179                        35,2611   77624 1            CALL
0180   REF   2  LAST  627   35,2612   72764 1                     S33/34.1
0181                        35,2613   77454 1            BZE      EXIT
0182   REF   1              35,2614   72625 0                     SWCHCLR
0183   REF  28  LAST  627   35,2615  0 5567 0            TC       ALARM
0184                        35,2616   00611 1            OCT      611
0185   REF   3  LAST  627   35,2617  3 5006 1            CAF      V05N09
0186   REF 163  LAST  657   35,2620  0 4616 1            TC       BANKCALL
0187   REF  13  LAST  657   35,2621   20476 0            CADR     GOFLASH
0188   REF  13  LAST  657   35,2622  0 6001 0            TC       GOTOPOOH
0189   REF   2  LAST  661   35,2623  0 2550 0            TC       P34/P74A          PROCEED
0190                        35,2624  0 2615 1            TC       -7                V32

0191                        35,2625   43014 0  SWCHCLR   BONCLR   BON
0192   REF   4  LAST  662   35,2626   03600 1                     ITSWICH
0193   REF   1              35,2627   72604 0                     INTLOOP
0194   REF   5  LAST  661   35,2630   01310 1                     ETPIFLAG
0195   REF   1              35,2631   72635 1                     P34/P74D          DISPLAY TTPI
0196                        35,2632   77776 1            EXIT
0197   REF   2  LAST  661   35,2633  0 3674 1            TC       DISPLAYE          DISPLAY ELEV AND CENTANG
0198   REF   1              35,2634  0 2640 1            TC       P34/P74E
0199                        35,2635   77776 1  P34/P74D  EXIT
0200   REF   3  LAST  661   35,2636  3 3723 1            CAF      V06N37            TTPI
0201   REF  14  LAST  661   35,2637  0 3712 0            TC       VNPOOH
0202   REF  75  LAST  661   35,2640  0 6037 0  P34/P74E  TC       INTPRET
0203                        35,2641   71201 1            SETPD    DLOAD
0204                        35,2642   00001 0                     0D
0205   REF   6  LAST  652   35,2643   02777 1                     RTX1
0206   REF  12  LAST  648   35,2644   14047 1            STODL    X1
0207   REF   6  LAST  661   35,2645   03621 1                     CENTANG
0208                        35,2646   71406 0            PUSH     COS
0209   REF   4  LAST  647   35,2647   16732 0            STODL    CSTH
0210                        35,2650   77756 0            SIN
0211   REF   6  LAST  647   35,2651   26730 1            STOVL    SNTH
0212   REF   6  LAST  642   35,2652   03552 0                     RPASS3
0213                        35,2653   77657 0            VSR*
0214                        35,2654   57176 0                     0,2
0215   REF   6  LAST  647   35,2655   26655 0            STOVL    RVEC
0216   REF   3  LAST  642   35,2656   03560 1                     VPASS3
0217                        35,2657   43057 1            VSR*     SET
0218                        35,2660   57176 0                     0,2
0219   REF   6  LAST  647   35,2661   03466 0                     RVSW
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 0220    REF    7  LAST  647    35,2662    36744 0           STCALL VVEC
 0221    REF    5  LAST  647    35,2663    24732 1                  TIMETHET
 0222                           35,2664    77745 1           DLOAD
 0223    REF   16  LAST  662    35,2665    03636 1                  TTPI
 0224    REF    1               35,2666    03610 0           STORE  INTIME             FOR INITVEL
 0225                           35,2667    77615 0           DAD
 0226    REF    2  LAST  494    35,2670    00037 0                  T                  RENDEZVOUS TIME
 0227    REF    5  LAST  652    35,2671    37631 1           STCALL TPASS4             FOR INITVEL
 0228    REF    1               35,2672    73306 0                  S34/35.2
 0229                           35,2673    51575 1           VLOAD  ABVAL
 0230    REF    4  LAST  653    35,2674    02366 0                  DELVEET3
 0231    REF    6  LAST  315    35,2675    27576 0           STOVL  DELVTPI
 0232    REF    1               35,2676    03506 1                  VPASS4
 0233                           35,2677    51451 0           VSU    ABVAL
 0234    REF    1               35,2700    03566 1                  VTPRIME
 0235    REF    3  LAST  315    35,2701    26350 0           STOVL  DELVTPF
 0236    REF    8  LAST  642    35,2702    03536 1                  RACT3
 0237                           35,2703    45115 0           PDVL   CALL
 0238    REF    2  LAST  653    35,2704    02337 1                  VTPRIME
 0239    REF    4  LAST  653    35,2705    46316 1                  PERIAPO1
 0240                           35,2706    77624 1           CALL
 0241    REF   10  LAST  653    35,2707    46426 0                  SHIFTR1
 0242    REF    4  LAST  315    35,2710    17606 1           STODL  POSTTPI
 0243    REF   17  LAST  663    35,2711    03636 1                  TTPI
 0244    REF   16  LAST  661    35,2712    03442 0           STORE  TIG
 0245                           35,2713    77776 1           EXIT
 0246    REF    1               35,2714  3 3725 1           CAF    V06N58
 0247    REF   15  LAST  662    35,2715  0 3712 0           TC     VNPOOH
 0248    REF   76  LAST  662    35,2716  0 6037 0           TC     INTPRET
 0249                           35,2717    77624 1           CALL
 0250    REF    1               35,2720    73522 0                  S34/35.5
 0251                           35,2721    77624 1           CALL
 0252    REF    4  LAST  653    35,2722    73606 0                  VN1645
 0253                           35,2723    77650 1           GOTO
 0254    REF    1               35,2724    72574 1                  P34/P74C
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R0255   RENDEZVOUS MID-COURSE MANEUVER PROGRAMS (P35 AND P75)

R0256   MOD NO -1         LOG SECTION - P32-P35, P72-P75
R0257   MOD BY WHITE.P  DATE  1JUNE67

R0258   PURPOSE

R0259           (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0260               REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE NEXT
R0261               MIDCOURSE CORRECTION OF THE TRANSFER PHASE OF AN ACTIVE
R0262               VEHICLE RENDEZVOUS.

R0263           (2) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0264               VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0265               ASTRONAUT/GROUND.

R0266           (3) TO STORE THE TPM TARGET PARAMETERS FOR USE BY THE DESIRED
R0267               THRUSTING PROGRAM.

R0268   ASSUMPTIONS

R0269           (1) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0270           (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0271               STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (3)).

R0272           (3) THE RENDEZVOUS RADAR IS ON AND IS LOCKED ON THE CSM.  THIS WAS
R0273               DONE DURING PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS
R0274               WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN
R0275               ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE
R0276               RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF
R0277               P20 AND AFTER EACH THRUSTING MANEUVER.

R0278           (4) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0279                   ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0280                   DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0281                   CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0282                   EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0283                   FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0284                   SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0285                   EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0286                   REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0287                   PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0288           (5) THE TIME OF INTERCEPT (T(INT)) WAS DEFINED BY PREVIOUS
R0289               COMPLETION OF THE TRANSFER PHASE INITIATION (TPI) PROGRAM
R0290               (P34/P74) AND IS PRESENTLY AVAILABLE IN STORAGE.
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R0291          (6) ONCE THE PARAMETERS REQUIRED FOR COMPUTION OF THE MANEUVER
R0292              HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0293              VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0294              THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0295              THROUGH THE USE OF V06N52.

R0296              THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0297              CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
R0298              170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0299              ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0300              UPON DELTA V AND EXPECTED MANEUVER TIME.

R0301          (7) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0302                   P35 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0303                   P75 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0304   INPUT

R0305          (1) TPASS4    TIME OF INTERCEPT - SAVED FROM P34/P74
R0306   OUTPUT

R0307          (1) TPKMKCNT  NUMBER OF MARKS
R0308          (2) TTOGO     TIME TO GO
R0309          (3) +MGA      MIDDLE GIMBAL ANGLE
R0310          (4) DVLOS     DELTA VELOCITY AT MID - LINE OF SIGHT
R0311          (5) DELVLVC   DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0312   DOWNLINK

R0325          (1) TIG       TIME OF THE TPM MANEUVER
R0326          (2) DELVEET3  DELTA VELOCITY AT TPM - REFERENCE COORDINATES
R0327          (3) TPASS4    TIME OF INTERCEPT
R0328   COMMUNICATION TO THRUSTING PROGRAMS

R0329          (1) TIG       TIME OF THE TPM MANEUVER
R0330          (2) RTARG     OFFSET TARGET POSITION
R0331          (3) TPASS4    TIME OF INTERCEPT            .
R0332          (4) XDELVFLG  RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0333   SUBROUTINES USED

R0334          AVFLAGA
R0335          AVFLAGP
R0336          LOADTIME
R0337          SELECTMU
R0338          PRECSET
R0339          S34/35.1
R0340          S34/35.2
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R0341          S34/35.5
R0342          VN1645

 0343   REF    2 LAST  650 TO  652:     14     14*            COUNT* $$/P3575
 0344   REF    1                 E7,1575                      EBANK= KT

 0345   REF    4  LAST  661     35,2725   0 2347 0  P35       TC      AVFLAGA
 0346                           35,2726   0 0006 1            EXTEND
 0347   REF    3  LAST  387     35,2727   3 1401 0            DCA     ATIGINC
 0348   REF    1                35,2730   0 2734 0            TC      P35/P75A
 0349   REF    4  LAST  661     35,2731   0 2354 1  P75       TC      AVFLAGP
 0350                           35,2732   0 0006 1            EXTEND
 0351   REF    1                35,2733   3 1403 1            DCA     PTIGINC
 0352   REF    2  LAST  666     35,2734   5 3576 0  P35/P75A  DXCH    KT
 03525  REF    5  LAST  661     35,2735   0 2361 1            TC      P20FLGON        SET UPDATFLG, TRACKFLG
 0353   REF   77  LAST  663     35,2736   0 6037 0            TC      INTPRET
 0359                           35,2737    77624 1            CALL
 0360   REF    4  LAST  661     35,2740    20000 0                    SELECTMU
 0361                           35,2741    77634 0  P35/P75B  RTB
 0362   REF   13  LAST  589     35,2742    21573 0                    LOADTIME
 03621  REF    2  LAST  283     35,2743    03612 1            STORE   TSTRT
 03622                          35,2744    77615 0            DAD
 03623  REF    3  LAST  666     35,2745    03576 0                    KT
 03624  REF   17  LAST  663     35,2746    03442 0            STORE   TIG
 0363   REF    2  LAST  663     35,2747    03610 0            STORE   INTIME          FOR INITVEL
 0364   REF   27  LAST  662     35,2750    34041 0            STCALL  TDEC1
 0365   REF    4  LAST  662     35,2751    46360 0                    PRECSET         ADVANCE BOTH VEHICLES
 0366                           35,2752    77624 1            CALL
 0367   REF    1                35,2753    73274 1                    S34/35.1        GET NORM AND LOS FOR TRANSFORM
 0368                           35,2754    77624 1            CALL
 0369   REF    2  LAST  663     35,2755    73306 0                    S34/35.2        GET DELTA V(LV)
 0370                           35,2756    77624 1            CALL
 0371   REF    2  LAST  663     35,2757    73522 0                    S34/35.5
 0372                           35,2760    77624 1            CALL
 0373   REF    5  LAST  663     35,2761    73606 0                    VN1645
 0379                           35,2762    77650 1            GOTO
 0380   REF    1                35,2763    72741 0                    P35/P75B
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P0381    ..... S33/34.1  .....

 0382                        35,2764   56220 1  S33/34.1 STQ    SSP
 0383   REF  4  LAST  630    35,2765   03463 0                  NORMEX
 0384   REF  1               35,2766   03614 1                  TITER
 0385                        35,2767   40000 0           OCT    40000
 0386                        35,2770   40345 1           DLOAD  SETPD
 0387   REF  1               35,2771   33734 1                  MAX250
 0388                        35,2772   00001 0                  0D
 0389   REF  1               35,2773   27574 1           STOVL  SECMAX
 0390   REF  9  LAST  663    35,2774   03536 1                  RACT3
 0391   REF  1               35,2775   27500 1           STOVL  RAPREC
 0392   REF  8  LAST  648    35,2776   03544 1                  VACT3
 0393   REF  1               35,2777   27506 1           STOVL  VAPREC
 0394   REF  7  LAST  662    35,3000   03552 0                  RPASS3
 0395   REF  1               35,3001   27522 1           STOVL  RPPREC
 0396   REF  4  LAST  662    35,3002   03560 1                  VPASS3
 0397   REF  1               35,3003   03530 1           STORE  VPPREC
 0398                        35,3004   77624 1  ELCALC   CALL
 0399   REF  2  LAST  666    35,3005   73274 1                  S34/35.1         NORMAL AND LOS
 0400                        35,3006   63235 0           VXV    PDVL
 0401   REF 10  LAST  667    35,3007   03536 1                  RACT3            (RA*VA)*RA 0D
 0402                        35,3010   53515 0           PDVL   UNIT             ULOS AT 6D
 0403   REF 11  LAST  667    35,3011   03536 1                  RACT3
 0404                        35,3012   46315 1           PDVL   VPROJ            XCHNJ AND UP
 0405                        35,3013   51352 1           VSL2   BVSU
 0406   REF  1               35,3014   02311 0                  ULOS
 0407                        35,3015   63256 0           UNIT   PDVL             UP AT 0D
 0408                        35,3016   63241 0           DOT    PDVL             UP.UN*RA AT 0D
 0409                        35,3017   00001 0                  0D               UP IN MPAC
 0410                        35,3020   75241 1           DOT    SIGN
 0411   REF  2  LAST  667    35,3021   02311 0                  ULOS
 0412                        35,3022   65552 0           SL1    ACOS
 0413                        35,3023   50315 0           PDVL   DOT              EA AT 0D
 0414   REF  3  LAST  667    35,3024   02311 0                  ULOS
 0415   REF 12  LAST  667    35,3025   03536 1                  RACT3
 0416                        35,3026   71244 0           BPL    DLOAD
 0417   REF  1               35,3027   73032 1                  TESTY
 0418   REF  6  LAST  622    35,3030   06530 1                  DPPOSMAX
 0419                        35,3031   41425 1           DSU    PUSH
 0420                        35,3032   71214 0  TESTY    BOFF   DLOAD
 0421   REF  5  LAST  662    35,3033   03740 1                  ITSWICH
 0422   REF  1               35,3034   73261 0                  ELEX
 0423   REF  1               35,3035   03576 0                  DELEL
 0424   REF  1               35,3036   14033 1           STODL  DELELO
 0425                        35,3037   77625 0           DSU
 0426   REF  7  LAST  661    35,3040   02257 0                  ELEV
 0427   REF  2  LAST  667    35,3041   03576 0           STORE  DELEL
 0428                        35,3042   45246 0           ABS    DSU
 0429   REF  1               35,3043   33740 1                  ELEPS
 0430                          35,3044   77640 0                  BMN
 0431   REF   1                35,3045   73271 1                          TIMEX            COMMERCIALS EVERYWHERE
 0432                          35,3046   70535 0   FIGTIME        SLOAD   SR1
 0433   REF   2   LAST   667   35,3047   03614 1                          TITER
 0434                          35,3050   72030 1                  BHIZ    LXA,1
 0435   REF   5   LAST   667   35,3051   03463 0                          NORMEX           TOO MANY ITERATIONS
 0436   REF 280   LAST   638   35,3052   00154 1                          MPAC
 0437                          35,3053   77330 1                  SXA,1   VLOAD
 0438   REF   3   LAST   668   35,3054   03613 0                          TITER
 0439   REF   8   LAST   667   35,3055   03552 0                          VPASS3
 0440                          35,3056   65256 0                  UNIT    PDDL
 0441                          35,3057   00045 0                          36D
 0442                          35,3060   53515 0                  PDVL    UNIT
 0443   REF  13   LAST   667   35,3061   03536 1                          RACT3
 0444                          35,3062   77725 1                  PDDL
 0445                          35,3063   41525 0                  PDDL    PUSH
 0446                          35,3064   00045 0                          36D
 0447                          35,3065   77621 1                  BDSU
 0448                          35,3066   00015 0                          12D
 0449                          35,3067   14037 0                  STODL   30D              RP - RA MAGNITUDES
 0450   REF   8   LAST   593   35,3070   06520 0                          DPHALF
 0451                          35,3071   41425 1                  DSU     PUSH
 0452   REF   8   LAST   667   35,3072   02257 0                          ELEV
 0453                          35,3073   50165 0                  SIGN    BMN
 0454                          35,3074   00037 0                          30D
 0455   REF   6   LAST   668   35,3075   03463 0                          NORMEX
 0456                          35,3076   71545 0                  DLOAD   COS
 0457                          35,3077   56205 0                  DMP     DDV
 0458                          35,3100   00017 1                          14D
 0459                          35,3101   00015 0                          12D
 0460                          35,3102   77676 0                  DCOMP                    SINCE COS(180-A)=-COS A
 0461                          35,3103   00035 1                  STORE   28D
 0462                          35,3104   44246 1                  ABS     BDSU
 0463   REF   9   LAST   668   35,3105   06520 0                          DPHALF
 0464                          35,3106   77240 1                  BMN     VLOAD
 0465   REF   7   LAST   668   35,3107   03463 0                          NORMEX
 0466   REF   1                35,3110   02261 0                          UNRM
 0467                          35,3111   53435 0                  VXV     UNIT
 0468                          35,3112   00007 0                          6D               UN*RA
 0469                          35,3113   41241 0                  DOT     DMP
 0470   REF   9   LAST   667   35,3114   03544 1                          VACT3
 0471                          35,3115   00015 0                          12D
 0472                          35,3116   47315 0                  PDVL    VXV
 0473                          35,3117   00001 0                          0D
 0474   REF   5   LAST   667   35,3120   03560 1                          VPASS3
 0475                          35,3121   53435 0                  VXV     UNIT
 0476                          35,3122   00001 0                          0D               (RP*VP)*RP
 0477                          35,3123   41241 0                  DOT     DMP
 0478   REF   6   LAST   668   35,3124   03560 1                          VPASS3
 0479                          35,3125   00017 1                          14D
 0480                           35,3126   77621 1                BDSU
 0481                           35,3127   63301 0                NORM    PDVL              NORMALIZED WA - WP 12D
 0482   REF  13  LAST  662      35,3130   00047 1                        X1
 0483                           35,3131   00007 0                        6D
 0484                           35,3132   50235 0                VXV     DOT
 0485                           35,3133   00001 0                        0D
 0486   REF   2  LAST  668      35,3134   02261 0                        UNRM              RA*RP.UN 14D
 0487                           35,3135   50315 0                PDVL    DOT
 0488                           35,3136   00001 0                        0D
 0489                           35,3137   00007 0                        6D
 0490                           35,3140   65552 0                SL1     ACOS
 0491                           35,3141   77765 0                SIGN
 0492                           35,3142   43225 0                DSU     DAD                 ALPHA   PI
 0493   REF  10  LAST  668      35,3143   06520 0                        DPHALF
 0494   REF   9  LAST  668      35,3144   02257 0                        ELEV
 0495                           35,3145   65525 0                PDDL    ACOS
 0496                           35,3146   00035 1                        28D
 0497                           35,3147   75221 1                BDSU    SIGN
 0498   REF  11  LAST  669      35,3150   06520 0                        DPHALF
 0499                           35,3151   00037 0                        30D               CONTAINS RP-RA
 0500                           35,3152   77615 0                DAD
 0501                           35,3153   56205 0                DMP     DDV
 0502   REF   4  LAST  644      35,3154   33732 1                        TWOPI
 0503                           35,3155   77605 1                DMP
 0504                           35,3156   41257 1                SL*     DMP
 0505                           35,3157   20176 0                        0 -3,1
 0506                           35,3160   51406 1                PUSH    ABS
 0507                           35,3161   50025 0                DSU     BMN
 0508   REF   2  LAST  667      35,3162   03574 1                        SECMAX
 0509   REF   1                 35,3163   73167 0                        OKMAX
 0510                           35,3164   75345 1                DLOAD   SIGN               REPLACE TIME WITH MAX TIME SIGNED
 0511   REF   3  LAST  669      35,3165   03574 1                        SECMAX
 0512                           35,3166   77606 1                PUSH
 0513                           35,3167   51135 1  OKMAX         SLOAD   BPL               TEST FIRST ITERATION
 0514   REF   4  LAST  668      35,3170   03614 1                        TITER
 0515   REF   1                 35,3171   73177 1                        REPETE
 0516                           35,3172   71331 0                SSP     DLOAD
 0517   REF   5  LAST  669      35,3173   03614 1                        TITER
 0518                           35,3174   37777 1                OCT     37777
 0519                           35,3175   77650 1                GOTO
 0520   REF   1                 35,3176   73235 1                        STORDELT
 0521                           35,3177   41345 0  REPETE        DLOAD   DMP
 0522   REF   3  LAST  667      35,3200   03576 0                        DELEL
 0523   REF   2  LAST  667      35,3201   00033 1                        DELELO
 0524                           35,3202   71244 0                BPL     DLOAD
 0525   REF   1                 35,3203   73213 0                        NEXTES
 0526   REF   4  LAST  669      35,3204   03574 1                        SECMAX
 0527                           35,3205   77605 1                DMP
 0528   REF   1                 35,3206   33736 0                        THIRD
 0529   REF   5  LAST  669      35,3207   17574 1                STODL   SECMAX
 0530                          35,3210   70446 0                ABS     SR1              CROSSED OVER SOLUTION
 0531                          35,3211   52076 1                DCOMP   GOTO             DT=(-SIGN(DTO)//DT//)/2
 0532   REF   1                35,3212   73223 0                        RESIGN
 0533                          35,3213   51545 1   NEXTES       DLOAD   ABS
 0534   REF   4   LAST   669   35,3214   03576 0                        DELFL
 0535                          35,3215   51525 1                PDDL    ABS
 0536   REF   3   LAST   669   35,3216   00033 1                        DELELO
 0537                          35,3217   77625 0                DSU
 0538                          35,3220   71240 1                BMN     DLOAD
 0539   REF   1                35,3221   73226 0                        REVERS           WRONG DIRECTION
 0540                          35,3222   77646 0                ABS
 0541                          35,3223   52165 1   RESIGN       SIGN    GOTO
 0542   REF   1                35,3224   03606 1                        DELTEEO
 0543   REF   2   LAST   669   35,3225   73235 1                        STORDELT
 0544                          35,3226   57545 1   REVERS       DLOAD   DCOMP
 0545   REF   2   LAST   670   35,3227   03606 1                        DELTEEO
 0546                          35,3230   70406 1                PUSH    SR1
 0547   REF   3   LAST   670   35,3231   03606 1                STORE   DELTEEO
 0548                          35,3232   77615 0                DAD
 0549                          35,3233   77650 1                GOTO
 0550   REF   1                35,3234   73236 1                        ADTIME
 0551   REF   4   LAST   670   35,3235   03606 1   STORDELT     STORE   DELTEEO
 0552                          35,3236   77615 0   ADTIME       DAD
 0553   REF   6   LAST   662   35,3237   02317 0                        NOMTPI           SUM OF DELTA T:S
 0554   REF   7   LAST   670   35,3240   02317 0                STORE   NOMTPI
 0555                          35,3241   63375 0                VLOAD   PDVL
 0556   REF   2   LAST   667   35,3242   03506 1                        VAPREC
 0557   REF   2   LAST   667   35,3243   03500 1                        RAPREC
 0558                          35,3244   77624 1                CALL
 0559   REF   1                35,3245   73462 0                        GOINT
 0560                          35,3246   77624 1                CALL
 0561   REF   3   LAST   637   35,3247   46402 0                        ACTIVE           STORE NEW RACT3 VACT3
 0562                          35,3250   63375 0                VLOAD   PDVL
 0563   REF   2   LAST   667   35,3251   03530 1                        VPPREC
 0564   REF   2   LAST   667   35,3252   03522 1                        RPPREC
 0565                          35,3253   77624 1                CALL
 0566   REF   2   LAST   670   35,3254   73462 0                        GOINT
 0567                          35,3255   77624 1                CALL
 0568   REF   3   LAST   627   35,3256   46412 1                        PASSIVE          STORE NEW RPASS3 VPASS3
 0569                          35,3257   77650 1                GOTO
 0570   REF   1                35,3260   73004 1                        ELCALC
 0571                          35,3261   43345 1   ELEX         DLOAD   DAD
 0572   REF  18   LAST   663   35,3262   03636 1                        TTPI
 0573   REF   8   LAST   670   35,3263   02317 0                        NOMTPI
 0574   REF  19   LAST   670   35,3264   17636 1                STODL   TTPI
 0575                          35,3265   77614 1                BON
 0576   REF   6   LAST   662   35,3266   01310 1                        ETPIFLAG
 0577   REF   2   LAST   668   35,3267   73271 1                        TIMEX
 0578   REF  10   LAST   669   35,3270   02257 0                STORE   ELEV
 0579                          35,3271   52145 0   TIMEX        DLOAD   GOTO
 0580   REF    8  LAST  661    35,3272    06522 1               ZEROVECS
 0581   REF    8  LAST  668    35,3273    03463 0               NORMEX
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P0582     ..... S34/35.1  .....

R0583     COMPUTE UNIT NORMAL AND LINE OF SIGHT VECTORS GIVEN THE ACTIVE AND
R0584     PASSIVE POS AND VEL AT TIME T3
 0585                             35,3274   52375 1  S34/35.1 VLOAD   VSU
 0586     REF   9  LAST  668      35,3275   03552 0                   RPASS3
 0587     REF  14  LAST  668      35,3276   03536 1                   RACT3
 0588                             35,3277   41456 0           UNIT    PUSH
 0589     REF   4  LAST  667      35,3300   26311 0           STOVL   ULOS
 0590     REF  15  LAST  672      35,3301   03536 1                   RACT3
 0591                             35,3302   53435 0           VXV     UNIT
 0592     REF  10  LAST  668      35,3303   03544 1                   VACT3
 0593     REF   3  LAST  669      35,3304   02261 0           STORE   UNRM
 0594                             35,3305   77616 0           RVQ
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P0595    ..... S34/35.2  .....

R0596    ADVANCE PASSIVE VEH TO RENDEZVOUS TIME AND GET REQ VEL FROM LAMBERT
 0597                           35,3306   77220 1  S34/35.2 STQ     VLOAD
 0598    REF  17  LAST  661     35,3307   03470 1                   SUBEXIT
 0599    REF   7  LAST  668     35,3310   03560 1                   VPASS3
 0600                           35,3311   65315 0           PDVL    PDDL
 0601    REF  10  LAST  672     35,3312   03552 0                   RPASS3
 0602    REF   3  LAST  666     35,3313   03610 0                   INTIME
 0603                           35,3314   65325 0           PDDL    PDDL
 0604    REF   6  LAST  663     35,3315   03631 0                   TPASS4
 0605    REF   5  LAST  669     35,3316   33732 1                   TWOPI          CONIC
 0606                           35,3317   46125 0           PDDL    BHIZ
 06061   REF   6  LAST  661     35,3320   03467 1                   NN
 06062   REF   1                35,3321   73325 1                   S3435.23
 06063                          35,3322   77745 1           DLOAD
 06064                          35,3323   41545 0           DLOAD   PUSH
 06065   REF   9  LAST  671     35,3324   06522 1                   ZEROVECS       PRECISION
 06066                          35,3325   77624 1  S3435.23 CALL
 0607    REF   5  LAST  644     35,3326   73466 1                   INTINT         GET TARGET VECTOR
 0608    REF   3  LAST  198     35,3327   27444 0  S3435.25 STOVL   RTARG
 0609    REF  11  LAST  656     35,3330   00007 0                   VATT
 0610    REF   2  LAST  663     35,3331   27506 1           STOVL   VPASS4
 0611    REF   4  LAST  673     35,3332   03444 0                   RTARG
R0612    COMPUTE PHI = PI +(ACOS(UNIT RA.UNIT RP)-PI)SIGN(RA*RP.U)
 0613                           35,3333   63256 0           UNIT    PDVL           UNIT RP
 0614    REF  16  LAST  672     35,3334   03536 1                   RACT3
 0615                           35,3335   41456 0           UNIT    PUSH           UNIT RA
 0616                           35,3336   50235 0           VXV     DOT
 0617                           35,3337   00001 0                   0D
 0618    REF   4  LAST  672     35,3340   02261 0                   UNRM           RA*RP.U
 0619                           35,3341   77715 1           PDVL
 0620                           35,3342   72441 0           DOT     SL1            UNIT RA.UNIT RP
 0621                           35,3343   00001 0                   0D
 0622                           35,3344   75326 1           ACOS    SIGN
 0623                           35,3345   43244 1           BPL     DAD
 0624    REF   1                35,3346   73350 0                   NOPIE
 0625    REF   7  LAST  667     35,3347   06530 1                   DPPOSMAX       REASONABLE TWO PI
 0626    REF   2  LAST  314     35,3350   15756 1  NOPIE    STODL   ACTCENT
 0627    REF   7  LAST  673     35,3351   03631 0                   TPASS4
 0628                           35,3352   77625 0           DSU
 0629    REF   4  LAST  673     35,3353   03610 0                   INTIME
 0630    REF   4  LAST  652     35,3354   03452 1           STORE   DELLT4
 0631                           35,3355   40335 0           SLOAD   SETPD
 0632    REF   7  LAST  673     35,3356   03467 1                   NN             NUMBER OF OFFSETS
 0633                           35,3357   00001 0                   0D
 06331                          35,3360   63325 0           PDDL    PDVL
 06332   REF   1                35,3361   33744 0                   EPSFOUR
 06333   REF  17  LAST  673     35,3362   03536 1                   RACT3
 06334   REF   2  LAST  652     35,3363   26323 1           STOVL   RINIT
 06335   REF   11   LAST   672     35,3364    03544 1                  VACT3
 06336   REF    2   LAST   652     35,3365    36331 0           STCALL VINIT
 06337   REF    2   LAST   652     35,3366    22000 1                  INITVEL
 0634                              35,3367    77624 1           CALL
 0635    REF    1                  35,3370    73447 1                  LOMAT
 0636                              35,3371    64375 1           VLOAD  MXV
 0637    REF    5   LAST   663     35,3372    02366 0                  DELVEET3
 0638                              35,3373    00001 0                  OD
 0639                              35,3374    77772 0           VSL1
 0640    REF   15   LAST   645     35,3375    37434 0           STCALL DELVLVC
 0641    REF   18   LAST   673     35,3376    03470 1                  SUBEXIT
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P0642   ..... S34/35.3  .....

 0643                          35,3377   45020 1  S34/35.3 STQ      CALL
 0644    REF   9  LAST  671    35,3400   03463 0                    NORMEX
 0645    REF   2  LAST  674    35,3401   73447 1                    LOMAT        GET MATRIX IN PUSH LIST
 0646                          35,3402   61375 1           VLOAD    VXM
 0647    REF  16  LAST  674    35,3403   03434 1                    DELVLVC      NEW DEL V TPI
 0648                          35,3404   00001 0                    0D
 0649                          35,3405   77772 0           VSL1
 0650    REF   6  LAST  674    35,3406   02366 0           STORE    DELVEET3     SAVE FOR TRANSFORM
 0651                          35,3407   63255 0           VAD      PDVL
 0652    REF  12  LAST  674    35,3410   03544 1                    VACT3        NEW V REQ
 0653    REF  18  LAST  673    35,3411   03536 1                    RACT3
 0654                          35,3412   65325 0           PDDL     PDDL
 0655    REF  18  LAST  666    35,3413   03442 0                    TIG
 0656    REF   8  LAST  673    35,3414   03631 0                    TPASS4
 0657                          35,3415   41525 0           PDDL     PUSH
 0658    REF   8  LAST  673    35,3416   06530 1                    DPPOSMAX
 0659                          35,3417   77624 1           CALL                  INTEG. FOR NEW TARGET VEC
 0660    REF   6  LAST  673    35,3420   73466 1                    INTINT
 0661                          35,3421   77775 1           VLOAD
 0662    REF  14  LAST  656    35,3422   00001 0                    RATT
 0663    REF   5  LAST  673    35,3423   03444 0           STORE    RTARG
 0664                          35,3424   41575 0     VPWRT VLOAD    PUSH
 0665    REF   5  LAST  672    35,3425   02311 0                    ULOS
 0666                          35,3426   57435 1           VXV      VCOMP
 0667    REF   5  LAST  673    35,3427   02261 0                    UNRM
 0668                          35,3430   41456 0           UNIT     PUSH
 0669                          35,3431   76435 1           VXV      VSL1
 0670    REF   6  LAST  675    35,3432   02311 0                    ULOS
 0671                          35,3433   77715 1           PDVL
 0672                          35,3434   64315 1           PDVL     MXV
 0673    REF   7  LAST  675    35,3435   02366 0                    DELVEET3
 0674                          35,3436   00001 0                    0D
 0675                          35,3437   77772 0           VSL1
 0676    REF   5  LAST  315    35,3440   36303 1           STCALL   DVLOS
 0677    REF  10  LAST  675    35,3441   03463 0                    NORMEX
```

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L         P34-P35, P74-P75                                                        USER'S PAGE NO.  19       E7 S3

P0678     ..... S34/35.4   .....

 0679                             35,3442    40220 0  S34/35.4 STQ      SETPD          NO ASTRONAUT OVERWRITE
 0680     REF  11  LAST  675      35,3443    03463 0                    NORMEX
 0681                             35,3444    00001 0                    OD
 0682                             35,3445    77650 1           GOTO
 0683     REF   1                 35,3446    73424 1                    NOVRWRT
```

```
P0684    ..... LOMAT      .....

 0685                            35,3447   57575 1  LOMAT     VLOAD   VCOMP
 0686    REF    6  LAST  675     35,3450   02261 0                    UNRM
 0687                            35,3451   24007 0            STOVL   6D                      Y
 0688    REF   19  LAST  675     35,3452   03536 1                    RACT3
 0689                            35,3453   57456 1            UNIT    VCOMP
 0690                            35,3454   00015 0            STORE   12D
 0691                            35,3455   76435 1            VXV     VSL1
 0692    REF    7  LAST  677     35,3456   02261 0                    UNRM                    Z*-Y
 0693                            35,3457   00001 0            STORE   0D
 0694                            35,3460   43401 0            SETPD   PVQ
 0695                            35,3461   00023 0                    18D
 0696                            35,3462   65325 0  GOINT     PDDL    PDDL                    DO
 0697    REF   10  LAST  673     35,3463   06522 1                    ZEROVECS                   NOT
 0698    REF    9  LAST  670     35,3464   02317 0                    NOMTPI
 0699                            35,3465   41406 0            PUSH    PUSH                                      ORDER OR INSERT BEFORE INTINT
 0700                            35,3466   45020 1  INTINT    STQ     CALL
 0701    REF    4  LAST  650     35,3467   03465 0                    RTRN
 0702    REF   19  LAST  655     35,3470   27414 0                    INTSTALL
 0703                            35,3471   71214 0            CLEAR   DLOAD
 0704    REF    7  LAST  655     35,3472   01673 1                    INTYPFLG
 0705                            35,3473   43054 1            BZE     SET
 0706                            35,3474   73476 0                    +2
 0707    REF    8  LAST  677     35,3475   01473 0                    INTYPFLG
 0708                            35,3476   45545 1            DLOAD   STADR
 0709    REF   28  LAST  666     35,3477   63736 0            STODL   TDEC1
 0710                            35,3500   73014 0            SET     LXA,2
 0711    REF    3  LAST  656     35,3501   00063 1                    MOONFLAG
 0712    REF    4  LAST  652     35,3502   02777 1                    RTX2
 0713                            35,3503   43014 0            BON     CLEAR
 0714    REF    3  LAST  635     35,3504   04303 0                    CMOONFLG
 0715    REF    1                35,3505   73507 1                    ALLSET
 0716    REF       LAST  677     35,3506   00263 0                    MOONFLAG
 0717    REF    6  LAST  656     35,3507   25517 0  ALLSET    STOVL   TET
 0718                            35,3510   77657 0            VSR*
 0719                            35,3511   57176 0                    0,2
 0720    REF    6  LAST  655     35,3512   25535 0            STOVL   RCV
 0721                            35,3513   77657 0            VSR*
 0722                            35,3514   57176 0                    0,2
 0723    REF    5  LAST  656     35,3515   35543 0            STCALL  VCV
 0724    REF    2  LAST  656     35,3516   27107 1                    INTEGRVS
 0725                            35,3517   52175 0            VLOAD   GOTO
 0726    REF   15  LAST  675     35,3520   00001 0                    RATT
 0727    REF    5  LAST  677     35,3521   03465 0                    RTRN
```

```
R0728        ..... S34/35.5   .....
R0729        SUBROUTINES USED

R0730              BANKCALL
R0731              GOFLASH
R0732              GOTOPOOH
R0733              S34/35.3
R0734              S34/35.4
R0735              VNPOOH

 0736                                 35,3522   43020 1  S34/35.5 STQ     BON
 0737    REF  19  LAST  674           35,3523   03470 1                   SUBEXIT
 0738    REF   4  LAST  653           35,3524   01311 0                   FINALFLG
 0739    REF   1                      35,3525   73531 1                   FLAGON
 0740                                 35,3526   52014 0           SET     GOTO
 0741    REF  10  LAST  652           35,3527   00470 1                   UPDATFLG
 0742    REF   1                      35,3530   73576 1                   FLAGOFF
 0743                                 35,3531   77214 0  FLAGON   CLEAR   VLOAD
 0744    REF   1                      35,3532   03274 0                   NTARGFLG
 07441   REF  17  LAST  675           35,3533   03434 1                   DELVLVC
 07442   REF   2  LAST  105           35,3534   01237 0           STORE   GDT/2
 07443                                35,3535   77776 1           EXIT
 0745    REF   3  LAST  653           35,3536  3 3727 0   +5      CAF     V06N81
 0746    REF 164  LAST  662           35,3537  0 4616 1           TC      BANKCALL
 0747    REF  14  LAST  662           35,3540   20476 0           CADR    GOFLASH
 0748    REF  14  LAST  662           35,3541  0 6001 0           TC      GOTOPOOH
 0749                                 35,3542  0 3544 1           TC      +2                 PRO
 0750    REF   2  LAST  678           35,3543  0 3536 1           TC      FLAGON +5          LOAD
 0751    REF   3  LAST  518           35,3544  3 5016 0   +2      CA      EBANK7
 07511   REF  19  LAST  520           35,3545  54 003 0           TS      EBANK              TO BE SURE

 07512                                35,3546  22 007 0           ZL
 07513   REF  14  LAST  608           35,3547  3 4736 1           CA      FIVE
 07514   REF 181  LAST  612           35,3550  54 002 1  NTARGCHK TS      Q
 07515   REF 182  LAST  678           35,3551  50 002 0           INDEX   Q
 07516   REF  18  LAST  678           35,3552  4 1433 0           CS      DELVLVC
 07517   REF 183  LAST  678           35,3553  50 002 0           INDEX   Q
 07518   REF   3  LAST  678           35,3554  6 1236 1           AD      GDT/2
 07519   REF  92  LAST  613           35,3555  26 001 1           ADS     L
 0752    REF 184  LAST  678           35,3556  10 002 1           CCS     Q
 07521   REF   1                      35,3557  1 3550 0           TCF     NTARGCHK
 07522   REF 215  LAST  612           35,3560  22 000 1           LXCH    A
 07523                                35,3561  0 0006 1           EXTEND
 07524                                35,3562  1 3565 0           BZF     +3
 07525   REF  37  LAST  629           35,3563  0 5504 0           TC      UPFLAG
 0753    REF   2  LAST  678           35,3564   00146 1           ADRES   NTARGFLG

 0754    REF  78  LAST  666           35,3565  0 6037 0           TC      INTPRET
 0755                                 35,3566   45014 0           BOFF    CALL
 0756    REF   3  LAST  678           35,3567   03354 0                   NTARGFLG
 0757    REF    1                35,3570   73572 0                     NOCHG
 0758    REF    1                35,3571   73377 0                     S34/35.3
 0759                            35,3572   77214 0  NOCHG     CLEAR    VLOAD
 0760    REF    4   LAST   653   35,3573   01267 0                     XDELVFLG
 0761    REF    8   LAST   675   35,3574   02366 0                     DELVEET3
 0762    REF   10   LAST   653   35,3575   03656 1            STORE    DELVSIN
 0763                            35,3576   77624 1  FLAGOFF   CALL
 0764    REF    1                35,3577   73442 1                     S34/35.4
 0765                            35,3600   77776 1            EXIT
 0766    REF    1                35,3601  3 3726 1            CAF      V06N59
 0767    REF   16   LAST   663   35,3602  0 3712 0            TC       VNPOOH
 0768    REF   79   LAST   678   35,3603  0 6037 0            TC       INTPRET
 0769                            35,3604   77650 1            GOTO
 0770    REF   20   LAST   678   35,3605   03470 1                     SUBEXIT
```

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P0771    ..... VN1645     .....

R0772    SUBROUTINES USED

R0773          P3XORP7X
R0774          GET+MGA
R0775          BANKCALL
R0776          DELAYJOB
R0777          COMPTGO
R0778          GOFLASHR
R0779          GOTOPOOH
R0780          FLAGUP

 0781                            35,3606   71220 1  VN1645    STQ      DLOAD
 0782    REF  21  LAST  679      35,3607   03470 1                     SUBEXIT
 0783    REF   1                 35,3610   33742 0                     DP-.01
 0784    REF   3  LAST  614      35,3611   02253 1            STORE    +MGA            MGA = -.01
 0785                            35,3612   71214 0            BOFF     DLOAD
 0786    REF   5  LAST  678      35,3613   01351 1                     FINALFLG
 0787    REF   1                 35,3614   73634 1                     GET45
 0788    REF   2  LAST  680      35,3615   33742 0                     DP-.01
 0789                            35,3616   77615 0            DAD
 0790    REF   3  LAST  680      35,3617   33742 0                     DP-.01
 0791    REF   4  LAST  680      35,3620   02253 1            STORE    +MGA            MGA = -.02
 0792                            35,3621   77414 0            BOFF     EXIT
 0793    REF   1                 35,3622   01742 1                     REFSMFLG
 0794    REF   2  LAST  680      35,3623   73634 1                     GET45
 0795    REF   1                 35,3624  0 3704 1            TC       P3XORP7X
 0796                            35,3625  0 3627 1            TC       +2              P3X
 0797    REF   3  LAST  680      35,3626  0 3635 1            TC       GET45 +1        P7X
 0798    REF  80  LAST  679      35,3627  0 6037 0            TC       INTPRET
 0799                            35,3630   41575 0            VLOAD    PUSH
 0800    REF  11  LAST  679      35,3631   03656 1                     DELVSIN
 0801                            35,3632   77624 1            CALL                     COMPUTE MGA
 0802    REF   1                 35,3633   15717 1                     GET+MGA
 0803                            35,3634   77776 1  GET45     EXIT
 0804    REF   1                 35,3635  0 2432 0            TC       COMPTGO         INITIATE TASK TO UPDATE TTOGO
 0805    REF  22  LAST  680      35,3636  3 1470 0            CA       SUBEXIT
 0806    REF   1                 35,3637  55'464 1            TS       QSAVED
 0807    REF   6  LAST  604      35,3640  3 4777 1            CAF      1SEC
 0808    REF 165  LAST  678      35,3641  0 4616 1            TC       BANKCALL
 0809    REF  11  LAST  516      35,3642   01735 1            CADR     DELAYJOB
 0810    REF   1                 35,3643  3 3730 0            CAF      V16N45          TRKMKCNT, TTOGO, +MGA
 0811    REF 166  LAST  680      35,3644  0 4616 1            TC       BANKCALL
 0812    REF  15  LAST  678      35,3645   20476 0            CADR     GOFLASH
 0813    REF   1                 35,3646  0 3651 0            TC       KILCLOCK        TERMINATE
 0814    REF   1                 35,3647  0 3654 0            TC       N45PROC         PROCEED
 0815    REF   1                 35,3650  0 3664 0            TC       CLUPDATE        RECYCLE - RETURN FOR INITIAL COMPUTATION
 0816    REF  13  LAST  430      35,3651  3 0005 1  KILCLOCK  CA       Z
 0817    REF   3  LAST  650      35,3652  55'163 0            TS       DISPDEX
 0818    REF  15  LAST  678    35,3653  0 6001 0              TC       GOTOPOOH
 0819    REF  17  LAST  604    35,3654  4 0076 1   N45PROC    CS       FLAGWRD2
 0820    REF  38  LAST  556    35,3655  7 4746 1              MASK     BIT6
 0821                          35,3656  0 0006 1              EXTEND
 0822    REF   2  LAST  680    35,3657  1 3651 1              BZF      KILCLOCK          FINALFLG IS SET-FLASH V37-AWAIT NEW PGM
 0823    REF  26  LAST  519    35,3660  0 5353 1              TC       PHASCHNG
 0824                          35,3661   04024 0              OCT      04024
 0825    REF  38  LAST  678    35,3662  0 5504 0              TC       UPFLAG            SET
 0826    REF   6  LAST  680    35,3663   00047 1              ADRES    FINALFLG          FINALFLG
 0827    REF  14  LAST  680    35,3664  3 0005 1   CLUPDATE   CA       Z
 0828    REF   4  LAST  680    35,3665  5 5163 0              TS       DISPDEX
 0829    REF  27  LAST  681    35,3666  0 5353 1              TC       PHASCHNG
 0830                          35,3667   04024 0              OCT      04024
 0831    REF  81  LAST  680    35,3670  0 6037 0              TC       INTPRET
 0832                          35,3671   52014 0              CLEAR    GOTO
 0833    REF  11  LAST  678    35,3672   00670 0                       UPDATFLG
 0834    REF   2  LAST  680    35,3673   03464 1                       QSAVED
```

```
P0835     ..... DISPLAYE  .....

R0836     SUBROUTINES USED

R0837           BANKCALL
R0838           GOFLASHR
R0839           GOTOPOOH
R0840           BLANKET
R0841           ENDOFJOB

 0842                              35,3674  0 0006 1  DISPLAYE EXTEND
 0843     REF  12  LAST  676       35,3675  23'463 1           DXCH     NORMEX
 0844     REF   2  LAST  622       35,3676  3 3724 0           CAF      V06N55
 0845     REF 167  LAST  680       35,3677  0 4616 1           TCR      BANKCALL
 0846     REF  16  LAST  680       35,3700   20476 0           CADR     GOFLASH
 0847     REF  16  LAST  681       35,3701  1 6001 1           TCF      GOTOPOOH
 0848     REF  13  LAST  682       35,3702  0 1463 1           TC       NORMEX
 0849                              35,3703  1 3676 1           TCF      -5
```

```
P0853     ..... P3XORP7X   .....

 0854     REF   2  LAST  246    35,3704  3 7744 1  P3XORP7X CAF     HIGH9
 0855     REF  11  LAST  497    35,3705  7 1011 1           MASK    MODREG *
 0856                           35,3706  0 0006 1           EXTEND
 0857                           35,3707  1 3711 1           BZF     +2
 0858     REF 185  LAST  678    35,3710  24 002 0           INCR    Q
 0859                           35,3711  0 0002 0           RETURN

R0860     ..... VNPOOH     .....

R0861     SUBROUTINES USED

R0862           BANKCALL
R0863           GOFLASH
R0864           GOTOPOOH

 0865                           35,3712  0 0006 1  VNPOOH   EXTEND
 0866     REF   6  LAST  677    35,3713  23'465 1           QXCH    RTRN
 0867     REF   3  LAST  630    35,3714  55'615 0           TS      VERBNOUN
 0868     REF   4  LAST  683    35,3715  3 1615 1           CA      VERBNOUN
 0869     REF 168  LAST  682    35,3716  0 4616 1           TC      BANKCALL
 0870     REF  17  LAST  682    35,3717   20476 0           CADR    GOFLASH
 0871     REF  17  LAST  682    35,3720  1 6001 1           TCF     GOTOPOOH
 0872     REF   7  LAST  683    35,3721  0 1465 1           TC      RTRN
 0873                           35,3722  1 3715 0           TCF     -5
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P0874    ..... CONSTANTS .....

 0875                        35,3723   01445 0  V06N37    VN      0637
 0876                        35,3724   01467 0  V06N55    VN      0655
 0877                        35,3725   01472 1  V06N58    VN      0658
 0878                        35,3726   01473 0  V06N59    VN      0659
 0879                        35,3727   01521 0  V06N81    VN      0681
 0880                        35,3730   04055 0  V16N45    VN      1645
 0881                        35,3731   14441 0  TWOPI     2DEC    6.283185307 B-4
 0881                        35,3732   37325 1
 0882                        35,3733   00001 0  MAX250    2DEC    25 E3
 0882                        35,3734   20650 0
 0883                        35,3735   12525 0  THIRD     2DEC    .333333333
 0883                        35,3736   12525 0
 0884                        35,3737   00004 0  ELEPS     2DEC    .27777777 E-3
 0884                        35,3740   21505 1
 0886                        35,3741   77777 0  DP-.01    OCT     77777            CONSTANTS
 0887                        35,3742   61337 1            OCT     61337            ADJACENT         -.01 FOR MGA DSP
 08871                       35,3743   01252 0  EPSFOUR   2DEC    .0416666666
 08871                       35,3744   25253 1
 08872                       35,3745   13434 0  130DEG    2DEC    .3611111111
 08872                       35,3746   16162 0
```

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R0888   ..... INITVEL .....

R0889   MOD NO -1          LOG SECTION - P34-P35, P74-P75
R0890   MOD BY WHITE.P  DATE  21NOV67

R0891   FUNCTIONAL DESCRIPTION

R0892          THIS SUBROUTINE COMPUTES THE REQUIRED INITIAL VELOCITY VECTOR FOR
R0893          A TRAJECTORY OF SPECIFIED TRANSFER TIME BETWEEN SPECIFIED INITIAL
R0894          AND TARGET POSITIONS.  THE TRAJECTORY MAY BE EITHER CONIC OR
R0895          PRECISION DEPENDING ON AN INPUT PARAMETER (NAMELY, NUMBER OF
R0896          OFFSETS).  IN ADDITION, IN THE PRECISION TRAJECTORY CASE, THE
R0897          SUBROUTINE ALSO COMPUTES AN OFFSET TARGET VECTOR, TO BE USED
R0898          DURING PURE-CONIC CROSS-PRODUCT STEERING.  THE OFFSET TARGET
R0899          VECTOR IS THE TERMINAL POSITION VECTOR OF A CONIC TRAJECTORY WHICH
R0900          HAS THE SAME INITIAL STATE AS A PRECISION TRAJECTORY WHOSE
R0901          TERMINAL POSITION VECTOR IS THE SPECIFIED TARGET VECTOR.

R0902          IN ORDER TO AVOID THE INHERENT SINGULARITIES IN THE 180 DEGREE
R0903          TRANSFER CASE WHEN THE (TRUE OR OFFSET) TARGET VECTOR MAY BE
R0904          SLIGHTLY OUT OF THE ORBITAL PLANE, THIS SUBROUTINE ROTATES THIS
R0905          VECTOR INTO A PLANE DEFINED BY THE INPUT INITIAL POSITION VECTOR
R0906          AND ANOTHER INPUT VECTOR (USUALLY THE INITIAL VELOCITY VECTOR),
R0907          WHENEVER THE INPUT TARGET VECTOR LIES INSIDE A CONE WHOSE VERTEX
R0908          IS THE ORIGIN OF COORDINATES, WHOSE AXIS IS THE 180 DEGREE
R0909          TRANSFER DIRECTION, AND WHOSE CONE ANGLE IS SPECIFIED BY THE USER.

R0910          THE LAMBERT SUBROUTINE IS UTILIZED FOR THE CONIC COMPUTATIONS AND
R0911          THE COASTING INTEGRATION SUBROUTINE IS UTILIZED FOR THE PRECISION
R0912          TRAJECTORY COMPUTATIONS.

R0913   CALLING SEQUENCE

R0914          L            CALL
R0915          L+1                  INITVEL
R0916          L+2          (RETURN - ALWAYS)

R0917   INPUT

R0918          (1) RINIT     INITIAL POSITION RADIUS VECTOR
R0919          (2) VINIT     INITIAL POSITION VELOCITY VECTOR
R0920          (3) RTARG     TARGET POSITION RADIUS VECTOR
R0921          (4) DELLT4    DESIRED TIME OF FLIGHT FROM RINIT TO RTARG
R0922          (5) INTIME    TIME OF RINIT
R0923          (6) 0D        NUMBER OF ITERATIONS OF LAMBERT/INTEGRVS
R0924          (7) 2D        ANGLE TO 180 DEGREES WHEN ROTATION STARTS
R0925          (8) RTX1      -2 FOR EARTH, -10D FOR LUNAR
R09251         (9) RTX2      COORDINATE SYSTEM ORIGIN - 0 FOR EARTH, 2 FOR LUNAR
R0926          PUSHLOC SET AT 4D
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R0927   OUTPUT

R0928          (1) RTARG    OFFSET TARGET POSITION VECTOR
R0929          (2) VIPRIME  MANEUVER VELOCITY REQUIRED
R0930          (3) VTPRIME  VELOCITY AT TARGET AFTER MANEUVER
R0931          (4) DELVEET3 DELTA VELOCITY REQUIRED FOR MANEUVER

R0932   SUBROUTINES USED

R0933          LAMBERT
R0934          INTSTALL
R0935          INTEGRVS

 0936   REF   1               11,2000                            SETLOC INTVEL
 0937                         11,2000                            BANK

 0938   REF   1                                                  COUNT* $$/INITV
 0958                         11,2000   77614 1  INITVEL  SET                     COGA GUESS NOT AVAILABLE
 0959   REF   1               11,2001   00475 1                         GUESSW
 0960                         11,2002   44175 1  HAVEGUES VLOAD  STQ
 0961   REF   6  LAST  675    11,2003   03444 0                         RTARG
 0962   REF  14  LAST  682    11,2004   03463 0                         NORMEX
 0963   REF   1               11,2005   03472 0                  STORE  RTARG1
 09631                        11,2006   77646 0                  ABVAL
 09632  REF   2  LAST  143    11,2007   03723 1                  STORE  RTMAG
 0964                         11,2010   46135 1                  SLOAD  BHIZ
 0965   REF   5  LAST  677    11,2011   03000 1                         RTX2
 0967   REF   1               11,2012   22026 0                         INITVEL1
 0968                         11,2013   72575 0                  VLOAD  VSL2
 0969   REF   3  LAST  673    11,2014   02323 1                         RINIT     B29
 0970   REF   4  LAST  686    11,2015   26323 1                  STOVL  RINIT     B27
 0971   REF   3  LAST  674    11,2016   02331 1                         VINIT     B7
 0972                         11,2017   77752 1                  VSL2
 0973   REF   4  LAST  686    11,2020   26331 1                  STOVL  VINIT     B5
 0974   REF   2  LAST  686    11,2021   03472 0                         RTARG1
 0975                         11,2022   77752 1                  VSL2
 0976   REF   3  LAST  686    11,2023   03472 0                  STORE  RTARG1
 09761                        11,2024   77646 0                  ABVAL
 09762  REF   3  LAST  686    11,2025   03723 1                  STORE  RTMAG
R0977         INITIALIZATION

 0978                         11,2026   71331 0  INITVEL1 SSP    DLOAD     SET ITCTR TO -1,LOAD MPAC WITH E4(PL 2D)
 0979   REF   1               11,2027   03617 1                         ITCTR
 0980                         11,2030   77776 1                         0 -1
 0981                         11,2031   70546 1                  COSINE SR1       CALCULATE COSINE (E4)  (+2)
 0982   REF   1               11,2032   17667 0                  STODL  COZY4     SET COZY4 TO COSINE(E4)         (PL 0D)
 0983                         11,2033   67154 0                  LXA,2  SXA,2
 0984   REF 281  LAST  668    11,2034   00154 1                         MPAC
 0985   REF   2  LAST  125    11,2035   02701 0                         VTARGTAG  SET VTARGTAG TO 0D (SP)
 0986                         11,2036   77775 1                  VLOAD
 0987    REF   5  LAST  686    11,2037    02323 1                      RINIT
 0988    REF   3  LAST  125    11,2040    26655 0            STOVL     R1VEC              R1VEC EQ RINIT
 0989    REF   4  LAST  686    11,2041    03472 0                      RTARG1
 0990    REF   2  LAST  125    11,2042    16663 0            STODL     R2VEC              R2VEC EQ RTARG
 0991    REF   5  LAST  673    11,2043    03452 1                      DELLT4
 0992    REF   2  LAST  125    11,2044    02671 0            STORE     TDESIRED           TDESIRED EQ DELLT4
 0993                          11,2045    77201 1            SETPD     VLOAD
 0994                          11,2046    00001 0                      0D                 INITIALIZE PL TO 0D
 0995    REF   6  LAST  687    11,2047    02323 1                      RINIT              MPAC EQ RINIT (+29)
 0996                          11,2050    41456 0            UNIT      PUSH               UNIT(RI)  (+1)                 (PL 6D)
 0997                          11,2051    53435 0            VXV       UNIT
 0998    REF   5  LAST  686    11,2052    02331 1                      VINIT              MPAC EQ UNIT(RI) X VI   (+8)
 0999    REF   2  LAST  125    11,2053    26674 0            STOVL     UN
 1000    REF   5  LAST  687    11,2054    03472 0                      RTARG1
 1001                          11,2055    50256 0            UNIT      DOT                TEMP=URT.URI  (+2)             (PL 0D)
 1002                          11,2056    43015 1            DAD       CLEAR
 1003    REF   2  LAST  686    11,2057    03667 0                      COZY4
 1004    REF   1               11,2060    03665 1                      NORMSW
 1005    REF   3  LAST  687    11,2061    03667 0            STORE     COZY4
 1006                          11,2062    43044 0  INITVEL2  BPL       SET
 1007    REF   1               11,2063    22105 0                      INITVEL3           UN CALCULATED IN LAMBERT
 1008    REF   2  LAST  687    11,2064    03465 0                      NORMSW
R1009        ROTATE  RC INTO YC PLANE - SET UNIT NORMAL TO YC

 1010                          11,2065    41575 0            VLOAD     PUSH                                              (PL 6D)
 1011    REF   3  LAST  687    11,2066    02663 0                      R2VEC              RC TO 6D  (+29)
 1012                          11,2067    63246 1            ABVAL     PDVL               RC TO MPAC, ABVAL(RC) (+29) TO 0D(PL 2D)
 1013                          11,2070    46206 1            PUSH      VPROJ                                             (PL 8D)
 1014    REF   3  LAST  687    11,2071    02674 0                      UN
 1015                          11,2072    51352 1            VSL2      BVSU
 1016                          11,2073    74256 0            UNIT      VXSC                                              (PL 0D)
 1017                          11,2074    77772 0            VSL1
 1018    REF   4  LAST  687    11,2075    02663 0            STORE     R2VEC
 1019                          11,2076    67351 1            TLOAD     SLOAD
 1020    REF   2  LAST   37    11,2077    24007 0                      ZEROVEC
 1021    REF   2  LAST  686    11,2100    03617 1                      ITCTR
 1022                          11,2101    77244 0            BPL       VLOAD
 1023    REF   2  LAST  687    11,2102    22105 0                      INITVEL3
 1024    REF   5  LAST  687    11,2103    02663 0                      R2VEC
 1025    REF   6  LAST  687    11,2104    03472 0            STORE     RTARG1
 1026                          11,2105    63345 0  INITVEL3  DLOAD     PDVL                                              (PL 2D)
 1027    REF   1               11,2106    26007 1                      MUEARTH            POSITIVE VALUE
 1028    REF   6  LAST  687    11,2107    02663 0                      R2VEC
 102802                        11,2110    63256 0            UNIT      PDVL               2D = UNIT(R2VEC)               (PL 8D)
 102804  REF   4  LAST  687    11,2111    02655 0                      R1VEC
 102806                        11,2112    41456 0            UNIT      PUSH               8D = UNIT(R1VEC)               (PL14D)
 102808                        11,2113    57435 1            VXV       VCOMP              -N = UNIT(R2VEC) X UNIT(R1VEC)
 10281                         11,2114    00003 1                      2D
 10282                         11,2115    77606 1            PUSH                                                        (PL20D)
 10283                         11,2116    71350 1            LXA,1     DLOAD
```

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  10284  RFF   7  LAST  662   11,2117   02776 0                      STX1
  10285                       11,2120   00023 0                      18D
  10286                       11,2121   62040 1             BMN      INCR,1
  10287                       11,2122   22124 0                      +2
  10288                       11,2123   77767 1             DEC      -8
  10289                       11,2124   67310 1             INCR,1   SLOAD
  1029                        11,2125   00012 1                      10D
  10291  REF  14  LAST  669   11,2126   00047 1                      X1
  10292                       11,2127   77230 0             BHIZ     VLOAD                                               (PL14D)
  10293                       11,2130   22132 1                      +2
  10294                       11,2131   41476 1             VCOMP    PUSH                                                (PL20D)
  10295                       11,2132   77775 1             VLOAD                                                        (PL14D)
  10296                       11,2133   50235 0             VXV      DOT                                                 (PL 2D)
  1032                        11,2134   71244 0             BPL      DLOAD                                               (PL 0D)
  1033   REF   1              11,2135   22137 1                      INITVEL4
  1034                        11,2136   41476 1             DCOMP    PUSH                                                (PL 2D)
  1035                        11,2137   67154 0   INITVEL4  LXA,2    SXA,2
  1036                        11,2140   00000 1                      0D
  1037   REF   2  LAST  125   11,2141   02672 0                      GEOMSGN
R1038      SET INPUTS UP FOR LAMBERT

  1039                        11,2142   45150 1             LXA,1    CALL
  1040   REF   8  LAST  688   11,2143   02776 0                      RTX1
R1041       OPERATE THE LAMBERT CONIC ROUTINE (COASTFLT SUBROUTINE)

  1042  *REF   1              11,2144   23765 1                      SETITCTR         GO TO END OF BANK TO SET ITERCTR BEFORE
A1043   *                                                                             CALLING LAMBERT (FOR REMANUFACTURE ONLY)


R1044    ARRIVED AT SOLUTION IS GOOD ENOUGH ACCORDING TO SLIGHTLY WIDER BOUNDS.

  1045                        11,2145   77214 0             CLEAR    VLOAD
  1046   REF   2  LAST  686   11,2146   00675 0                      GUESSW
  1047   REF   8  LAST  663   11,2147   02744 1                      VVEC
R1048    STORE CALCULATED INITIAL VELOCITY REQUIRED IN VIPRIME
R1049
  1050   REF   3  LAST  663   11,2150   16337 1             STODL    VIPRIME          INITIAL VELOCITY REQUIRED  (+7)
R1051
R1052      IF NUMIT IS ZERO, CONTINUE AT INITVELB, OTHERWISE
R1053    SET UP INPUTS FOR ENCKE INTEGRATION (INTEGRVS).

  1054   REF   3  LAST  686   11,2151   02702 0                      VTARGTAG
  1055                        11,2152   45030 0             BHIZ     CALL
  1056   REF   1              11,2153   22230 0                      INITVEL7
  1057   REF  20  LAST  677   11,2154   27414 0                      INTSTALL
  1061                        11,2155   43135 1             SLOAD    CLEAR
  1062   REF   6  LAST  686   11,2156   03000 1                      RTX2
  1063   REF   5  LAST  677   11,2157   00263 0                      MOONFLAG
  1064                        11,2160   43030 0             BHIZ     SET
  1065   REF   1              11,2161   22163 0                      INITVEL5
```

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 1066    REF   6  LAST  688    11,2162    00063 1                    MOONFLAG
 1067                          11,2163    77775 1  INITVEL5 VLOAD
 1068    REF   7  LAST  687    11,2164    02323 1                    RINIT
 1069    REF   5  LAST  687    11,2165    02655 0           STORE    R1VEC
 1070    REF   7  LAST  677    11,2166    25535 0           STOVL    RCV
 1071    REF   4  LAST  688    11,2167    02337 1                    VIPRIME
 1072    REF   6  LAST  677    11,2170    15543 1           STODL    VCV
 1073    REF   5  LAST  673    11,2171    03610 0                    INTIME
 1074    REF   7  LAST  677    11,2172    01517 0           STORE    TET
 1075                          11,2173    43015 1           DAD      CLEAR
 1076    REF   6  LAST  687    11,2174    03452 1                    DELLT4
 1077    REF   9  LAST  677    11,2175    01673 1                    INTYPFLG
 1078    REF  29  LAST  677    11,2176    34041 0           STCALL   TDEC1
 1079    REF   3  LAST  677    11,2177    27107 1                    INTEGRVS
 1080                          11,2200    77775 1           VLOAD
 1081    REF   8  LAST  656    11,2201    00025 0                    VATT1
 1082    REF   2  LAST  125    11,2202    02703 1           STORE    VTARGET
R1083     IF ITERATION COUNTER (ITCTR) EQ NO. ITERATIONS (NUMIT), CONTINUE AT
R1084    INITVELC, OTHERWISE REITERATE LAMBERT AND ENCKE

 1085                          11,2203    63154 1           LXA,2    INCR,2
 1086    REF   3  LAST  687    11,2204    03616 0                    ITCTR
 1087                          11,2205    00001 0                    1D               INCREMENT ITCTR
 1088                          11,2206    55134 1           SXA,2    XSU,2
 1089    REF   4  LAST  689    11,2207    03616 0                    ITCTR
 1090    REF   4  LAST  688    11,2210    02701 0                    VTARGTAG
 1091                          11,2211    46135 1           SLOAD    BHIZ             IF SP(MPAC) EQ 0, CONTINUE AT INITVELC
 1092    REF   9  LAST  656    11,2212    00050 1                    X2
 1093    REF   1               11,2213    22225 1                    INITVEL6
R1094
R1095      OFFSET CONIC TARGET VECTOR

 1096                          11,2214    52375 1           VLOAD    VSU
 1097    REF   7  LAST  687    11,2215    03472 0                    RTARG1
 1098    REF   5  LAST  656    11,2216    00017 1                    RATT1
 1099                          11,2217    77655 1           VAD
 1100    REF   7  LAST  687    11,2220    02663 0                    R2VEC
 1101    REF   8  LAST  689    11,2221    16663 0           STODL    R2VEC
 1102    REF   4  LAST  687    11,2222    03667 0                    CCZY4
 1103                          11,2223    77650 1           GOTO
 1104    REF   1               11,2224    22062 0                    INITVEL2         CONTINUE ITERATING AT INITVEL2
R1105    COMPUTE THE DELTA VELOCITY

 1106                          11,2225    77775 1  INITVEL6 VLOAD
 1107    REF   9  LAST  689    11,2226    02663 0                    R2VEC
 1108    REF   8  LAST  689    11,2227    03472 0           STORE    RTARG1
 1109                          11,2230    52375 1  INITVEL7 VLOAD    VSU
 1110    REF   5  LAST  689    11,2231    02337 1                    VIPRIME
 1111    REF   6  LAST  687    11,2232    02331 1                    VINIT
 1112    REF   9  LAST  679    11,2233    26366 0           STOVL    DELVEET3         DELVEET3 = VIPRIME-VINIT  (+7)
 1113    REF   3  LAST  689    11,2234    02703 1                      VTARGET
 1114    REF   2  LAST  663    11,2235    03566 1            STORE     VTPRIME
 1115                          11,2236    46135 1            SLOAD     BHIZ
 1116    REF   7  LAST  688    11,2237    03000 1                      RTX2
 1117    REF   1               11,2240    22255 0                      INITVELX
 11171                         11,2241    70575 1            VLOAD     VSR2
 11172   REF   3  LAST  690    11,2242    03566 1                      VTPRIME
 1118    REF   4  LAST  690    11,2243    27566 1            STOVL     VTPRIME
 1119    REF   6  LAST  689    11,2244    02337 1                      VIPRIME
 1120                          11,2245    77742 0            VSR2
 1121    REF   7  LAST  690    11,2246    26337 1            STOVL     VIPRIME
 1122    REF   9  LAST  [illegible]  11,2247    03472 0                      RTARG1
 1123                          11,2250    77742 0            VSR2
 1124    REF  10  LAST  690    11,2251    27472 0            STOVL     RTARG1
 1125    REF  10  LAST  689    11,2252    02366 0                      DELVEET3
 1126                          11,2253    77742 0            VSR2
 1127    REF  11  LAST  690    11,2254    02366 0            STORE     DELVEET3
 1128                          11,2255    70750 1  INITVELX  LXA,1     DLOAD*
 11281   REF   9  LAST  688    11,2256    02776 0                      RTX1
 11282   REF   1               11,2257    10003 0                      MUTABLE -2,1
 112825                        11,2260    41206 0            PUSH      DMP
 11283   REF   3  LAST  648    11,2261    02742 1                      R1A
 11284                         11,2262    56342 1            SL1       DDV
 11285   REF   4  LAST  648    11,2263    00041 1                      R1
 11286   REF   2  LAST  143    11,2264    17721 0            STODL     MU/A
 11287                         11,2265    77661 0            SP
 112871                        11,2266    20607 1                      6
 112875  REF   2  LAST  143    11,2267    03717 0            STORE     MUASTEER
 11288                         11,2270    77201 1            SETPD     VLOAD
 1129                          11,2271    00001 0                      0D
 1130    REF  11  LAST  690    11,2272    03472 0                      RTARG1
 1131    REF   7  LAST  686    11,2273    37444 1            STCALL    RTARG
 1134    REF  15  LAST  686    11,2274    03463 0                      NORMEX
R1135
R1136      ..... END OF INITVEL ROUTINE .....
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R1137    ..... MIDGIM .....

R1138    MOD NO. 0, BY WILLMAN, SUBROUTINE RENDGUID, LOG P34-P35, P74-P75
R1139     REVISION 03, 17 FEB 67

R1140              IF THE ACTIVE VEHICLE IS DOING THE COMPUTATION, MIDGIM COMPUTES
R1141    THE POSITIVE MIDDLE GIMBAL ANGLE OF THE ACTIVE VEHICLE TO THE INPUT
R1142    DELTA VELOCITY VECTOR (OD IN PUSH LIST),  OTHERWISE
R1143    MIDGIM CONVERTS THE INPUT DELTA VELOCITY VECTOR FROM INERTIAL COORDIN-
R1144    ATES TO LOCAL VERTICAL COORDINATES OF THE ACTIVE VEHICLE.

R1145      .. INPUTS ..

R1146        NAME        MEANING                                  UNITS/SCALING/MODE

R1147       AVFLAG  INT FLAG - 0 IS CSM ACTIVE, 1 IS LEM ACTIVE              BIT
R1148       RINIT   ACTIVE VEHICLE RADIUS VECTOR             METERS/CSEC (+7) VT
R1150       VINIT   ACTIVE VEHICLE VELOCITY VECTOR           METERS/CSEC (+7) VT
R1151       OD (PL) ACTIVE VEHICLE DELTA VELOCITY VECTOR     METERS/CSEC (+7) VT

R1152      .. OUTPUTS ..

R1153        NAME        MEANING                                  UNITS/SCALING/MODE

R1154         +MGA   + MIDDLE GIMBAL ANGLE                  REVOLUTIONS (+0)  DP
R1155       DELVLVC DELTA VELOCITY VECTOR IN LV COORD.      METERS/CSEC (+7)  VT
R1156      MGLVFLAG INT FLAG - 0 IS +MGA COMPUTED, 1 IS DELVLVC COMP.  -     BIT

R1157      .. CALLING SEQUENCE ..

R1158    L          CALL
R1159    L+1                MIDGIM
R1160    L+2        (RETURN - ALWAYS)

R1161      .. NO SUBROUTINES CALLED ..

R1162      .. DEBRIS - ERASEABLE TEMPORARY USAGE

R1163           A,Q,L, PUSH LIST, MPAC.

R1164      .. ALARMS - NONE ..
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P1165   MIDDLE GIMBAL ANGLE COMPUTATION.

 1166   REF    1                  06,2000                             SETLOC  MIDDGIM
 1167                             06,3715                             BANK

 1168   REF    1                                                      COUNT*  $$/MIDG

 1169                             06,3715   20000 0   HALFREV   2DEC    1 B-1
 1169                             06,3716   00000 1
 1176                             06,3717   53575 0   GET+MGA   VLOAD   UNIT              (PL 0D) V (+7) TO MPAC, UNITIZE  UV (+1)
 1176                             06,3720   77656 1             UNIT
 1177                             06,3721   72441 0             DOT     SL1               DOT UV WITH Y(STABLE MEMBER) AND RESCALE
 1178   REF   16   LAST   592     06,3722   01742 1                     REFSMMAT +6        FROM +2 TO +1 FOR ASIN ROUTINE
 1179                             06,3723   51136 1             ARCSIN  BPL
 1180   REF    1                  06,3724   15730 1                     SETMGA
 1181                             06,3725   43215 0             DAD     DAD               CONVERT -MGA TO +MGA BY
 1182   REF    1                  06,3726   15716 0                     HALFREV           ADDING ONE REVOLUTION
 1183   REF    2   LAST   692     06,3727   15716 0                     HALFREV
 1184   REF    5   LAST   680     06,3730   02253 1   SETMGA    STORE   +MGA
 1185                             06,3731   43414 1             CLR     RVQ               CLEAR MGLVFLAG TO INDICATE +MGA CALC
 1186   REF    1                  06,3732   02675 1                     MGLVFLAG              AND EXIT
 1191                             06,3733   53575 0   GET.LVC   VLOAD   UNIT              (PL 6D)   R (+29) IN MPAC, UNITIZE  UR
 1192   REF    8   LAST   689     06,3734   02323 1                     RINIT
 1193                             06,3735   77676 0             VCOMP                     U(-R)
 1194                             06,3736   00023 0             STORE   18D               U(-R) TO 18D
 1195                             06,3737   53435 0             VXV     UNIT              U(-R)*V EQ V*U(R), U(V*R)
 1196   REF    7   LAST   689     06,3740   02331 1                     VINIT
 1197                             06,3741   00015 0             STORE   12D               U(V*R) TO 12D
 1198                             06,3742   53435 0             VXV     UNIT              U(V*R)*U(-R), U((V*R)*(-R))
 1199                             06,3743   00023 0                     18D
 1200                             06,3744   24007 0             STOVL   6D                TRANSFORMATION MATRIX IS IN 6D (+1)
 1201                             06,3745   00001 0                     0D                DELTA V (+7) IN 0D
 1202                             06,3746   76521 0             MXV     VSL1              CONVERT FROM INER COOR TO LV COOR (+8)
 1203                             06,3747   00007 0                     6D                 AND SCALE +7 IN MPAC
 1204   REF   19   LAST   678     06,3750   03434 1             STORE   DELVLVC           STORE IN DELVLVC (+7)
 1205                             06,3751   43414 1             SET     RVQ               SET MGLVFLAG TO INDICATE LVC CALC
 1206   REF    2   LAST   692     06,3752   02475 0                     MGLVFLAG              AND EXIT
R1207      ..... END OF MIDGIM ROUTINE .....
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P1208
 12082                            10,2000                          BANK     10
 12084  REF    1                  10,2000                          SETLOC SLCTMU
 12086                            10,2000                          BANK
 12088  REF    1                                                   COUNT* $$/MIDG

 1209                             10,2000    77160 0   SELECTMU AXC,1    AXT,2
 1210                             10,2001    00002 0                     2D
 1211                             10,2002    00000 1                     0D
 1212                             10,2003    77614 1            BOFF
 1213   REF    4  LAST   677      10,2004    04343 1                     CMOONFLG
 1214   REF    1                  10,2005    20011 0                     SETMUER
 1215                             10,2006    77160 0            AXC,1    AXT,2
 1216                             10,2007    00012 1                     10D
 1217                             10,2010    00002 0                     2D
 1218                             10,2011    66143 1   SETMUER  DLOAD*   SXA,1
 1219   REF    2  LAST   690      10,2012    10011 0                     MUTABLE +4,1
 1220   REF   10  LAST   690      10,2013    02776 0                     RTX1
 1221   REF    4  LAST   635      10,2014    22317 1            STODL*   RTSR1/MU
 1222   REF    3  LAST   693      10,2015    10003 0                     MUTABLE -2,1
 1223                             10,2016    54214 1            BOFF     SR
 1224   REF    5  LAST   693      10,2017    04343 1                     CMOONFLG
 1225   REF    1                  10,2020    20022 0                     RTRNMU
 1226                             10,2021    20607 1                     6D
 1227   REF    4  LAST   648      10,2022    02321 0   RTRNMU   STORE    RTMU
 1228                             10,2023    43134 0            SXA,2    CLEAR
 1229   REF    8  LAST   690      10,2024    02777 1                     RTX2
 1230   REF    7  LAST   681      10,2025    01271 1                     FINALFLG
 1234                             10,2026    77650 1            GOTO
 1235   REF    6  LAST   666      10,2027    73606 0                     VN1645
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P1236    ..... PERIAPO .....

R1237    MOD NO -1        LOG SECTION - P34-P35, P74-P75
R1238    MOD BY WHITE.P   DATE  1 JAN69

R1239    FUNCTIONAL DESCRIPTION

R1240            THIS SUBROUTINE COMPUTES THE TWO BODY APOCENTER AND PERICENTER
R1241            ALTITUDES GIVEN THE POSITION AND VELOCITY VECTORS FOR A POINT ON
R1242            THE TRAJECTORY AND THE PRIMARY BODY.

R1243            SETRAD IS CALLED TO DETERMINE THE RADIUS OF THE PRIMARY BODY.

R1244            APSIDES IS CALLED TO SOLVE FOR THE TWO BODY RADII OF APOCENTER AND
R1245            PERICENTER AND THE ECCENTRICITY OF THE TRAJECTORY.

R1246    CALLING SEQUENCE

R1247            L            CALL
R1248            L+1                  PERIAPO
R1249            L+2          (RETURN - ALWAYS)

R1250    INPUT

R1251            (1) RVEC     POSITION VECTOR IN METERS
R1252                         SCALE FACTOR - EARTH +29, MOON +27
R1253            (2) VVEC     VELOCITY VECTOR IN METERS/CENTISECOND
R1254                         SCALE FACTOR - EARTH +7, MOON +5
R1255            (3) X1       PRIMARY BODY INDICATOR
R1256                         EARTH -2, MOON -10

R1257    OUTPUT

R1258            (1) 2D       APOCENTER RADIUS IN METERS
R1259                         SCALE FACTOR - EARTH +29, MOON +27
R1260            (2) 4D       APOCENTER ALTITUDE IN METERS
R1261                         SCALE FACTOR - EARTH +29, MOON P27
R1262            (3) 6D       PERICENTER RADIUS IN METERS
R1263                         SCALE FACTOR - EARTH +29, MOON +27
R1264            (4) 8D       PERICENTER ALTITUDE IN METERS
R1265                         SCALE FACTOR - EARTH +29, MOON +27
R1266            (5) ECC      ECCENTRICITY OF CONIC TRAJECTORY
R1267                         SCALE FACTOR - +3
R1268            (6) XXXALT   RADIUS OF THE PRIMARY BODY IN METERS
R1269                         SCALE FACTOR - EARTH +29, MOON +27
R1270            (7) PUSHLOC  EQUALS 10D

R1271    SUBROUTINES USED

R1272            SETRAD
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R1273          APSIDES

 1274  REF   1                23,2000                       SETLOC APOPERI
 1275                         23,2314                       BANK

 1276  REF   1                                              COUNT* $$/PERAP

 1277                         23,2314   00302 0  RPAD       2DEC   6373338 B-29   STANDARD RADIUS  OF PAD 37-B.
 1277                         23,2315   17755 0
A1278                                                                             = 20 909 901.57 FT

 1279                         23,2316   53754 1  PERIAPO1   LXA,2  VSR*
 1280  REF   9  LAST   693    23,2317   02777 1                    RTX2
 1281                         23,2320   57176 0                    0,2
 1282  REF   9  LAST   688    23,2321   26744 1             STOVL  VVEC
 1283                         23,2322   53750 0             LXA,1  VSR*
 1284  REF  11  LAST   693    23,2323   02776 0                    RTX1
 1285                         23,2324   57176 0                    0,2
 1286  REF   7  LAST   662    23,2325   02655 0             STORE  RVEC
 1287                         23,2326   45020 1  PERIAPO    STQ    CALL
 1288  REF  16  LAST   690    23,2327   03463 0                    NORMEX
 1289  REF   1                23,2330   46344 0                    SETRAD
 1290  REF   2  LAST   142    23,2331   37671 0             STCALL XXXALT
 1291  REF   1                23,2332   25674 0                    APSIDES
 1292                         23,2333   41401 1             SETPD  PUSH           2D = APOCENTER RADIUS   B29 OR B27
 1293                         23,2334   00003 1                    2D
 1294                         23,2335   45225 1             DSU    PDDL           4D = APOGEE ALTITUDE    B29 OR B27
 1295  REF   3  LAST   695    23,2336   03671 1                    XXXALT
 1296                         23,2337   00001 0                    0D
 1297                         23,2340   45206 1             PUSH   DSU            6D = PERICENTER RADIUS  B29 OR B27
 1298  REF   4  LAST   695    23,2341   03671 1                    XXXALT
 1299                         23,2342   52006 0             PUSH   GOTO           8D = PERIGEE ALTITUDE   B29 OR B27
 1300  REF  17  LAST   695    23,2343   03463 0                    NORMEX
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P1301    SETRAD
 1302                             23,2344    41545 0  SETRAD     DLOAD    PUSH
 1303    REF   1                  23,2345    06315 0                      RPAD
 1304                             23,2346    03130 0             SXA,1    INCR,2
 1305    REF  10  LAST   689      23,2347    00047 1                      X2
 1306                             23,2350    00002 0                      2D
 1307                             23,2351    46135 1             SLOAD    BHIZ
 1308    REF  11  LAST   696      23,2352    00050 1                      X2
 1309    REF   1                  23,2353    46357 1                      SETRADX
 1310                             23,2354    51575 1             VLOAD    ABVAL
 1311    REF   3  LAST   200      23,2355    02023 1                      RLS
 1312                             23,2356    77725 1             PDDL
 1313                             23,2357    43545 1  SETRADX    DLOAD    RVQ
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P1314   PRECSET
 1315                               23,2360   77620 0  PRECSET  STQ
 1316   REF  18  LAST  695          23,2361   03463 0                   NORMEX
 1317   REF   2  LAST  622          23,2362   37574 0           STCALL  TDEC2
 1318   REF   5  LAST  652          23,2363   27057 0                   LEMPREC
 1319                               23,2364   77624 1           CALL
 1320   REF   1                     23,2365   46376 1                   LEMSTORE
 1321                               23,2366   77745 1           DLOAD
 1322   REF   3  LAST  697          23,2367   03574 1                   TDEC2
 1323   REF  30  LAST  689          23,2370   34041 0           STCALL  TDEC1
 1324   REF   3  LAST  207          23,2371   27043 0                   CSMPREC
 1325                               23,2372   77624 1           CALL
 1326   REF   1                     23,2373   46406 1                   CSMSTORE
 1327                               23,2374   77650 1           GOTO
 1328   REF  19  LAST  697          23,2375   03463 0                   NORMEX
 1329                               23,2376   43175 0  LEMSTORE VLOAD   BOFF
 1330   REF  16  LAST  677          23,2377   00001 0                   RATT
 1331   REF   3  LAST  629          23,2400   01352 1                   AVFLAG
 1332   REF   4  LAST  670          23,2401   46412 1                   PASSIVE
 1333   REF  20  LAST  677          23,2402   27536 1  ACTIVE   STOVL   RACT3
 1334   REF  12  LAST  673          23,2403   00007 0                   VATT
 1335   REF  13  LAST  675          23,2404   03544 1           STORE   VACT3
 1336                               23,2405   77616 0           RVQ
 1337                               23,2406   43175 0  CSMSTORE VLOAD   BOFF
 1338   REF  17  LAST  697          23,2407   00001 0                   RATT
 1339   REF   4  LAST  697          23,2410   01352 1                   AVFLAG
 1340   REF   4  LAST  670          23,2411   46402 0                   ACTIVE
 1341   REF  11  LAST  673          23,2412   27552 0  PASSIVE  STOVL   RPASS3
 1342   REF  13  LAST  697          23,2413   00007 0                   VATT
 1343   REF   8  LAST  673          23,2414   03560 1           STORE   VPASS3
 1344                               23,2415   77616 0           RVQ
```

```
P1345    VECSHIFT
  1346                               23,2416    53754 1  VECSHIFT LXA,2  VSR*
  1347   REF  10   LAST   695        23,2417    02777 1                  RTX2
  1348                               23,2420    57176 0                  0,2
  1349                               23,2421    63350 1           LXA,1  PDVL
  1350   REF  12   LAST   695        23,2422    02776 0                  RTX1
  1351                               23,2423    63257 1           VSR*   PDVL
  1352                               23,2424    57176 0                  0,2
  1353                               23,2425    77616 0           RVQ
```

```
P1354    SHIFTR1
 1355                         23,2426    53754 1   SHIFTR1   LXA,2   SL*
 1356    REF  11  LAST  698   23,2427    02777 1                     RTX2
 1357                         23,2430    57576 1                     0,2
 1358                         23,2431    77616 0             RVQ
```

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R1359    PROGRAM DESCRIPTION
R1360    SUBROUTINE NAME         R36   OUT-OF-PLANE RENDEZVOUS ROUTINE
R1361    MOD NO.  0                    DATE        22 DECEMBER 67
R1362    MOD BY    N.M.NEVILLE         LOG SECTION   EXTENDED VERBS
R1363    FUNCTIONAL DESCRIPTION

R1364    TO DISPLAY AT ASTRONAUT REQUEST LGC CALCULATED RENDEZVOUS
R1365    OUT-OF-PLANE PARAMETERS (Y , YDOT , PSI). (REQUESTED BY DSKY).

R1366    CALLING SEQUENCE

R1367    ASTRONAUT REQUEST THROUGH DSKY  V 90 E

R1368    SUBROUTINES CALLED

R1369    EXDSPRET
R1370    GOMARKF
R1371    CSMPREC
R1372    LEMPREC
R1373    SGNAGREE
R1374    LOADTIME

R1375    NORMAL EXIT MODES

R1376    ASTRONAUT REQUEST THROUGH DSKY TO TERMINATE PROGRAM V 34 E

R1377    ALARM OR ABORT EXIT MODES

R1378    NONE

R1379    OUTPUT

R1380    DECIMAL DISPLAY OF TIME , Y , YDOT AND PSI

R1381    DISPLAYED VALUES Y , YDOT , AND PSI , ARE STORED IN ERASABLE
R1382    REGISTERS RANGE , RRATE AND RTHETA RESPECTIVELY.

R1383    ERASABLE INITIALIZATION REQUIRED

R1384    CSM AND LEM STATE VECTORS

R1385    DEBRIS

R1386    CENTRALS A,Q,L

R1387    OTHER THOSE USED BY THE ABOVE LISTED SUBROUTINES

 1388                            20,2115                        BANK    20
 1389    REF    1                04,2000                        SETLOC R36LM
 1390                            04,2656                        BANK
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```
1391   REF   3  LAST 284   E4,1606                       EBANK=  RPASS36

1392   REF   1                                           COUNT*  $$/R36

1393                       04,2656   22 007 0  R36       ZL
1394   REF 128  LAST 650   04,2657   3 4755 1            CAF     ZERO           SET TIME OF EVENT TO ZERO FOR FIRST
1395   REF   6  LAST 305   04,2660   53'052 0            DXCH    DSPTEMX        DISPLAY
1396   REF   1             04,2661   3 3011 1            CAF     VC6N16N
1397   REF 169  LAST 683   04,2662   0 4616 1            TC      BANKCALL
1398   REF   9  LAST 278   04,2663    20334 1            CADR    GOMARKF
1399   REF  36  LAST 609   04,2664   1 5472 1            TCF     ENDEXT         TERMINATE
1400                       04,2665   1 2667 0            TCF     +2             PROCEED
1401                       04,2666   1 2661 0            TCF     -5             RECYCLE FOR ASTRONAUT INPUT TIME
1402   REF   7  LAST 701   04,2667   53'052 0            DXCH    DSPTEMX
1403                       04,2670   0 0006 1            EXTEND
1404   REF   1             04,2671   1 3000 0            BZF     LREGCHK        A-REG ZERO GOTO CHECK L-REG FOR ZERO
1405   REF 282  LAST 686   04,2672   52 155 1  ASTROTIM  DXCH    MPAC           A-REG NON-ZERO, TIME = ASTRO INPUT TIME
1406   REF  82  LAST 691   04,2673   0 6037 0            TC      INTPRET
1407                       04,2674    77634 0            RTB
1408   REF   1             04,2675    21716 1                    DPMODE
1409   REF  31  LAST 697   04,2676    34041 0  R36INT    STCALL  TDEC1
1410   REF   1             04,2677    27043 0                    OTHPREC
1411                       04,2700    63375 0            VLOAD   PDVL
1412   REF  14  LAST 697   04,2701    00007 0                    VATT
1413   REF  18  LAST 697   04,2702    00001 0                    RATT            -
1414   REF   4  LAST 701   04,2703    02207 0            STORE   RPASS36         R
1415                       04,2704    63256 0            UNIT    PDVL             P
1416                       04,2705    53435 0            VXV     UNIT            -
1417                       04,2706    77626 0            STADR
1418   REF   1             04,2707    61562 1            STODL   UNP36           U
1419   REF   9  LAST 657   04,2710    00015 0                    TAT
1420   REF  32  LAST 701   04,2711    34041 0            STCALL  TDEC1
1421   REF   1             04,2712    27057 0                    THISPREC
1422                       04,2713    63375 0            VLOAD   PDVL                               -
1423   REF  15  LAST 701   04,2714    00007 0                    VATT            VELOCITY VECTOR   V              00D
1424   REF  19  LAST 701   04,2715    00001 0                    RATT                                A
1425                       04,2716    77725 1            PDDL
1426   REF  10  LAST 701   04,2717    00015 0                    TAT             SAVE TIME IN LOCATION 30D FOR REDISPLAY
1427                       04,2720    24037 0            STOVL   30D                                -
1428                       04,2721    41406 0            PUSH    PUSH            POSITION VECTOR   R   IN  06D AND 12D
1429                       04,2722    63245 1            BVSU    PDVL                                A - -
1430   REF   5  LAST 701   04,2723    02207 0                    RPASS36         LINE OF SIGHT VECTOR R - R       12D
1431                       04,2724    72441 0            DOT     SL1                                    P   A
1432   REF   2  LAST 701   04,2725    02215 0                    UNP36               -  -
1433   REF   9  LAST 317   04,2726    26201 0            STOVL   RANGE           Y = U .R
1434                       04,2727    00001 0                    00D                      A
1435                       04,2730    72441 0            DOT     SL1
1436   REF   3  LAST 701   04,2731    02215 0                    UNP36           .   -  -
1437   REF   5  LAST 317   04,2732    26203 1            STOVL   RRATE           Y = U .V
1438                       04,2733    00007 0                    06D             -       A    -
```

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1439                             04,2734   41456 0            UNIT    PUSH        U   = UNIT( R  )                  18D
1440                             04,2735   47235 0            VXV     VXV          RA           A
1441                             04,2736   00001 0                    00D          -   -   -     -
1442                             04,2737   00023 0                    18D         (U  XV )XU    =U
1443                             04,2740   53552 0            VSL2    UNIT          RA  A   RA    A
144305                           04,2741   77656 1            UNIT
1444                             04,2742   24001 0            STOVL   00D         UNIT HORIZONTAL IN FORWARD DIR.   00D
1445                             04,2743   00023 0                    18D
1446                             04,2744   74241 0            DOT     VXSC        -
1447                             04,2745   00015 0                    12D         U
1448                             04,2746   77752 1            VSL2                 L
1449                             04,2747   53445 1            BVSU    UNIT
144905                           04,2750   77656 1            UNIT
1450                             04,2751   50206 0            PUSH    DOT         LOS PROJECTED INTO HORIZONTAL     12D
1451                             04,2752   00001 0                    00D         PLANE
1452                             04,2753   65552 0            SL1     ARCCOS                  -  -
1453      REF   5  LAST   317    04,2754   26205 1            STOVL   RTHETA      PSI= ARCCOS(U .U )
1454                             04,2755   50235 0            VXV     DOT                      A  L
1455                             04,2756   00001 0                    00D
1456                             04,2757   71244 0            BPL     DLOAD
1457      REF   1                04,2760   10765 1                    R36TAG2
1458      REF   2  LAST    37    04,2761   24020 0                    LODPMAX
1459                             04,2762   77625 0            DSU
1460      REF   6  LAST   702    04,2763   02205 1                    RTHETA
1461      REF   7  LAST   702    04,2764   02205 1            STORE   RTHETA
1462                             04,2765   47145 1  R36TAG2   DLOAD   RTB
1463                             04,2766   00037 0                    30D
1464      REF   2  LAST   376    04,2767   21612 1                    SGNAGREE
1465      REF   8  LAST   701    04,2770   01052 1            STORE   DSPTEMX
1466                             04,2771   77776 1            EXIT
1467      REF   1                04,2772  3 3012 1            CAF     V06N90N     DISPLAY Y , YDOT , AND PSI
1468      REF 170  LAST   701    04,2773  0 4616 1            TC      BANKCALL
1469      REF  10  LAST   701    04,2774   20334 1            CADR    GOMARKF
1470      REF  37  LAST   701    04,2775  1 5472 1            TCF     ENDEXT     TERMINATE
1471      REF  38  LAST   702    04,2776  1 5472 1            TCF     ENDEXT     PROCEED , END OF PROGRAM
1472      REF   2  LAST   284    04,2777  1 2661 0            TCF     R36 +3     REDISPLAY OUTPUT
1473      REF  93  LAST   678    04,3000  56 001 0  LREGCHK   XCH     L
1474                             04,3001  0 0006 1            EXTEND
1475      REF   1                04,3002  1 3005 0            BZF     ENTTIM2    L-REG ZERO ,SET TIME = PRESENT TIME
1476      REF  94  LAST   702    04,3003  56 001 0            XCH     L          L-REG NON ZERO, TIME = ASTRO INPUT TIME
1477      REF   1                04,3004  1 2672 1            TCF     ASTROTIM
1478      REF  83  LAST   701    04,3005  0 6037 0  ENTTIM2   TC      INTPRET
1479                             04,3006   52034 1            RTB     GOTO
1480      REF  14  LAST   666    04,3007   21573 0                    LOADTIME
1481      REF   1                04,3010   10676 1                    R36INT
1482                             04,3011   01420 0  V06N16N   VN      00616
1483                             04,3012   01532 1  V06N90N   VN      00690
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P0001
 0002                          40,3674                       BANK    40
 0003   REF    1               40,2000                       SETLOC  R31LOC
 0004                          40,3674                       BANK

 0005   REF    1                                             COUNT*  $$/R31

 0006   REF    9  LAST   260   40,3674  3 5015 0  R31CALL    CAF     PRIO3
 0007   REF   24  LAST   592   40,3675  0 5105 0             TC      FINDVAC
 0008   REF   23  LAST   680   E7,1470                       EBANK=  SUBEXIT
 0009   REF    1               40,3676   03121 0             2CADR   V83CALL
 0009   REF    1               40,3677   76067 1
 0010   REF   10  LAST   561   40,3700  0 5221 0  DSPDELAY   TC      FIXDELAY
 0011                          40,3701   00144 0             DEC     100
 0012   REF    9  LAST   488   40,3702  3 1044 0             CA      EXTVBACT
 0013   REF   25  LAST   597   40,3703  7 4740 1             MASK    BIT12
 0014                          40,3704  0 0006 1             EXTEND
 0015   REF    1               40,3705  1 3700 1             BZF     DSPDELAY

 0016   REF    5  LAST   488   40,3706  3 5017 1             CAF     PRIO5
 0017   REF   14  LAST   605   40,3707  0 5072 1             TC      NOVAC
 0018   REF    3  LAST   666   E7,1611                       EBANK=  TSTFLT
 0019   REF    1               40,3710   03113 1             2CADR   DISPN5X
 0019   REF    1               40,3711   76067 1
 0020   REF   30  LAST   605   40,3712  1 5261 0             TCF     TASKOVER

 00202                         37,3113                       BANK    37
 00204  REF    1               37,2000                       SETLOC  R31
 00206                         37,3113                       BANK
 00208  REF    1                                             COUNT*  $$/R31

 0021   REF    1               37,3113  3 3407 1  DISPN5X    CAF     V16N54
 0022   REF  171  LAST   702   37,3114  0 4616 1             TC      BANKCALL
 0023   REF   11  LAST   702   37,3115   20334 1             CADR    GOMARKF
 0024   REF    6  LAST   489   37,3116  0 5563 1             TC      B5OFF
 0025   REF    7  LAST   703   37,3117  0 5563 1             TC      B5OFF
 0026   REF    2  LAST   703   37,3120  1 3113 0             TCF     DISPN5X

 0027   REF    4  LAST   280   37,3121  4 0103 1  V83CALL    CS      FLAGWRD7          TEST AVERAGE G FLAG
 0028   REF    2  LAST   186   37,3122  7 4747 0             MASK    AVEGFBIT
 0029                          37,3123  0 0006 1             EXTEND
 0030   REF    1               37,3124  1 3377 0             BZF     MUNG?             ON - TEST MUNFLAG

 0031   REF    7  LAST   539   37,3125  4 0104 0             CS      FLAGWRD8
 0032   REF    6  LAST   539   37,3126  7 4744 0             MASK    SURFFBIT
 0033                          37,3127  0 0006 1             EXTEND
 0034   REF    1               37,3130  1 3403 1             BZF     ONEBASE           ON SURFACE - BYPASS LEMPREC

 0035   REF   84  LAST   702   37,3131  0 6037 0             TC      INTPRET           EXTRAPOLATE BOTH STATE VECTORS
 0036                          37,3132   77634 0             RTB
 0037    REF  15  LAST  702    37,3133    21573 0                   LOADTIME
 0038    REF  33  LAST  701    37,3134    34041 0          STCALL   TDEC1
 0039    REF   6  LAST  697    37,3135    27057 0                   LEMPREC          PRECISION BASE VECTOR FOR LM
 0040                          37,3136    77775 1          VLOAD
 0041    REF   6  LAST  689    37,3137    00017 1                   RATT1
 0042    REF   1               37,3140    26170 0          STOVL    BASETHP
 0043    REF   9  LAST  689    37,3141    00025 0                   VATT1
 0044    REF   1               37,3142    16105 1          STODL    BASETHV
 0045    REF  11  LAST  701    37,3143    00015 0                   TAT
 0046    REF   1               37,3144    02114 1  DOCMBASE STORE   BASETIME         PRECISION BASE VECTOR FOR CM
 0047    REF  34  LAST  704    37,3145    34041 0          STCALL   TDEC1
 0048    REF   4  LAST  697    37,3146    27043 0                   CSMPREC
 0049                          37,3147    77775 1          VLOAD
 0050    REF   7  LAST  704    37,3150    00017 1                   RATT1
 0051    REF   1               37,3151    26140 0          STOVL    BASEOTP
 0052    REF  10  LAST  704    37,3152    00025 0                   VATT1
 0053    REF   1               37,3153    02120 0          STORE    BASEOTV
 0054                          37,3154    77776 1          EXIT

 0055    REF   5  LAST  703    37,3155  4 0103 1  REV83    CS       FLAGWRD7
 0056    REF   3  LAST  703    37,3156  7 4747 0           MASK     AVEGFBIT
 0057                          37,3157  0 0006 1           EXTEND
 0058    REF   1               37,3160  1 3326 1           BZF      GETRVN           IF AVEGFLAG SET, USE RN,VN

 0059    REF   8  LAST  703    37,3161  4 0104 0           CS       FLAGWRD8
 0060    REF   7  LAST  703    37,3162  7 4744 0           MASK     SURFFBIT
 0061                          37,3163  0 0006 1           EXTEND
 0062    REF   1               37,3164  1 3370 1           BZF      R31SURF          IF ON SURFACE,USE LEMAREC

 0063    REF  85  LAST  703    37,3165  0 6037 0           TC       INTPRET          DO CONIC EXTRAPOLATION FOR BOTH VEHICLES
 0064                          37,3166    77634 0          RTB
 0065    REF  16  LAST  704    37,3167    21573 0                   LOADTIME
 0066    REF  35  LAST  704    37,3170    34041 0          STCALL   TDEC1
 0067    REF  21  LAST  688    37,3171    27414 0                   INTSTALL
 0068                          37,3172    43175 0          VLOAD    CLEAR
 0069    REF   2  LAST  704    37,3173    02170 0                   BASETHP
 0070    REF   7  LAST  689    37,3174    00263 0                   MOONFLAG
 0071    REF   8  LAST  689    37,3175    25535 0          STOVL    RCV
 0072    REF   2  LAST  704    37,3176    02105 1                   BASETHV
 0073    REF   7  LAST  689    37,3177    15543 1          STODL    VCV
 0074    REF   2  LAST  704    37,3200    02114 1                   BASETIME
 0075                          37,3201    43014 0          BOF      SET              GET APPROPRIATE MOONFLAG SETTING
 0076    REF   2  LAST  297    37,3202    04344 0                   MOONTHIS
 0077                          37,3203    77205 0                   +2
 0078    REF   8  LAST  704    37,3204    00063 1                   MOONFLAG
 0079                          37,3205    77614 1          SET
 0080    REF  10  LAST  689    37,3206    01473 0                   INTYPFLG         CONIC EXTRAP.
 0081    REF   8  LAST  689    37,3207    35517 1          STCALL   TET
 0082    REF   4  LAST  689    37,3210    27107 1                   INTEGRVS         INTEGRATION --- AT LAST---
 0083                          37,3211    77775 1  OTHCONIC VLOAD
 0084   REF  20  LAST  701   37,3212   00001 0                     RATT
 0085   REF   7  LAST  339   37,3213   26207 0            STOVL    RONE
 0086   REF  16  LAST  701   37,3214   00007 0                     VATT
 0087   REF   1              37,3215   36215 1            STCALL   VONE          GET SET FOR CONIC EXTRAP.,OTHER.
 0088   REF  22  LAST  704   37,3216   27414 0                     INTSTALL
 0089                        37,3217   71214 0            SET      DLOAD
 0090   REF  11  LAST  704   37,3220   01473 0                     INTYPFLG
 0091   REF  12  LAST  704   37,3221   00015 0                     TAT
 0092   REF  36  LAST  704   37,3222   00041 1  OTHINT    STORE    TDEC1
 0093                        37,3223   43175 0            VLOAD    CLEAR
 0094   REF   2  LAST  704   37,3224   02140 0                     BASEOTP
 0095   REF   9  LAST  704   37,3225   00263 0                     MOONFLAG
 0096   REF   9  LAST  704   37,3226   25535 0            STOVL    RCV
 0097   REF   2  LAST  704   37,3227   02120 0                     BASEOTV
 0098   REF   8  LAST  704   37,3230   15543 1            STODL    VCV
 0099   REF   3  LAST  704   37,3231   02114 1                     BASETIME
 0100                        37,3232   43014 0            BOF      SET
 0101   REF   3  LAST  704   37,3233   04344 0                     MOONTHIS
 0102                        37,3234   77236 0                     +2
 0103   REF  10  LAST  705   37,3235   00063 1                     MOONFLAG
 0104   REF   3  LAST  704   37,3236   35517 1            STCALL   TET
 0105   REF   5  LAST  704   37,3237   27107 1                     INTEGRVS
 0106                        37,3240   52375 1  COMPDISP  VLOAD    VSU
 0107   REF  21  LAST  705   37,3241   00001 0                     RATT
 0108   REF   8  LAST  705   37,3242   02207 0                     RONE
 0109                        37,3243   65234 1            RTB      PDDL
 0110   REF   2  LAST  585   37,3244   21724 0                     NORMUNX1      UNIT(RANGE) TO PD 0-5
 0111                        37,3245   00045 0                     36D
 0112                        37,3246   77657 0            SL*                    RESCALE AFTER NORMUNIT
 0113                        37,3247   20201 0                     0,1
 0114   REF  10  LAST  701   37,3250   26201 0            STOVL    RANGE         SCALED 2(29)M
 0115   REF  17  LAST  705   37,3251   00007 0                     VATT
 0116                        37,3252   50251 1            VSU      DOT           (VCM- VLM).UNIT(LOS), PD=0
 0117   REF   2  LAST  705   37,3253   02215 0                     VONE
 0118                        37,3254   77752 1            SL1                    SCALED 2(7)M/CS
 0119   REF   6  LAST  701   37,3255   26203 1            STOVL    RRATE
 0120   REF   9  LAST  705   37,3256   02207 0                     RONE
 0121                        37,3257   63256 0            UNIT     PDVL          UNIT(R) TO PD 0-5
 0122   REF   6  LAST  580   37,3260   06514 1                     UNITZ
 0123                        37,3261   77624 1            CALL
 0124   REF   1              37,3262   47661 0                     CDU*NBSM
 0125                        37,3263   41505 1            VXM      PUSH          UNIT (Z)/4 TO PD 6-11
 0126   REF  17  LAST  692   37,3264   01734 0                     REFSMMAT
 0127                        37,3265   72431 1            VPROJ    VSL2          UNIT(P)=UNIT(UZ -(UZ)PROJ(UR))
 0128                        37,3266   00001 0                     0D
 0129                        37,3267   53445 1            BVSU     UNIT
 0130                        37,3270   00007 0                     6D
 0131                        37,3271   47315 0            PDVL     VXV           UNIT(P) TO PD 12-17
 0132                        37,3272   00001 0                     0D            UNIT(RL)
 0133   REF   3  LAST  705   37,3273   02215 0                     VONE
 0134                          37,3274   50235 0             VXV     DOT            (UR * VL)*UR . U(P)
 0135                          37,3275   00001 0                     0D
 0136                          37,3276   00013 0                     12D
 0137                          37,3277   77715 1             PDVL                   SIGN TO 12-13 , LOAD U(P)
 0138                          37,3300   75241 1             DOT     SIGN
 0139                          37,3301   00007 0                     6D
 0140                          37,3302   00015 0                     12D
 0141                          37,3303   65512 1             SL2     ACOS           ARCCOS(UP.UZ(SIGN))
 0142   REF   8  LAST  702     37,3304   26205 1             STOVL   RTHETA
 0143                          37,3305   00001 0                     0D
 0144                          37,3306   51041 0             DOT     BPL            IF UP.UZ NEG,
 0145                          37,3307   00007 0                     6D               RTHETA = 1 - RTHETA
 0146                          37,3310   77315 0                     +5
 0147                          37,3311   45345 1             DLOAD   DSU
 0148   REF   9  LAST  675     37,3312   06530 1                     DPPOSMAX
 0149   REF   9  LAST  706     37,3313   02205 1                     RTHETA
 0150   REF  10  LAST  706     37,3314   02205 1             STORE   RTHETA
 0151                          37,3315   77776 1             EXIT

 0152   REF  28  LAST  613     37,3316  3 4747 1             CA      BIT5
 0153   REF  10  LAST  703     37,3317  7 1044 1             MASK    EXTVBACT
 0154                          37,3320  0 0006 1             EXTEND                 IF ANSWERED,
 0155   REF  39  LAST  702     37,3321  1 5472 1             BZF     ENDEXT                  TERMINATE

 0156   REF  11  LAST  706     37,3322  4 1044 1             CS      EXTVBACT
 0157   REF  26  LAST  703     37,3323  7 4740 1             MASK    BIT12
 0158   REF  12  LAST  706     37,3324  2 1044 1             ADS     EXTVBACT       SET BIT 12
 0159   REF   1                37,3325  1 3155 1             TCF     REV83          AND START AGAIN.


 0160   REF   3  LAST  534     37,3326  3 7710 0   GETRVN    CA      PRIO22         INHIBIT SERVICER
 0161   REF  10  LAST  496     37,3327  0 5146 1             TC      PRIOCHNG
 0162   REF  86  LAST  704     37,3330  0 6037 0             TC      INTPRET
 0163                          37,3331   40375 1             VLOAD   SETPD
 0164   REF   5  LAST  320     37,3332   01221 1                     RN             LM STATE VECTOR IN RN,VN
 0165                          37,3333   00001 0                     0
 0166   REF  10  LAST  705     37,3334   26207 0             STOVL   RONE
 0167   REF   5  LAST  320     37,3335   01227 1                     VN
 0168   REF   4  LAST  705     37,3336   26215 0             STOVL   VONE           LOAD R(CSM),V(CSM) IN CASE MUNFLAG SET
 0169   REF   2  LAST  598     37,3337   01726 0                     V(CSM)         (TO INSURE TIME COMPATABILITY)
 0170                          37,3340   65315 0             PDVL    PDDL
 0171   REF   2  LAST  598     37,3341   01720 0                     R(CSM)
 0172   REF   5  LAST  597     37,3342   01235 1                     PIPTIME
 0173                          37,3343   77776 1             EXIT
 0174   REF  10  LAST  703     37,3344  3 5015 0             CA      PRIO3
 0175   REF  11  LAST  706     37,3345  0 5146 1             TC      PRIOCHNG
 0176   REF  87  LAST  706     37,3346  0 6037 0             TC      INTPRET
 0177                          37,3347   77214 0             BOFF    VLOAD
 0178   REF   2  LAST  229     37,3350   03347 1                     MUNFLAG
 0179   REF   1                37,3351   77363 1                     GETRVN2        IF MUNFLAG RESET, DO CM DELTA PRECISION
 0180                             37,3352   60505 1               VXM     VSR4            CHANGE TO REFERENCE SYSTEM AND RESCALE
 0181    REF  18  LAST  705       37,3353   01734 0                       REFSMMAT
 0182                             37,3354   77715 1               PDVL                    R TO PD 0-5
 0183                             37,3355   76505 0               VXM     VSL1
 0184    REF  19  LAST  707       37,3356   01734 0                       REFSMMAT
 0185                             37,3357   40206 1               PUSH    SETPD           V TO PD 5-11
 0186                             37,3360   00001 0                       0
 0187                             37,3361   77650 1               GOTO
 0188    REF   1                  37,3362   77240 1                       COMPDISP


 0189                             37,3363   77624 1   GETRVN2     CALL
 0190    REF  23  LAST  705       37,3364   27414 0                       INTSTALL
 0191                             37,3365   52014 0               CLEAR   GOTO
 0192    REF  12  LAST  705       37,3366   01673 1                       INTYPFLG        PREC EXTRAP FOR OTHER
 0193    REF   1                  37,3367   77222 0                       OTHINT
 0194    REF  88  LAST  706       37,3370  0 6037 0   R31SURF     TC      INTPRET
 0195                             37,3371   77634 0               RTB                     LM IS ON SURFACE, SO PRECISION
 0196    REF  17  LAST  704       37,3372   21573 0                       LOADTIME        INTEGRATION USES PLANETARY INERTIAL
 0197    REF  37  LAST  705       37,3373   34041 0               STCALL  TDEC1           ORIENTATION SUBROUTINE
 0198    REF   7  LAST  704       37,3374   27057 0                       LEMPREC
 0199                             37,3375   77650 1               GOTO                    DO CSM CONIC
 0200    REF   1                  37,3376   77211 0                       OTHCONIC
 0201    REF   2  LAST  186       37,3377  4 0102 0   MUNG?       CS      FLAGWRD6
 0202    REF   2  LAST  186       37,3400  7 4744 0               MASK    MUNFLBIT
 0203                             37,3401  0 0006 1               EXTEND
 0204    REF   2  LAST  704       37,3402  1 3326 1               BZF     GETRVN          IF MUNFLAG SET, CSM BASE NOT NEEDED

 0205    REF  89  LAST  707       37,3403  0 6037 0   ONEBASE     TC      INTPRET         GET CSM BASE VECTOR
 0206                             37,3404   52034 1               RTB     GOTO
 0207    REF  18  LAST  707       37,3405   21573 0                       LOADTIME
 0208    REF   1                  37,3406   77144 0                       DOCMBASE

 0209                             37,3407   04066 0   V16N54      VN      1654
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P5000    1) PROGRAM NAME - TARGET DELTA V PROGRAM (P76).
R5001    2) FUNCTIONAL DESCRIPTION - UPON ENTRY BY ASTRONAUT ACTION, P76 FLASHES DSKY REQUESTS TO THE ASTRONAUT
R5003          TO PROVIDE VIA DSKY (1) THE DELTA V TO BE APPLIED TO THE OTHER VEHICLE STATE VECTOR AND (2) THE
R5005          TIME (TIG) AT WHICH THE OTHER VEHICLE VELOCITY WAS CHANGED BY  EXECUTION OF A THRUSTING MANEUVER. THE
R5007          OTHER VEHICLE STATE VECTOR IS INTEGRATED TO TIG AND UPDATED BY THE ADDITION OF DELTA V (DELTA V HAVING
R5009          BEEN TRANSFORMED FROM LV TO REF COSYS). USING INTEGRVS, THE     PROGRAM THEN INTEGRATES THE OTHER
R5011    VEHICLE STATE VECTOR TO THE STATE VECTOR OF THIS VEHICLE, THUS INSURING THAT THE W-MATRIX AND BOTH VEHICLE
R5013    STATES CORRESPOND TO THE SAME TIME.
R5014    3) ERASABLE INITIALIZATION REQUIRED - NONE.
R5015    4) CALLING SEQUENCES AND EXIT MODES - CALLED BY ASTRONAUT REQUEST THRU DSKY V 37 E 76 E.
R5017          EXITS BY TCF ENDOFJOB.
R5018    5) OUTPUT - OTHER VEHICLE STATE VECTOR INTEGRATED TO TIG AND INCREMENTED BY DELTA V IN REF COSYS.
R5020          THE PUSHLIST CONTAINS THE MATRIX BY WHICH THE INPUT DELTA V MUST BE POST-MULTIPLIED TO CONVERT FROM LV
R5022          TO REF COSYS.
R5023    6) DEBRIS - OTHER VEHICLE STATE VECTOR.
R5024    7) SUBROUTINES CALLED - BANKCALL,GOXDSPF,CSMPREC (OR LEMPREC),ATOPCSM (OR ATOPLEM),INTSTALL,INTWAKE, PHASCHNG
R5026          INTPRET, INTEGRVS, AND MINIRECT.

R5027    8) FLAG USE - MOONFLAG,CMOONFLAG,INTYPFLG,RASFLAG, AND MARKCTR.

 5028                         30,2061                          BANK    30
 5029    REF   1              13,2000                          SETLOC P76LOC
 5030                         13,2207                          BANK

 5031    REF   1                                               COUNT* $$/P76

 5032    REF  19  LAST  675   E7,1441                          EBANK= TIG

 5033    REF  39  LAST  681   13,2207  0 5504 0   P76          TC      UPFLAG
 5034    REF   6  LAST  629   13,2210   00031 0                ADRES   TRACKFLG

 50341   REF  90  LAST  707   13,2211  0 6037 0                TC      INTPRET
 50342                        13,2212   77775 1                VLOAD
 50343   REF  20  LAST  692   13,2213   03434 1                        DELVLVC
 50344   REF   4  LAST  316   13,2214   02223 0                STORE   DELVOV
 50345                        13,2215   77776 1                EXIT

 5035    REF   1              13,2216  3 2336 0                CAF     V06N84          FLASH LAST DELTA V,
 5040    REF 172  LAST  703   13,2217  0 4616 1                TC      BANKCALL        AND WAIT FOR KEYBOARD ACTION.
 5041    REF  18  LAST  683   13,2220   20476 0                CADR    GOFLASH
 5042    REF   1              13,2221  1 2333 1                TCF     ENDP76
 5043                         13,2222  0 2224 1                TC      +2              PROCEED
 5044                         13,2223  0 2216 0                TC      -5              STORE DATA AND REPEAT FLASHING
 5045    REF   2  LAST  709   13,2224  3 2337 1                CAF     V06N84 +1       FLASH VERB 06 NOUN 33, DISPLAY LAST TIG,
 5046    REF 173  LAST  709   13,2225  0 4616 1                TC      BANKCALL        AND WAIT FOR KEYBOARD ACTION.
 5047    REF  19  LAST  709   13,2226   20476 0                CADR    GOFLASH
 5048    REF   2  LAST  709   13,2227  1 2333 1                TCF     ENDP76
 5049                         13,2230  0 2232 0                TC      +2
 5050                         13,2231  0 2224 1                TC      -5
 5051    REF  91  LAST  709   13,2232  0 6037 0                TC      INTPRET         RETURN TO INTERPRETIVE CODE
 5052                       13,2233   77745 1             DLOAD                   SET D(MPAC)=TIG IN CSEC B28
 5053  REF  20  LAST  709   13,2234   03442 0                     TIG
 5054  REF  38  LAST  707   13,2235   34041 0             STCALL  TDEC1           SET TDEC1=TIG FOR ORBITAL INTEGRATION
 5055  REF   2  LAST  701   13,2236   27043 0                     OTHPREC
 5056                       13,2237   53575 0   COMPMAT   VLOAD   UNIT
 5057  REF  22  LAST  705   13,2240   00001 0                     RATT
 5058                       13,2241   77676 0             VCOMP                   U(-R)
 5059                       13,2242   00031 0             STORE   24D             U(-R) TO 24D
 5060                       13,2243   53435 0             VXV     UNIT            U(-R)XV = U(VXR)
 5061  REF  18  LAST  705   13,2244   00007 0                     VATT
 5062                       13,2245   00023 0             STORE   18D
 5063                       13,2246   53435 0             VXV     UNIT            U(VXR)XU(-R) = U((RXV)XR)
 5064                       13,2247   00031 0                     24D
 5065                       13,2250   24015 0             STOVL   12D
 5066  REF   5  LAST  709   13,2251   02223 0                     DELVOV
 5067                       13,2252   76505 0             VXM     VSL1            V(MPAC)=DELTA V IN REFCOSYS
 5068                       13,2253   00015 0                     12D
 5069                       13,2254   77655 1             VAD
 5070  REF  19  LAST  710   13,2255   00007 0                     VATT
 5071                       13,2256   00007 0             STORE   6               V(PD6)=VATT + DELTA V
 5072                       13,2257   77624 1             CALL                    PREVENT WOULD-BE USER OF ORBITAL
 5073  REF  24  LAST  707   13,2260   27414 0                     INTSTALL        INTEG FROM INTERFERING WITH UPDATING
 5074                       13,2261   77624 1             CALL
 5075  REF   1                13,2262   26340 1                     P76SUB1
 5076                       13,2263   53775 1             VLOAD   VSR*
 5077                       13,2264   00007 0                     6
 5078                       13,2265   57176 0                     0,2
 5079  REF   9  LAST  705   13,2266   25543 1             STOVL   VCV
 5080  REF  23  LAST  710   13,2267   00001 0                     RATT
 5081                       13,2270   77657 0             VSR*
 5082                       13,2271   57176 0                     0,2
 5083  REF  10  LAST  705   13,2272   15535 0             STODL   RCV
 5084  REF  21  LAST  710   13,2273   03442 0                     TIG
 5085  REF  10  LAST  705   13,2274   01517 0             STORE   TET
 5086                       13,2275   71214 0             CLEAR   DLOAD
 5087  REF  13  LAST  707   13,2276   01673 1                     INTYPFLG
 5088  REF   1                13,2277   01643 1                     TETTHIS
 5089  REF  39  LAST  710   13,2300   34041 0   INTOTHIS  STCALL  TDEC1
 5090  REF   6  LAST  705   13,2301   27107 1                     INTEGRVS
 5091                       13,2302   77624 1             CALL
 5093  REF  25  LAST  710   13,2303   27414 0                     INTSTALL
 5094                       13,2304   77775 1             VLOAD
 5095  REF   8  LAST  704   13,2305   00017 1                     RATT1
 5096  REF   3  LAST  495   13,2306   01503 0             STORE   RRECT
 5097  REF  11  LAST  710   13,2307   15535 0             STODL   RCV
 5098  REF  13  LAST  705   13,2310   00015 0                     TAT
 5099  REF  11  LAST  710   13,2311   25517 0             STOVL   TET
 5100  REF  11  LAST  704   13,2312   00025 0                     VATT1
 5101                       13,2313   77624 1             CALL
 5102  REF   2  LAST  495   13,2314   23455 1                     MINIRECT
 5103                          13,2315   77776 1              EXIT
 5104   REF  28  LAST  681     13,2316  0 5353 1              TC      PHASCHNG
 5105                          13,2317   04024 0              OCT     04024

 5106   REF  40  LAST  709     13,2320  0 5504 0              TC      UPFLAG
 5107   REF   1                13,2321   00236 0              ADRES   REINTFLG

 5109   REF  92  LAST  709     13,2322  0 6037 0              TC      INTPRET
 5110                          13,2323   77624 1              CALL
 5111   REF   1                13,2324   26661 1                      ATOPOTH
 5116                          13,2325   77531 0              SSP     EXIT
 5117   REF   3  LAST  610     13,2326   00053 1                      QPRET
 5118   REF   1                13,2327   26332 1                      OUT
 5119   REF 174  LAST  709     13,2330  0 4616 1              TC      BANKCALL         PERMIT USE OF ORBITAL INTEGRATION
 5120   REF   1                13,2331   27445 1              CADR    INTWAKE1
 5121                          13,2332   77776 1  OUT         EXIT
 5125   REF 129  LAST  701     13,2333  3 4755 1  ENDP76      CAF     ZERO
 5126   REF   5  LAST  585     13,2334  55'462 1              TS      MARKCTR          CLEAR RR TRACKING MARK COUNTER
 5129   REF  18  LAST  683     13,2335  1 6001 1              TCF     GOTOPOOH

 5130                          13,2336   01524 0  V06N84      NV      0684
 5131                          13,2337   01441 1              NV      0633
 5132                          13,2340   43174 1  P76SUB1     AXT,2   SET
 5133                          13,2341   00002 0                      2
 5134   REF  11  LAST  705     13,2342   00063 1                      MOONFLAG         SET MEANS MOON IS SPHERE OF INFLUENCE.
 5135                          13,2343   77014 1              BON     AXT,2
 5136   REF   6  LAST  693     13,2344   04303 0                      CMOONFLG         SET MEANS PERM CM STATE IN LUNAR SPHERE.
 5137   REF   4  LAST  711     13,2345   00052 0                      QPRET
 5138                          13,2346   00000 1                      0
 5139                          13,2347   43414 1              CLEAR   RVQ
 5140   REF  12  LAST  711     13,2350   00263 0                      MOONFLAG
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R0001    SUBROUTINE NAME:      V82CALL
R0002    MOD NO:  0                                                                  DATE:             16 FEB 67
R0004    MOD BY:  RR BAIRNSFATHER                                                    LOG SECTION:      R30
R0006    MOD NO: 1                MOD BY: R  BAIRNSFATHER       DATE: 11 APR 67      SR30.1 CHANGED TO ALLOW MONITOR OPERN
R0008    MOD  NO: 2               MOD  BY ALONSO                DATE : 11 DEC 67     VB82 PROGRAM REWRITTEN
R0010    MOD NO: 3                MOD  BY ALONSO                DATE: 26 MAR 68      PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R0012     NEW FUNCTIONAL DESCRIPTION:    CALLED BY VERB 82 ENTER.  PRIORITY 10
R0013      USED THROUGHOUT.              CALCULATE AND DISPLAY ORBITAL PARAMETERS

R0014    1. IF AVERAGE G IS OFF:
R0015             FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0016              TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0017              CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0018             SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0019             CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R0020              RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0021              HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0022              HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0023              INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0024             FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0025              NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0026              ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0027              DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0028              ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0029    2. IF AVERAGE G IS ON:
R0030             CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0031              FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0032              OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0033             FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0036    ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R0037              ABOVE REMARKS.

R0038    CALLING SEQUENCE:  VERB 82 ENTER.


R0039    SUBROUTINES CALLED:  SR30.1, GOXDSPF
R0040                         MAYBE - THISPREC , OTHPREC, LOADTIME, DELRSPL
R0041    NORMAL EXIT MODES:  TC ENDEXT

R0042    ALARMS:  NONE

R0043    OUTPUT:  HAPOX     (-29) M
R0044             HPERX     (-29) M
R0045             RAPO      (-29) M EARTH
R0046                       (-27) M MOON
R0047             RPER      (-29) M EARTH
R0048                       (-27) M MOON
R0049             TFF       (-28) CS        CONTAINS NEGATIVE QUANTITY
R0050             -TPER     (-28) CS        CONTAINS NEGATIVE QUANTITY
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R0051
R0052    ERASABLE INITIALIZATION REQUIRED: STATE VECTOR.

R0053    DEBRIS:  QPRET, RONE, VONE,TFF/RTMU, HPERMIN, RPADTEM, V82EMFLG.
R0054             MAYBE: TSTART82, V82FLAGS, TDEC1.


 0055   REF   3  LAST  314   E4,1517                       EBANK= HAPOX
 0056                        31,2144                       BANK    31
 0057   REF   2  LAST   44   22,2000                       SETLOC R30LOC
 0058                        22,3242                       BANK
 0059   REF   2 LAST   44 TO   44:       4        4*       COUNT* $$/P30

 0060   REF  93  LAST  711   22,3242  0 6037 0  V82CALL    TC      INTPRET
 0061                        22,3243   52014 0             BON     GOTO
 0062   REF   2  LAST  228   22,3244   03712 0                     AVEGFLAG
 0063   REF   1              22,3245   45465 1                     V82GON             IF AVERAGE G ON
 0064   REF   1              22,3246   45247 1                     V82GOFF            IF AVERAGE G OFF


 0065                        22,3247   77776 1  V82GOFF    EXIT                       ALLOW ASTRONAUT TO SELECT VEHICLE
 0066   REF  37  LAST  563   22,3250  3 4752 0             CAF     TWO                DESIRED FOR ORBITAL PARAMETERS
 0067   REF  11  LAST  339   22,3251  55'051 0             TS      OPTIONX            CALCULATION AND DISPLAY.
 0068   REF  81  LAST  655   22,3252  3 4753 1             CAF     ONE
 0069   REF  12  LAST  713   22,3253  55'052 0             TS      OPTIONX +1
 0070   REF   1              22,3254  3 3316 0             CAF     OPTIONVN           V 04 N 06
 0071   REF 175  LAST  711   22,3255  0 4616 1             TC      BANKCALL
 0072   REF   8  LAST  608   22,3256   20334 1             CADR    GOXDSPF
 0073   REF  40  LAST  706   22,3257  0 5472 0             TC      ENDEXT             TERMINATE
 0074                        22,3260  0 3262 1             TC      +2                 PROCEED
 0075                        22,3261  0 3254 1             TC      -5                 DATA IN. OPTION1+1 = 1 FOR THIS VEHICLE.
A0076                                                                                            UNEQ 1 FOR OTHER VEHICLE.
 0077   REF  28  LAST  604   22,3262  3 4750 1             CAF     BIT4               80 MS
 0078   REF  30  LAST  650   22,3263  0 5203 0             TC      WAITLIST
 0079   REF   3  LAST  314   E4,1540                       EBANK= TFF
 0080   REF   1              22,3264   03430 0             2CADR   TICKTEST
 0080   REF   1              22,3265   44064 0
 0081                        22,3266  0 0003 1             RELINT
 0082   REF   1              22,3267  3 3320 0  V82GOFLP   CAF     TFFBANK            MAJOR RECYCLE LOOP ENTRY
 0083   REF  20  LAST  678   22,3270  54 003 0             TS      EBANK
 0084   REF 130  LAST  711   22,3271  3 4755 1             CAF     ZERO
 0085   REF   2  LAST  115   22,3272  55'537 0             TS      V82FLAGS           ZERO FLAGS FOR TICKTEST. INHIBITS
A0086                                                                                 DECREMENTING OF TFF AND -TPER.
 0087   REF   6  LAST  292   22,3273  3 5021 1             CAF     PRIO7
 0088   REF  25  LAST  703   22,3274  0 5105 0             TC      FINDVAC            V82GOFF1 WILL EXECUTE STATE VECTOR
 0089   REF   4  LAST  713   E4,1540                       EBANK= TFF                 UPDATE AND ORBIT CALCULATIONS FOR
 0090   REF   1              22,3275   03321 1             2CADR   V82GOFF1           SELECTED VEHICLE ABOUT PROPER BODY.
 0090   REF   1              22,3276   44064 0
 0091                        22,3277  0 0003 1             RELINT
 0092   REF  20  LAST  601   22,3300  3 6245 1  V82STALL   CAF     THREE              STALL IN THIS LOOP AND WITHOLD V 16 N 44
 0093   REF   3  LAST  713   22,3301  7 1537 0             MASK    V82FLAGS       UNTIL STATE VECTOR UPDATE SETS ONE OF
 0094   REF 216  LAST  678   22,3302  10 000 0             CCS     A              OUR FLAG BITS.
 0095   REF   1              22,3303  0 3310 0             TC      FLAGGON        EXIT FROM STALL LOOP.
 0096   REF   7  LAST  680   22,3304  3 4777 1             CAF     1SEC
 0097   REF 176  LAST  713   22,3305  0 4616 1             TC      BANKCALL
 0098   REF  12  LAST  680   22,3306   01735 1             CADR    DELAYJOB
 0099   REF   1              22,3307  0 3300 1             TC      V82STALL

 0100   REF   1              22,3310  3 3317 1  FLAGGON    CAF     V16N44         MONITOR HAPO,HPER,TFF.
 0101   REF 177  LAST  714   22,3311  0 4616 1             TC      BANKCALL
 0102   REF   9  LAST  713   22,3312   20334 1             CADR    GOXDSPF
 0103   REF   8  LAST  703   22,3313  0 5563 1             TC      B5OFF          TERM  THIS TELLS TICKTEST TO KILL ITSELF
 0104   REF   9  LAST  714   22,3314  0 5563 1             TC      B5OFF          PROCEED  DITTO
 0105   REF   1              22,3315  0 3267 1             TC      V82GOFLP       RECYCLE  RECOMPUTE STATE VECT + DISPLAY

 0106                        22,3316   01014 0  OPTIONVN   VN      412
 0107                        22,3317   04054 1  V16N44     VN      1644
 0108   REF   5  LAST  713   22,3320   02140 0  TFFBANK    ECADR   TFF


 0109   REF  94  LAST  713   22,3321  0 6037 0  V82GOFF1   TC      INTPRET
 0110                        22,3322   77634 0             RTB
 0111   REF  19  LAST  707   22,3323   21573 0                     LOADTIME
 0112   REF  40  LAST  710   22,3324   00041 1             STORE   TDEC1          TIME FOR STATE VECTOR UPDATE.
 0113   REF   3  LAST  339   22,3325   02205 1             STORE   TSTART82       TIME FOR INTERNAL USE.
 0114                        22,3326   77776 1             EXIT
 0115   REF  13  LAST  713   22,3327  4 1052 0             CS      OPTIONX +1     1 FOR THIS VEHICLE, NOT 1 FOR OTHER.
 0116   REF  82  LAST  713   22,3330  6 4753 1             AD      ONE
 0117                        22,3331  0 0006 1             EXTEND
 0118   REF   1              22,3332  1 3354 0             BZF     THISSHIP
 0119   REF  95  LAST  714   22,3333  0 6037 0  OTHSHIP    TC      INTPRET
 0120                        22,3334   77624 1             CALL                   CALL STATE VECTOR UPDATE FOR OTHER SHIP.
 0121   REF   3  LAST  710   22,3335   27043 0                     OTHPREC
 0122                        22,3336   77775 1  BOTHSHIP   VLOAD                  MOVE RESULTS INTO TFFCONIC STORAGE AREAS
 0123   REF  24  LAST  710   22,3337   00001 0                     RATT            TO BE CALLED BY SR30.1.
 0124   REF  11  LAST  706   22,3340   26207 0             STOVL   RONE           RATT AT (-29)M FOR EARTH OR MOON
 0125   REF  20  LAST  710   22,3341   00007 0                     VATT
 0126   REF   5  LAST  706   22,3342   02215 0             STORE   VONE            VATT AT (-7)M/CS FOR EARTH OR MOON
 0127                        22,3343   77743 1             DLOAD*
 0128   REF   1              22,3344   73774 1                     1/RTMUE,2       X2 IS 0 FOR EARTH CENTERED STATE VEC
 0129   REF   1              22,3345   00037 0             STORE   TFF/RTMU        X2 IS 2 FOR MOON
 0130                        22,3346   77743 1             DLOAD*                 AS LEFT BY THISPREC OR OTHPREC.
 0131   REF   1              22,3347   72411 0                     MINPERE,2
 0132   REF   2  LAST  115   22,3350   02201 0             STORE   HPERMIN          TFFRTMU, HPERMIN AND RPADTEM ARE ALL
 0133                        22,3351   46135 1             SLOAD   BHIZ           EARTH/MOON PARAMETERS AS SET HERE.
 0134   REF  12  LAST  696   22,3352   00050 1                     X2
 0135   REF   1              22,3353   45367 1                     EARTHPAD
 0136                        22,3354   77650 1             GOTO
 0137   REF   1              22,3355   45373 1                     MOONPAD
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L        R30                                                                             USER'S PAGE NO.   4      E4 S3

 0138   REF  96  LAST  714    22,3356   0 6037 0  THISSHIP TC      INTPRET
 0139                         22,3357    77624 1           CALL                     CALL STATE VECTOR UPDATE FOR THIS SHIP.
 0140   REF   2  LAST  701    22,3360    27057 0                   THISPREC
 0141                         22,3361    77650 1           GOTO
 0142   REF   1               22,3362    45336 0                   BOTHSHIP

R0143   THE FOLLOWING CONSTANTS ARE PAIRWISE INDEXED. DO NOT SEPARATE PAIRS.

 0146                         22,3363    00001 0  MINPERM  2DEC    10068 B-27       35 KFT MIN PERIGEE HEIGHT FOR MOON(-27)M
 0146                         22,3364    11530 1
 0147                         22,3365    00002 0  MINPERE  2DEC    91440 B-29       300 KFT (-29)M FOR EARTH
 0147                         22,3366    31230 1

 0148                         22,3367    43145 0  EARTHPAD DLOAD   CLRGO             PAD 37-B RADIUS.  SCALED AT (-29)M.
 0149   REF   2  LAST  696    22,3370    06315 0                   RPAD
 0150   REF   1               22,3371    03635 1                   V82EMFLG          INDICATE EARTH SCALING FOR SR30.1
 0151   REF   1               22,3372    45377 0                   BOTHPAD

 0152                         22,3373    51575 1  MOONPAD  VLOAD   ABVAL            COMPUTE MOON PAD RADIUS FROM RLS VECTOR.
 0153   REF   4  LAST  696    22,3374    02023 1                   RLS               SCALED AT (-27)M.
 0154                         22,3375    77614 1           SET
 0155   REF   2  LAST  715    22,3376    03475 1                   V82EMFLG          INDICATE MOON  SCALING FOR SR30.1
 0156   REF   2  LAST  115    22,3377    36203 0  BOTHPAD  STCALL  RPADTEM
 0157   REF   1               22,3400    45551 1                   SR30.1           CALCULATE ORBITAL PARAMETERS
 0158                         22,3401    45234 0           RTB     DSU
 0159   REF  20  LAST  714    22,3402    21573 0                   LOADTIME
 0160   REF   4  LAST  714    22,3403    02205 1                   TSTART82         PRESENT TIME - TIME V82GOFF1 BEGAN
 0161   REF   5  LAST  715    22,3404    02205 1           STORE   TSTART82                         SAVE IT
 0162                         22,3405    53145 1           DLOAD   BZE              SR30.1 SETS -TPER=0 IF HPER L/
 0163   REF   2  LAST  306    22,3406    02143 0                   -TPER             HPERMIN (300 OR 35) KFT.
 0164   REF   1               22,3407    45420 0                   TICKTFF          (-TPER = 0)
 0165                         22,3410    43345 1  TICKTPER DLOAD   DAD              (-TPER NON ZERO)  TFF WAS NOT COMPUTED,
 0166   REF   3  LAST  715    22,3411    02143 0                   -TPER            BUT WAS SET TO 59M59S.DONT TICK TFF, DO
 0167   REF   6  LAST  715    22,3412    02205 1                   TSTART82         TICK -TPER. DISPLAY BOTH.
 0168   REF   4  LAST  715    22,3413    02143 0           STORE   -TPER            -TPER CORRECTED FOR TIME SINCE V82GOFF1
 0169                         22,3414    77776 1           EXIT                     BEGAN.
 0170   REF  34  LAST  612    22,3415   3 4753 1           CAF     BIT1
 0171   REF   4  LAST  714    22,3416   55'537 0           TS      V82FLAGS         INFORMS TICKTEST TO INCREMENT ONLY -TPER
 0172   REF 103  LAST  607    22,3417   0 5155 0           TC      ENDOFJOB

 0173                         22,3420    43345 1  TICKTFF  DLOAD   DAD              (-TPER=0)  TFF WAS COMPUTED.TICK TFF.
 0174   REF   6  LAST  714    22,3421    02141 1                   TFF              DO NOT TICK -TPER.DISPLAY TFF, BUT NOT
 0175   REF   7  LAST  715    22,3422    02205 1                   TSTART82         -TPER.
 0176   REF   7  LAST  715    22,3423    02141 1           STORE   TFF              TFF CORRECTED FOR TIME SINCE V82GOFF1
 0177                         22,3424    77776 1           EXIT                     BEGAN.
 0178   REF  37  LAST  655    22,3425   3 4752 0           CAF     BIT2
 0179   REF   5  LAST  715    22,3426   55'537 0           TS      V82FLAGS         INFORMS TICKTEST TO INCREMENT ONLY TFF.
 0180   REF 104  LAST  715    22,3427   0 5155 0           TC      ENDOFJOB
 0181    REF  29  LAST  706    22,3430  3 4747 1  TICKTEST CAF     BIT5        THIS WAITLIST PROGRAM PERPETUATES ITSELF
 0182    REF  13  LAST  706    22,3431  7 1044 1           MASK    EXTVBACT    ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 0183    REF 217  LAST  714    22,3432 10 000 0            CCS     A
 0184    REF   1               22,3433  0 3441 0           TC      DOTICK
 0185    REF   3  LAST  592    22,3434  3 7713 0           CAF     PRIO25
 0186    REF  15  LAST  703    22,3435  0 5072 1           TC      NOVAC       TERMINATE V 82.CANT CALL ENDEXT IN RUPT.
 0187    REF  14  LAST  716       1044                     EBANK=  EXTVBACT
 0188    REF  41  LAST  713    22,3436   05472 0           2CADR   ENDEXT
 0188                          22,3437   04062 1
 0189    REF  31  LAST  703    22,3440  0 5261 1           TC      TASKOVER
 0190    REF   8  LAST  714    22,3441  3 4777 1  DOTICK   CAF     1SEC        RE-REQUEST TICKTEST.
 0191    REF  31  LAST  713    22,3442  0 5203 0           TC      WAITLIST
 0192    REF   8  LAST  715    E4,1[illegible]             EBANK=  TFF
 0193    REF   2  LAST  713    22,3443   03430 0           2CADR   TICKTEST
 0193                          22,3444   44064 0
 0194    REF  21  LAST  713    22,3445  3 6245 1           CAF     THREE
 0195    REF   6  LAST  715    22,3446  7 1537 0           MASK    V82FLAGS
 0196    REF 218  LAST  716    22,3447 50 000 1            INDEX   A
 0197                          22,3450  0 3451 1           TC      +1
 0198    REF  32  LAST  716    22,3451  0 5261 1           TC      TASKOVER    IF NO FLAGBITS SET DONT CHANGE TFF OR
A0199                                                                          -TPER, BUT CONTINUE LOOP.
 0200    REF   1               22,3452  0 3460 0           TC      TPERTICK    ONLY BIT 1 SET. INCR -TPER BY 1 SEC.
 0201    REF   9  LAST  716    22,3453  3 4777 1  TFFTICK  CAF     1SEC        ONLY BIT 2 SET. INCR TFF BY 1 SEC.
 0202    REF  95  LAST  702    22,3454 54 001 1            TS      L
 0203    REF 131  LAST  713    22,3455  3 4755 1           CAF     ZERO
 0204    REF   9  LAST  716    22,3456 21'541 1            DAS     TFF
 0205    REF  33  LAST  716    22,3457  0 5261 1           TC      TASKOVER
 0206    REF  10  LAST  716    22,3460  3 4777 1  TPERTICK CAF     1SEC
 0207    REF  96  LAST  716    22,3461 54 001 1            TS      L
 0208    REF 132  LAST  716    22,3462  3 4755 1           CAF     ZERO
 0209    REF   5  LAST  715    22,3463 21'543 0            DAS     -TPER
 0210    REF  34  LAST  716    22,3464  0 5261 1           TC      TASKOVER
 0211                           22,3465   77776 1  V82GON    EXIT                       AVERAGE G ON. USE CURRENT STATE VECTOR
A0212                                                                                  FOR ORBITAL PARAMETER CALCULATIONS.
 0213    REF   7  LAST  713     22,3466  3 5021 1            CAF      PRIO7             LESS THAN LAMBERT
 0214    REF  2   LAST  713     22,3467  0 5105 0            TC       FINDVAC           V82GON1 WILL PERFORM ORBIT CALCULATIONS
 0215    REF  1   LAST  716     E4,1540                      EBANK=   TFF               ABOUT PROPER BODY APPROX ONCE PER SEC.
 0216    REF   1                22,3470   03503 1            2CADR    V82GON1
 0216    REF   1                22,3471   44064 0
 0217                           22,3472  0 0003 1            RELINT
 0218    REF   4  LAST  552     22,3473  10 067 1            CCS      NEWJOB            WITHOLD V16 N44 UNTIL FIRST ORBIT CALC
 0219    REF   3  LAST  552     22,3474  0 5122 0            TC       CHANG1            IS DONE. NOTE: V82GON1 (PRIO7, FINDVAC
A0220                                                                                  JOB) IS COMPLETED BEFORE V82GON (PRIO7,
A0221                                                                                  NOVAC JOB).
 0222    REF   2  LAST  714     22,3475  3 3317 1  V82FEDSP  CAF      V16N44            MONITOR HAPO, HPER, TFF
 0223    REF 178  LAST  714     22,3476  0 4616 1            TC       BANKCALL
 0224    REF  10  LAST  714     22,3477   20334 1            CADR     GOXDSPF
 0225    REF  10  LAST  714     22,3500  0 5563 1            TC       B5OFF             TERM THIS TELLS V82GON1 TO KILL ITSELF.
 0226    REF  11  LAST  717     22,3501  0 5563 1            TC       B5OFF             PROC DITTO.
 0227    REF   1                22,3502  0 3475 1            TC       V82FEDSP          RECYCLE

 0228    REF  97  LAST  715     22,3503  0 6037 0  V82GON1   TC       INTPRET           THIS EXEC PROGRAM PERPETUATES ITSELF
A0229                                                                                  ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 0230                           22,3504   52175 0            VLOAD    GOTO              HOLDS OFF CCS NEWJOB BETWEEN RN AND
 0231    REF   6  LAST  706     22,3505   01221 1                     RN                  VN FETCH SO RN , VN ARE FROM SAME
 0232    REF   1                22,3506   45507 1                     NEXTLINE            STATE VECTOR UPDATE.
 0233    REF  12  LAST  714     22,3507   26207 0  NEXTLINE  STOVL    RONE               RN AT (-29)M FOR EARTH OR MOON
 0234    REF   6  LAST  706     22,3510   01227 1                     VN
 0235    REF   6  LAST  714     22,3511   02215 0            STORE    VONE              VN AT (-7)M/CS FOR EARTH OR MOON
 0236                           22,3512   52014 0            BON      GOTO
 0237    REF   4  LAST  705     22,3513   04304 1                     MOONTHIS          FLAG INDICATES BODY ABOUT WHICH ORBITAL
 0238    REF   1                22,3514   45516 1                     MOONGON              CALCULATIONS ARE TO BE PERFORMED.
 0239    REF   1                22,3515   45527 0                     EARTHGON            IF SET - MOON , IF RESET - EARTH.

 0240                           22,3516   71214 0  MOONGON   SET      DLOAD
 0241    REF   3  LAST  715     22,3517   03475 1                     V82EMFLG          INDICATE MOON SCALING FOR SR30.1
 0242    REF   1                22,3520   04001 1                     1/RTMUM           LUNAR PARAMETERS LOADED HERE FOR SR30.1
 0243    REF   2  LAST  714     22,3521   14037 0            STODL    TFF/RTMU
 0244    REF   1                22,3522   05364 0                     MINPERM
 0245    REF   3  LAST  714     22,3523   26201 0            STOVL    HPERMIN
 0246    REF   5  LAST  715     22,3524   02023 1                     RLS                SCALED AT (-27)M.
 0247                           22,3525   52046 1            ABVAL    GOTO
 0248    REF   1                22,3526   45536 0                     V82GON2
 0249                           22,3527   71214 0  EARTHGON  CLEAR    DLOAD
 0250    REF   4  LAST  717     22,3530   03675 0                     V82EMFLG          INDICATE EARTH SCALING FOR SR30.1
 0251    REF   2  LAST  714     22,3531   04003 0                     1/RTMUE           EARTH PARAMETERS LOADED HERE FOR SR30.1
 0252    REF   3  LAST  717     22,3532   14037 0            STODL    TFF/RTMU
 0253    REF   2  LAST  714     22,3533   05366 1                     MINPERE
 0254    REF   4  LAST  717     22,3534   16201 0            STODL    HPERMIN
 0255    REF   3  LAST  715     22,3535   06315 0                     RPAD
 0256    REF   3  LAST  715     22,3536   36203 0  V82GON2   STCALL   RPADTEM           COMMON CODE FOR EARTH & MOON.
 0257    REF   2  LAST  715     22,3537   45551 1                     SR30.1
 0258                                22,3540   77776 1             EXIT
 0259    REF  30  LAST  716          22,3541  3 4747 1   V82GON3   CAF      BIT5
 0260    REF  15  LAST  716          22,3542  7 1644 1             MASK     EXTVBACT          SEE IF ASTRONAUT HAS SIGNALLED TERMINATE
 0261                                22,3543  0 0006 1             EXTEND
 0262    REF  42  LAST  716          22,3544  1 5472 1             BZF      ENDEXT            YES, TERMINATE VB 82 LOOP
 0263    REF  11  LAST  716          22,3545  3 4777 1             CAF      1SEC
 0264    REF 179  LAST  717          22,3546  0 4616 1             TC       BANKCALL          WAIT ONE SECOND BEFORE REPEATING
 0265    REF  13  LAST  714          22,3547   01735 1             CADR     DELAYJOB            ORBITAL PARAMETER COMPUTATION.
 0266    REF   2  LAST  717          22,3550  0 3503 1             TC       V82GON1

 0267    REF   1                     22,3541             SPIRET    =        V82GON3
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R0268    SUBROUTINE NAME:      SR30.1
R0269    MOD NO:  0                                                        DATE:               16 FEB 67
R0271    MOD BY:  RR BAIRNSFATHE                                           LOG SECTION:    R32
R0273    MOD NO:  1            MOD BY:  RR BAIRNSFATHE      DATE: 11 APR 67    SR30.1 CHANGED TO ALLOW MONITOR OPERN
R0275    MOD NO:  2            MOD BY:  RR BAIRNSFATHER     DATE:  14 APR 67   ADD OVFL CK FOR RAPO
R0277    MOD NO:  3            MOD BY ALONSO                DATE: 11 DEC 67    SUBROUTINE REWRITTEN
R0279    MOD NO: 4             MOD BY ALONSO                DATE: 26 MAR 68    PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R0281    MOD NO:  5            MOD BY:  RR BAIRNSFATHER     DATE:  6 AUG 68    OVFL CK FOR HAPO & HPER.VOIDS MOD #2.
R0283

R0284    NEW FUNCTIONAL DESCRIPTION:     ORBITAL PARAMETERS DISPLAY FOR NOUNS 32  AND 44.
R0286    SR30.1 CALLS TFFCONMU AND TFFRP/RA TO CALCULATE RPER (PERIGEE RADIUS),
R0287    RAPO (APOGEE RADIUS), HPER (PERIGEE HEIGHT ABOVE LAUNCH PAD OR LUNAR
R0288    LANDING SITE), HAPO (APOGEE HEIGHT AS ABOVE), TPER (TIME TO PERIGEE),
R0289    TFF (TIME TO INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0290    IF HPER IS GREATER THAN OR EQUAL TO HPERMIN, CALCULATES TPER AND STORES
R0291    NEGATIVE    IN -TPER. OTHERWISE STORES +0 IN -TPER. WHENEVER TPER IS
R0292    CALCULATED, TFF IS NOT COMPUTABLE AND DEFAULTS TO -59MIN 59SEC. IF HAPO
R0293    WOULD EXCEED 9999.9 NM, IT IS LIMITED TO THAT VALUE FOR DISPLAY.

R0294    ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R0295              ABOVE REMARKS.

R0296    CALLING SEQUENCE:           CALL
R0297                                      SR30.1
R0298    SUBROUTINES CALLED:         TFFCONMU, TFFRP/RA, CALCTPER, CALCTFF
R0299    NORMAL EXIT MODE:           CALLING LINE +1 (STILL IN INTERPRETIVE MODE)
R0300    ALARMS:                     NONE
R0301    OUTPUT:  RAPO    (-29) M EARTH    APOGEE RADIUS    EARTH CENTERED COORD.
R0302                     (-27) M MOON                      MOON CENTERED COORD.
R0303             RPER    (-29) M EARTH    PERIGEE RADIUS   EARTH CENTERED COORD.
R0304                     (-27) M MOON                      MOON  CENTERED COORD.
R0305             HAPOX   (-29) M          APOGEE ALTITUDE ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM.
R0307             HPERX   (-29) M          PERIGEE ALT. ABOVE PAD OR LAND. SITE    MAX VALUE LIMITED TO 9999.9 NM.
R0309             TFF     (-28) CS         TIME TO 300KFT OR 35KFT ALTITUDE
R0310             -TPER   (-28) CS         TIME TO PERIGEE
R0311    ERASABLE INITIALIZATION REQUIRED-
R0312             TFF/RTMU (+17) EARTH     RECIPROCAL OF PROPER GRAV CONSTANT FOR
R0313                      (+14) MOON      EARTH OR MOON = 1/SQRT(MU).
R0314             RONE     (-29) M         STATE VECTOR
R0315             VONE     (-7)  M/CS      STATE VECTOR
R0316             RPADTEM (-29) M EARTH    RADIUS OF LAUNCH PAD OR LUNAR LANDING
R0317                     (-27) M MOON     SITE.
R0318             HPERMIN (-29) M EARTH    (300 OR 35)KFT MINIMUM PERIGEE ALTITUDE
R0319                     (-27) M MOON     ABOVE LAUNCH PAD OR LUNAR LANDING SITE.
R0320             V82EMFLG (INT SW BIT) RESET FOR EARTH, SET FOR MOON.

R0321    DEBRIS:  QPRET, PDL, S2
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 0322  REF   1                                           COUNT*  $$/SR30S

 0323                    22,3551   44001 0   SR30.1    SETPD   STQ             INITIALIZE PUSHDOWN LIST.
 0324                    22,3552   00001 0                     0
 0325  REF   7  LAST 610   22,3553   00051 0                     S2
A0326                                                                            SR30.1 INPUT: RONE AT (-29)M EARTH/MOON
A0327                                                                                          VONE AT (-7)M/CS
A0328                                                                             TFFCONMU,TFFRP/RA,CALCTPER AND CALCTFF
A0329                                                                             CALLS REQUIRE :
A0330                                                                             EARTH CENTERED (NO RESCALING REQUIRED)
A0331                                                                                           RONE SCALED TO B-29 M
A0332                                                                                           VONE SCALED TO B-7 M/CS
A0333                                                                             MOON CENTERED  (RESCALING REQUIRED)
A0334                                                                                           RONE SCALED TO B-27 M
A0335                                                                                           VONE SCALED TO B-5  M/CS
 0336                    22,3554   77214 0             BOFF    VLOAD
 0337  REF   5  LAST 717   22,3555   03755 0                     V82EMFLG          OFF FOR EARTH ,  ON FOR MOON.
 0338  REF   1             22,3556   45565 0                     TFFCALLS
 0339  REF  13  LAST 717   22,3557   02207 0                     RONE
 0340                    22,3560   77752 1             VSL2
 0341  REF  14  LAST 720   22,3561   26207 0             STOVL   RONE
 0342  REF   7  LAST 717   22,3562   02215 0                     VONE
 0343                    22,3563   77752 1             VSL2
 0344  REF   8  LAST 720   22,3564   02215 0             STORE   VONE
 0345                    22,3565   77624 1   TFFCALLS  CALL
 0346  REF   1             22,3566   57361 1                     TFFCONMU
 0347                    22,3567   77624 1             CALL                    TFFRP/RA COMPUTES RAPO,RPER.
 0348  REF   1             22,3570   57427 1                     TFFRP/RA
A0349                                                                            RETURNS WITH RAPO IN D(MPAC).
 0350                    22,3571   77625 0             DSU
 0351  REF   4  LAST 717   22,3572   02203 1                     RPADTEM
 0352                    22,3573   64414 1             BOFF    SR2R            NEED HAPO AT (-29)M FOR DISPLAY.
A0353                                                                            IF MOON CENTERED, RESCALE FROM (-27)M.
A0354                                                                             IF EARTH CENTERED ALREADY AT (-29)M.
 0355  REF   6  LAST 720   22,3574   03755 0                     V82EMFLG         OFF FOR EARTH , ON FOR MOON.
 0356                    22,3575   45576 1                     +1
 0357                    22,3576   77624 1             CALL                    IF HAPO > MAXNM, SET HAPO =9999.9 NM.
 0358  REF   5  LAST 653   22,3577   45636 0                     MAXCHK          OTHERWISE STORE (RAPO-RPADTEM) IN HAPO.
 0359  REF   4  LAST 713   22,3600   16120 0   STORHAPO  STODL   HAPOX
 0360  REF   1             22,3601   00017 1                     RPER
 0361                    22,3602   77625 0             DSU
 0362  REF   5  LAST 720   22,3603   02203 1                     RPADTEM         GIVES HPER AT (-29)M EARTH, (-27)M MOON.
 0363  REF 283  LAST 701   22,3604   00161 1             STORE   MPAC +4         SAVE THIS FOR COMPARISON TO HPERMIN.
 0364                    22,3605   64414 1             BOFF    SR2R            NEED HPER AT (-29)M FOR DISPLAY.
A0365                                                                            IF MOON CENTERED, RESCALE FROM (-27)M.
A0366                                                                            IF EARTH CENTERED ALREADY AT (-29)M.
 0367  REF   7  LAST 720   22,3606   03755 0                     V82EMFLG        OFF FOR EARTH,  ON FOR MOON.
 0368                    22,3607   45610 1                     +1
 0369                    22,3610   77624 1             CALL                    IF HPER > MAXNM, SET HPER = 9999.9 NM.
 0370  REF   6  LAST 720   22,3611   45636 0                     MAXCHK
 0371  REF   2  LAST  314   22,3612   16122 1  STORHPER STODL  HPERX         STORE (RPER - RPADTEM) INTO HPERX.
 0372  REF 284  LAST  720   22,3613   00161 1                  MPAC +4
 0373                       22,3614   51025 1           DSU    BPL           HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
 0374  REF   5  LAST  717   22,3615   02201 0                  HPERMIN       IF HPER L/   HPERMIN (300 OR 35)KFT,
 0375  REF   1              22,3616   45622 0                  DOTPER         THEN ZERO INTO -TPER.
 0376                       22,3617   52145 0           DLOAD  GOTO            OTHERWISE CALCULATE TPER.
 0377  REF   4  LAST  593   22,3620   06522 1                  HI6ZEROS
 0378  REF   1              22,3621   45626 1                  SKIPTPER
 0379                       22,3622   45145 0  DOTPER   DLOAD  CALL
 0380  REF   2  LAST  720   22,3623   00017 1                  RPER
 0381  REF   1              22,3624   57465 1                  CALCTPER
 0382                       22,3625   77676 0           DCOMP                TPER IS PUT NEG INTO -TPER.
 0383  REF   6  LAST  716   22,3626   16143 0  SKIPTPER STODL  -TPER
 0384  REF   6  LAST  721   22,3627   02201 0                  HPERMIN       HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
 0385                       22,3630   45015 1           DAD    CALL
 0386  REF   6  LAST  720   22,3631   02203 1                  RPADTEM       RPADTEM AT (-29)M FOR EARTH, (-27)M MOON
 0387  REF   1              22,3632   57470 0                  CALCTFF       GIVES 59M59S FOR TFF IF RPER G/
 0388                       22,3633   77676 0           DCOMP                  HPERMIN + RPADTEM. (TPER WAS NON ZERO)
 0389  REF  11  LAST  717   22,3634   36141 0           STCALL TFF           OTHERWISE COMPUTES TFF.       (GOTO)
 0390  REF   8  LAST  720   22,3635   00051 0                  S2

 0391                       22,3636   51025 1  MAXCHK   DSU    BPL           IF C(MPAC) > 9999.9 NM, MPAC = 9999.9 NM
 0392  REF   1              22,3637   05646 0                  MAXNM
 0393                       22,3640   45643 1                  +3            OTHERWISE C(MPAC) = B(MPAC).
 0394                       22,3641   43415 0           DAD    RVQ
 0395  REF   2  LAST  721   22,3642   05646 0                  MAXNM
 0396                       22,3643   43545 1  +3       DLOAD  RVQ           (USED BY P30 - P37 ALSO)
 0397  REF   3  LAST  721   22,3644   05646 0                  MAXNM

 0398                       22,3645   01065 0  MAXNM    2OCT   01065 05603
 0398                       22,3646   05603 1
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R0001   STABLE ORBIT RENDEZVOUS PROGRAMS (P38 AND P78)

R0002   MOD NO -1            LOG SECTION - STABLE ORBIT - P38-P39
R0003   MOD BY RUDNICKI.S    DATE 25JAN68

R0004   FUNCTIONAL DESCRIPTION

R0005           P38 AND P78 CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL
R0006           CONDITIONS REQUIRED BY THE AGC TO (1) PUT THE ACTIVE VEHICLE
R0007           ON A TRANSFER TRAJECTORY THAT INTERCEPTS THE PASSIVE VEHICLE
R0008           ORBIT A GIVEN DISTANCE, DELTA R, EITHER AHEAD OF OR BEHIND THE
R0009           PASSIVE VEHICLE AND (2) ACTUALLY PLACE THE ACTIVE VEHICLE IN THE
R0010           PASSIVE VEHICLE ORBIT WITH A DELTA R SEPARATION BETWEEN THE TWO
R0011           VEHICLES

R0012   CALLING SEQUENCE

R0013           ASTRONAUT REQUEST THRU DSKY

R0014           V37E38E   IF THIS VEHICLE IS ACTIVE VEHICLE
R0015           V37E78E   IF OTHER VEHICLE IS ACTIVE VEHICLE

R0016   INPUT

R0017           (1) SOI MANEUVER

R0018               (A) TIG       TIME OF SOI MANEUVER
R0019               (B) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE
R0020                             DURING TRANSFER FROM TIG TO TIME OF INTERCEPT
R0021               (C) DELTAR    THE DESIRED SEPARATION OF THE TWO VEHICLES
R0022                             SPECIFIED AS A DISTANCE ALONG THE PASSIVE VEHICLE
R0023                             ORBIT
R0024               (D) OPTION    EQUALS 1 FOR SOI

R0025           (2) SOR MANEUVER

R0026               (A) TIG       TIME OF SOR MANEUVER
R0027               (B) CENTANG   AN OPTIONAL RESPECIFICATION OF 1 (B) ABOVE
R0028               (C) OPTION    EQUALS 2 FOR SOR
R0029               (D) DELTTIME  THE TIME REQUIRED TO TRAVERSE DELTA R WHEN
R0030                             TRAVELING AT A VELOCITY EQUAL TO THE HORIZONTAL
R0031                             VELOCITY OF THE PASSIVE VEHICLE - SAVED FROM
R0032                             SOI PHASE
R0033               (E) TINT      TIME OF INTERCEPT (SOI) - SAVED FROM SOI PHASE

R0034   OUTPUT

R0035           (1) TRKMKCNT NUMBER OF MARKS
R0036           (2) TTOGO    TIME TO GO
R0037           (3) +MGA     MIDDLE GIMBAL ANGLE
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R0038          (4) DSPTEM1  TIME OF INTERCEPT OF PASSIVE VEHICLE ORBIT
R0039                       (FOR SOI ONLY)
R0040          (5) POSTTPI  PERIGEE ALTITUDE OF ACTIVE VEHICLE ORBIT AFTER
R0041                       THE SOI (SOR) MANEUVER
R0042          (6) DELVTPI  MAGNITUDE OF DELTA V AT SOI (SOR) TIME
R0043          (7) DELVTPF  MAGNITUDE OF DELTA V AT INTERCEPT TIME
R0044          (8) DELVLVC  DELTA VELOCITY AT SOI (AND SOR) - LOCAL VERTICAL
R0045                       COORDINATES

R0046    SUBROUTINES USED

R0047              AVFLAGA
R0048              AVFLAGP
R0049              VNDSPLY
R0050              BANKCALL
R00502             GOFLASHR
R00504             GOTOPOOH
R00506             BLANKET
R00508             ENDOFJOB
R0051              PREC/TT
R0052              SELECTMU
R0053              INTRPVP
R0054              MAINRTNE

 0055                        04,3013                            BANK    04
 0056    REF   1             34,2000                            SETLOC  STBLEORB
 0057                        34,3271                            BANK

 0058    REF  24  LAST  703  E7,1470                            EBANK=  SUBEXIT
 0059    REF   1                                                COUNT*  $$/P3879

 0060    REF 180  LAST  718  34,3271  0 4616 1  P38             TC      BANKCALL
 0061    REF   5  LAST  666  34,3272   72347 1                  CADR    AVFLAGA          THIS VEHICLE ACTIVE
 0062                        34,3273  0 3276 1                  TC      +3
 0063    REF 181  LAST  724  34,3274  0 4616 1  P78             TC      BANKCALL
 0064    REF   5  LAST  666  34,3275   72354 0                  CADR    AVFLAGP          OTHER VEHICLE ACTIVE
 00645   REF 182  LAST  724  34,3276  0 4616 1                  TC      BANKCALL
 00646   REF   6  LAST  666  34,3277   72361 0                  CADR    P20FLGON         SET UPDATFLG, TRACKFLG
 00648   REF   1             34,3300  3 3641 1                  CAF     DECTWO
 00649   REF   8  LAST  673  34,3301  55'466 0                  TS      NN
 0065    REF   1             34,3302  3 3632 0                  CAF     V06N33SR         DISPLAY TIG
 0066    REF   1             34,3303  0 3621 1                  TC      VNDSPLY
 0067    REF   1             34,3304  3 3633 1                  CAF     V06N55SR         DISPLAY CENTANG
 0068    REF 183  LAST  724  34,3305  0 4616 1                  TCR     BANKCALL
 0069    REF   1             34,3306   20635 0                  CADR    GOFLASHR
 00694   REF  19  LAST  711  34,3307  1 6001 1                  TCF     GOTOPOOH         TERMINATE
 00696                       34,3310  1 3315 1                  TCF     +5               PROCEED
 00698                       34,3311  1 3304 1                  TCF     -5               RECYCLE
 0070    REF  22  LAST  716  34,3312  3 6245 1                  CAF     THREE            IMMEDIATE RETURN - BLANK R1, R2
 00702   REF   9  LAST  489  34,3313  0 5464 1                  TCF     BLANKET
 00704  REF 105  LAST  715    34,3314  1 5155 1             TCF    ENDOFJOB
 0071   REF  15  LAST  678    34,3315  3 4756 1             CAF    FIVE
 0072   REF   2  LAST  305    34,3316 55'144 0              TS     OPTION1
 0073   REF  83  LAST  714    34,3317  3 4753 1             CAF    ONE
 0074   REF   6  LAST  656    34,3320 55'145 1              TS     OPTION2             OPTION CODE IS SET TO 1
 00742  REF   1               34,3321  3 3634 0             CAF    V04N06SP            DISPLAY OPTION CODE - 1 = SOI, 2 = SOR
 00744  REF 184  LAST  724    34,3322  0 4616 1             TCR    BANKCALL
 00746  REF   2  LAST  724    34,3323   20635 0             CADR   GOFLASHR
 00748  REF  20  LAST  724    34,3324  1 6001 1             TCF    GOTOPOOH            TERMINATE
 0075                         34,3325  1 3332 1             TCF    +5                  PROCEED
 00752                        34,3326  1 3321 0             TCF    -5                  RECYCLE
 0076   REF  30  LAST  613    34,3327  3 4751 0             CAF    BIT3                IMMEDIATE RETURN - BLANK R3
 0077   REF  10  LAST  724    34,3330  0 5464 1             TCR    BLANKET
 0078   REF 106  LAST  725    34,3331  1 5155 1             TCF    ENDOFJOB
 0079   REF  98  LAST  717    34,3332  0 6037 0             TC     INTPRET
 0080                         34,3333   70535 0             SLOAD  SR1
 0081   REF   7  LAST  725    34,3334   01146 0                    OPTION2
 0082                         34,3335   71230 0             BHIZ   DLOAD
 0083   REF   1               34,3336   71344 1                    OPTN1
 0084   REF   1               34,3337   03631 0                    TINT
 0085   REF   1               34,3340   02303 0             STORE  TINTSOI             STORE FOR SOR PHASE
 0086                         34,3341   77614 1             CLRGO
 0087   REF   1               34,3342   01230 1                    OPTNSW              OPTNSW: ON = SOI, OFF = SOR
 0088   REF   1               34,3343   71375 0                    JUNCTN1
 0089                         34,3344   43014 0   OPTN1     SET    CLEAR               SOI
 0090   REF   2  LAST  725    34,3345   01070 1                    OPTNSW
 00901  REF  12  LAST  681    34,3346   00670 0                    UPDATFLG
 00902                        34,3347   77624 1             CALL
 0091   REF   1               34,3350   71554 0                    PREC/TT
 0092                         34,3351   43015 1             DAD    SET
 0093   REF  22  LAST  710    34,3352   03442 0                    TIG
 00931  REF  13  LAST  725    34,3353   00470 1                    UPDATFLG
 0094   REF   2  LAST  725    34,3354   03631 0             STORE  TINT                TI = TIG + TF
 0096                         34,3355   77776 1             EXIT
 00962  REF   1               34,3356  3 3635 1             CAF    V06N57SR            DISPLAY DELTA R
 00964  REF 185  LAST  725    34,3357  0 4616 1             TCR    BANKCALL
 00966  REF   3  LAST  725    34,3360   20635 0             CADR   GOFLASHR
 00968  REF  21  LAST  725    34,3361  1 6001 1             TCF    GOTOPOOH            TERMINATE
 0097                         34,3362  1 3367 1             TCF    +5                  PROCEED
 00972                        34,3363  1 3356 0             TCF    -5                  RECYCLE
 0098   REF  15  LAST  592    34,3364  3 6242 0             CAF    SIX                 IMMEDIATE RETURN - BLANK R2, R3
 0099   REF  11  LAST  725    34,3365  0 5464 1             TCR    BLANKET
 0100   REF 107  LAST  725    34,3366  1 5155 1             TCF    ENDOFJOB
 01001                        34,3367  0 0006 1   +5        EXTEND
 01002  REF   3  LAST  725    34,3370  3 1631 1             DCA    TINT
 01003  REF  25  LAST  657    34,3371 53'046 0              DXCH   DSPTEM1             FOR DISPLAY
 0101   REF   1               34,3372  3 3636 1             CAF    V06N34SR            DISPLAY TIME OF INTERCEPT
 0102   REF   2  LAST  724    34,3373  0 3621 1             TC     VNDSPLY
 0103   REF  99  LAST  725    34,3374  0 6037 0             TC     INTPRET
 0104                         34,3375   45014 0   JUNCTN1   CLEAR  CALL
 0105   REF   1               34,3376   04266 1                     P39/79SW
 0106   REF   5  LAST  666    34,3377   20000 0                     SELECTMU        SELECT MU, CLEAR FINALFLG, GO TO VN1645
 0107                         34,3400   77624 1   RECYCLE  CALL
 0108   REF   2  LAST  725    34,3401   71554 0                     PREC/TT
 0109                         34,3402   71214 0            BOFF     DLOAD
 0110   REF   3  LAST  725    34,3403   01350 0                     OPTNSW
 0111   REF   1               34,3404   71424 0                     OPTN2
 0112   REF   4  LAST  725    34,3405   03631 0                     TINT
 0113   REF  41  LAST  714    34,3406   34041 0            STCALL   TDEC1           PRECISION UPDATE PASSIVE VEHICLE TO
 0114   REF   1               34,3407   71605 1                     INTRPVP            INTERCEPT TIME
 0115                         34,3410   53575 0            VLOAD    UNIT
 0116   REF  25  LAST  714    34,3411   00001 0                     RATT            RP/(RP)
 0117                         34,3412   47315 0            PDVL     VXV
 0118   REF  21  LAST  714    34,3413   00007 0                     VATT
 0119                         34,3414   60246 1            ABVAL    NORM            (VP X RP/(RP))
 0120   REF  15  LAST  688    34,3415   00047 1                     X1
 0121                         34,3416   56325 0            PDDL     DDV
 0122   REF   5  LAST  315    34,3417   02303 0                     DELTAR
 0123                         34,3420   77657 0            SL*                      DELTA R / (VP X RP/RP)
 0124                         34,3421   20172 1                     0 -7,1
 0125   REF   2  LAST  117    34,3422   36305 1            STCALL   DELTTIME        DELTA T = (RP) DELTA R / (VP X RP)
 0126   REF   1               34,3423   71430 0                     JUNCTN2
 0127                         34,3424   43345 1   OPTN2    DLOAD    DAD
 0128   REF   2  LAST  725    34,3425   02303 0                     TINTSOI
 0129   REF   3  LAST  663    34,3426   00037 0                     T
 0130   REF   5  LAST  726    34,3427   03631 0            STORE    TINT            TI = TI + TF
 0131                         34,3430   45345 1   JUNCTN2  DLOAD    DSU
 0132   REF   6  LAST  726    34,3431   03631 0                     TINT
 0133   REF   3  LAST  726    34,3432   02305 0                     DELTTIME
 0134   REF   1               34,3433   02307 1            STORE    TARGTIME        TT = TI - DELTA T
R0135   .... MAINRTNE ....
R0136   SUBROUTINES USED

R0137          S3435.25
R0138          PERIAPO1
R0139          SHIFTR1
R0140          VNDSPLY
R0141          BANKCALL
R0142          GOFLASH
R0143          GOTOPOOH
R0145          VN1645

 0146   REF  42  LAST  726    34,3434   34041 0   MAINRTNE STCALL   TDEC1           PRECISION UPDATE PASSIVE VEHICLE TO
 0147   REF   2  LAST  726    34,3435   71605 1                     INTRPVP            TARGET TIME
 0148                         34,3436   77745 1            DLOAD
 0149   REF  23  LAST  725    34,3437   03442 0                     TIG
 0150   REF   6  LAST  689    34,3440   03610 0            STORE    INTIME
 0151                         34,3441   77331 0            SSP      VLOAD
 0152   REF  25  LAST  724    34,3442   03471 0                     SUBEXIT
 0153   REF   1               34,3443   71447 0                     TEST3979
 0154   REF  26  LAST  726   34,3444   00001 0                    RATT
 0155                        34,3445   77624 1           CALL
 0156   REF   1              34,3446   73327 0                    S3435.25
 0157                        34,3447   43014 0  TEST3979 BOFF     BON
 0158   REF   2  LAST  726   34,3450   04346 1                    P39/79SW
 0159   REF   1              34,3451   71460 0                    MAINRTN1
 0160   REF   8  LAST  693   34,3452   01311 0                    FINALFLG
 0161   REF   1              34,3453   71456 0                    P39P79
 0162                        34,3454   77614 1           SET
 0163   REF  14  LAST  725   34,3455   00470 1                    UPDATFLG
 0164                        34,3456   77776 1  P39P79   EXIT
 01645  REF   1              34,3457  0 3505 1           TC       DSPLY81          FOR P39 AND P79
 0165                        34,3460   51575 1  MAINRTN1 VLOAD    ABVAL
 0166   REF  12  LAST  690   34,3461   02366 0                    DELVEET3
 0167   REF   7  LAST  663   34,3462   27576 0           STOVL    DELVTPI          DELTA V
 0168   REF   3  LAST  673   34,3463   03506 1                    VPASS4
 0169                        34,3464   51451 0           VSU      ABVAL
 0170   REF   5  LAST  690   34,3465   03566 1                    VTPRIME
 0171   REF   4  LAST  663   34,3466   26350 0           STOVL    DELVTPF          DELTA V (FINAL) = V'T - VT
 0172   REF  21  LAST  697   34,3467   03536 1                    RACT3
 0173                        34,3470   45115 0           PDVL     CALL
 0174   REF   8  LAST  690   34,3471   02337 1                    VIPRIME
 0175   REF   5  LAST  663   34,3472   46316 1                    PERIAPO1         GET PERIGEE ALTITUDE
 0176                        34,3473   77624 1           CALL
 0177   REF  11  LAST  663   34,3474   46426 0                    SHIFTR1
 0178   REF   5  LAST  663   34,3475   03606 1           STORE    POSTTPI
 0179                        34,3476   43014 0           BON      SET
 0180   REF   9  LAST  727   34,3477   01311 0                    FINALFLG
 0181   REF   1              34,3500   71502 0                    DSPLY58
 0182   REF  15  LAST  727   34,3501   00470 1                    UPDATFLG
 0183                        34,3502   77776 1  DSPLY58  EXIT
 0184   REF   1              34,3503  3 3637 0           CAF      V06N58SR         DISPLAY HP, DELTA V, DELTA V (FINAL)
 0185   REF   3  LAST  725   34,3504  0 3621 1           TC       VNDSPLY
 0186   REF   1              34,3505  3 3640 0  DSPLY81  CAF      V06N81SR         DISPLAY DELTA V (LV)
 0187   REF   4  LAST  727   34,3506  0 3621 1           TC       VNDSPLY
 0188   REF 100  LAST  725   34,3507  0 6037 0           TC       INTPRET
 0189                        34,3510   77214 0           CLEAR    VLOAD
 0204   REF   5  LAST  679   34,3511   01267 0                    XDELVFLG
 0205   REF  13  LAST  727   34,3512   02366 0                    DELVEET3
 0206   REF  12  LAST  680   34,3513   37656 0           STCALL   DELVSIN
 0207   REF   7  LAST  693   34,3514   73606 0                    VN1645           DISPLAY TFKMKCNT, TTOGO, +MGA
 0208                        34,3515   52014 0           BON      GOTO
 0209   REF   3  LAST  727   34,3516   04306 0                    P39/79SW
 0210   REF   1              34,3517   71541 1                    P39/P79B
 0211   REF   1              34,3520   71400 0                    RECYCLE
R0212   STABLE ORBIT MIDCOURSE PROGRAM (P39 AND P79)

R0213   MOD NO -1             LOG SECTION - STABLE ORBIT - P38-P39
R0214   MOD BY RUDNICKI.S     DATE 25JAN68
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R0215   FUNCTIONAL DESCRIPTION

R0216          P39 AND P79 CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL
R0217          CONDITIONS REQUIRED BY THE AGC TO MAKE A MIDCOURSE CORRECTION
R0218          MANEUVER AFTER COMPLETING THE SOI MANEUVER BUT BEFORE MAKING
R0219          THE SOR MANEUVER

R0220   CALLING SEQUENCE

R0221          ASTRONAUT REQUEST THRU DSKY

R0222          V37E39E    IF THIS VEHICLE IS ACTIVE VEHICLE
R0223          V37E79E    IF OTHER VEHICLE IS ACTIVE VEHICLE

R0224   INPUT

R0225          (1) TPASS4    TIME OF INTERCEPT - SAVED FROM P38/P78
R0226          (2) TARGTIME TIME THAT PASSIVE VEHICLE IS AT INTERCEPT POINT -
R0227                        SAVED FROM P38/P78

R0228   OUTPUT

R0229          (1) TRKMKCNT NUMBER OF MARKS
R0230          (2) TTOGO     TIME TO GO
R0231          (3) +MGA      MIDDLE GIMBAL ANGLE
R0232          (4) DELVLVC   DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0233   SUBROUTINES USED

R0234          AVFLAGA
R0235          AVFLAGP
R0236          LOADTIME
R0237          SELECTMU
R0238          PRECSET
R0239          S34/35.1
R0240          MAINRTNE

 0241   REF 186  LAST  725    34,3521  0 4616 1  P39        TC      BANKCALL
 0242   REF   6  LAST  724    34,3522   72347 1             CADR    AVFLAGA           THIS VEHICLE ACTIVE
 0243                         34,3523  0 0006 1             EXTEND
 0244   REF   4  LAST  666    34,3524  3 1401 0             DCA     ATIGINC
 0245   REF   1               34,3525  0 3532 0             TC      P39/P79A
 0246   REF 187  LAST  728    34,3526  0 4616 1  P79        TC      BANKCALL
 0247   REF   6  LAST  724    34,3527   72354 0             CADR    AVFLAGP           OTHER VEHICLE ACTIVE
 0248                         34,3530  0 0006 1             EXTEND
 0249   REF   2  LAST  666    34,3531  3 1403 1             DCA     PTIGINC
 0250   REF   4  LAST  666    34,3532  53'576 0  P39/P79A   DXCH    KT                TIME TO PREPARE FOR BURN
 02505  REF 188  LAST  728    34,3533  0 4616 1             TC      BANKCALL
 02506  REF   7  LAST  724    34,3534   72361 0             CADR    P20FLGON          SET UPDATFLG, TRACKFLG
 0251   REF 101  LAST  727    34,3535  0 6037 0             TC      INTPRET
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L         STABLE ORBIT - P38-P39                                                        USER'S PAGE NO.   7       E7 S3

 0255                              34,3536   45014 0             SET     CALL
 02555   REF   4  LAST  727        34,3537   04066 0                     P39/79SW
 0256    REF   6  LAST  726        34,3540   21000 0                     SELECTMU        SELECT MU, CLEAR FINALFLG, GO TO VN1645
 0257                              34,3541   43234 0   P39/P79B RTB      DAD
 0258    REF  21  LAST  715        34,3542   21573 0                     LOADTIME
 0259    REF   5  LAST  728        34,3543   03576 0                     KT
 02595   REF  24  LAST  726        34,3544   03442 0             STORE   TIG             TIG = T (PRESENT) + PREPARATION TIME
 0260    REF  43  LAST  726        34,3545   34041 0             STCALL  TDEC1           PRECISION UPDATE ACTIVE AND PASSIVE
 0261    REF   5  LAST  666        34,3546   46360 0                     PRECSET            VEHICLES TO TIG
 0262                              34,3547   77624 1             CALL
 0263    REF   3  LAST  667        34,3550   73274 1                     S34/35.1        GET UNIT NORMAL
 0264                              34,3551   52145 0             DLOAD   GOTO
 0265    REF   2  LAST  726        34,3552   02307 1                     TARGTIME
 0266    REF   1                   34,3553   71434 1                     MAINRTNE        CALCULATE DELTA V AND DELTA V (LV)
R0272    .... PREC/TT ....
R0273    SUBROUTINES USED

R0274          PRECSET
R0275          TIMETHET
R0276          S34/35.1

 0277                              34,3554   71220 1   PREC/TT   STQ     DLOAD
 0278    REF   8  LAST  683        34,3555   03465 0                     RTRN
 0279    REF  25  LAST  729        34,3556   03442 0                     TIG
 0280    REF  44  LAST  729        34,3557   34041 0             STCALL  TDEC1           PRECISION UPDATE ACTIVE AND PASSIVE
 0281    REF   6  LAST  729        34,3560   46360 0                     PRECSET            VEHICLES TO TIG
 0282                              34,3561   53775 1             VLOAD   VSR*
 0283    REF  12  LAST  697        34,3562   03552 0                     RPASS3
 0284                              34,3563   57176 0                     0,2
 0285    REF   8  LAST  695        34,3564   16655 0             STODL   RVEC
 0286    REF   7  LAST  662        34,3565   03621 1                     CENTANG
 0287                              34,3566   71406 0             PUSH    COS
 0288    REF   5  LAST  662        34,3567   16732 0             STODL   CSTH
 0289                              34,3570   43156 1             SIN     SET
 0290    REF   7  LAST  662        34,3571   03466 0                     RVSW
 0291    REF   7  LAST  662        34,3572   26730 1             STOVL   SNTH
 0292    REF   9  LAST  697        34,3573   03560 1                     VPASS3
 0293                              34,3574   77657 0             VSR*
 0294                              34,3575   57176 0                     0,2
 0295    REF  10  LAST  695        34,3576   36744 0             STCALL  VVEC            GET TRANSFER TIME BASED ON CENTANG OF
 0296    REF   6  LAST  663        34,3577   24732 1                     TIMETHET           PASSIVE VEHICLE
 0297                              34,3600   77624 1             CALL
 0298    REF   4  LAST  729        34,3601   73274 1                     S34/35.1        GET UNIT NORMAL
 0299                              34,3602   52145 0             DLOAD   GOTO
 0300    REF   4  LAST  726        34,3603   00037 0                     T
 0301    REF   9  LAST  729        34,3604   03465 0                     RTRN
R0302    .... INTRPVP ....
R0303    SUBROUTINES USED

R0304          CSMPREC
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R0305         LEMPREC

 0306                               34,3605   43020 1  INTRPVP  STQ      BCFF            PRECISION UPDATE PASSIVE VEHICLE TO
 0307    REF  10  LAST  729         34,3606   03465 0                    RTRN              TDEC1
 0308    REF   5  LAST  697         34,3607   01352 1                    AVFLAG
 0309    REF   1                    34,3610   71615 0                    OTHERV
 0310                               34,3611   77624 1           CALL
 0311    REF   5  LAST  704         34,3612   27043 0                    CSMPREC
 0312                               34,3613   77650 1           GOTO
 0313    REF  11  LAST  730         34,3614   03465 0                    RTRN
 0314                               34,3615   77624 1  OTHERV   CALL
 0315    REF   8  LAST  707         34,3616   27057 0                    LEMPREC
 0316                               34,3617   77650 1           GOTO
 0317    REF  12  LAST  730         34,3620   03465 0                    RTRN
R0318    .... VNDSPLY ....
R0319    SUBROUTINES USED

R0320          BANKCALL
R0321          GOFLASH
R0322          GOTOPOOH

 0323                               34,3621  0 0006 1  VNDSPLY  EXTEND                   FLASH DISPLAY
 0324    REF  13  LAST  730         34,3622  23'465 1           QXCH     RTRN
 0325    REF   5  LAST  683         34,3623  55'615 0           TS       VERBNOUN
 0326    REF   6  LAST  730         34,3624  3 1615 1           CA       VERBNOUN
 0327    REF 189  LAST  728         34,3625  0 4616 1           TCR      BANKCALL
 0328    REF  20  LAST  709         34,3626   20476 0           CADR     GOFLASH
 0329    REF  22  LAST  725         34,3627  1 6001 1           TCF      GOTOPOOH        TERMINATE
 0330    REF  14  LAST  730         34,3630  0 1465 1           TC       RTRN            PROCEED
 0331                               34,3631  1 3624 0           TCF      -5              RECYCLE
 0351                               34,3632   01441 1  V06N33SR VN       0633
 0352                               34,3633   01467 0  V06N55SR VN       0655
 0353                               34,3634   01006 0  V04N06SR VN       0406
 0354                               34,3635   01471 1  V06N57SR VN       0657
 0355                               34,3636   01442 1  V06N34SR VN       0634
 0356                               34,3637   01472 1  V06N58SR VN       0658
 0357                               34,3640   01521 0  V06N81SR VN       0681
 0358                               34,3641   00002 0  DECTWO   OCT      2

*** END OF KISSING .050 ***
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 0001                                36,2022                      BANK    36
 0002   REF    3  LAST   40          36,2000                      SETLOC  P40S
 0003                                36,2022                      BANK
 0004   REF    3  LAST  650          E7,1455                      EBANK=  WHICH
 0005   REF    3 LAST    40 TO   40:       2       18*            COUNT*  $$/P40
R0006        THE MASTER IGNITION ROUTINE IS DESIGNED FOR USE BY THE FOLLOWING LEM PROGRAMS:  P12, P40, P42, P61, P63.
R0008   IT PERFORMS ALL FUNCTIONS IMMEDIATELY ASSOCIATED WITH APS OR DPS IGNITION:  IN PARTICULAR, EVERYTHING LYING
R0010   BETWEEN THE PRE-IGNITION TIME CHECK -- ARE WE WITHIN 45 SECONDS OF TIG? -- AND TIG + 26 SECONDS, WHEN DPS
R0012   PROGRAMS THROTTLE UP.

R0013        VARIATIONS AMONG PROGRAMS ARE ACCOMODATED BY MEANS OF TABLES CONTAINING CONSTANTS (FOR AVEGEXIT, FOR
R0015   WAITLIST, FOR PINBALL) AND TCF INSTRUCTIONS.   USERS PLACE THE ADRES OF THE HEAD OF THE APPPROPRIATE TABLE
R0017   (OF P61TABLE FOR P61LM, FOR EXAMPLE) IN ERASABLE REGISTER 'WHICH' (E4).   THE IGNITION ROUTINE THEN INDEXES BY
R0019   WHICH TO OBTAIN OR EXECUTE THE PROPER TABLE ENTRY.   THE IGNITION ROUTINE IS INITIATED BY A TCF BURNBABY,
R0021   THROUGH BANKJUMP IF NECESSARY.   THERE IS NO RETURN.

R0022        THE MASTER IGNITION ROUTINE WAS CONCEIVED AND EXECUTED, AND (NOTA BENE) IS MAINTAINED BY ADLER AND EYLES.


R0024                                                     HONI SOIT QUI MAL Y PENSE


R0025                                              ****************************************
R0026                                              TABLES FOR THE IGNITION ROUTINE
R0027                                              ****************************************

R0028                                                          NOLI SE TANGERE

 0029                                36,2022   01512 0  P12TABLE VN      0674             (0)
 0030   REF    1                     36,2023 1 2325 0           TCF     ULLGNOT          (1)
 0031   REF    1                     36,2024 1 2612 1           TCF     COMFAIL3         (2)
 0032   REF    1                     36,2025 1 3062 1           TCF     GOCUTOFF         (3)
 0033   REF   35  LAST  716          36,2026 1 5261 0           TCF     TASKOVER         (4)
 0034   REF    1                     36,2027 1 2146 1           TCF     P12SPOT          (5)
 0035                                36,2030   00000 1           DEC     0                (6)       NO ULLAGE
 0036   REF    4  LAST  731          E7,1455                    EBANK=  WHICH
 0037   REF    1                     36,2031   03770 1           2CADR   SERVEXIT         (7)
 0037   REF    1                     36,2032   64067 1
 0038   REF    1                     36,2033 1 2376 0           TCF     DISPCHNG         (11)
 0039   REF    1                     36,2034 1 2503 1           TCF     WAITABIT         (12)
 0040   REF    1                     36,2035 1 2521 1           TCF     P12IGN           (13)
R0043


 0044                                36,2036   01450 1  P40TABLE VN      0640             (0)
 0045   REF    2  LAST  731          36,2037 1 2325 0           TCF     ULLGNOT          (1)
 0046   REF    1                     36,2040 1 2614 1           TCF     COMFAIL4         (2)
 0047   REF    1                     36,2041 1 3047 0           TCF     GOPOST           (3)
 0048   REF   36  LAST  731          36,2042 1 5261 0           TCF     TASKOVER         (4)
 0049   REF    1                     36,2043 1 2146 1           TCF     P40SPOT          (5)
 0050                          36,2044   04300 0             DEC      2240          (6)
 0051  REF    1                E6,1422                       EBANK=  OMEGAQ
 0052  REF    1                36,2045   03666 1             2CADR    STEERING      (7)
 0052  REF    1                36,2046   74066 1
 0053  REF    1                36,2047  1 2366 1             TCF      P40SJUNK      (11)
 0054  REF    2  LAST   731    36,2050  1 2563 1             TCF      WAITABIT      (12)
 0055  REF    1                36,2051  1 2504 0             TCF      P40IGN        (13)
 0056  REF    1                36,2052  1 3123 0             TCF      REP40ALM      (14)
R0058


 0060  REF    1                36,2053  1 2151 1  P41TABLE   TCF      P41SPOT       (5)
 0061                          36,2054   77776 1             DEC      -1            (6)
 0062  REF    2  LAST   732    E6,1422                       EBANK=  OMEGAQ
 0063  REF    1                36,2055   03376 0             2CADR    CALCN85       (7)
 0063  REF    1                36,2056   74066 1
 0064  REF    1                36,2057  1 2400 0             TCF      COMMON        (11)
 0065  REF    1                36,2060  1 2567 0             TCF      TIGTASK       (12)
R0066


 0067                          36,2061   01450 1  P42TABLE   VN       0640          (0)
 0068  REF    1                36,2062  1 2322 1             TCF      WANTAPS       (1)
 0069  REF    2  LAST   731    36,2063  1 2614 1             TCF      COMFAIL4      (2)
 0070  REF    2  LAST   731    36,2064  1 3047 0             TCF      GOPOST        (3)
 0071  REF   37  LAST   731    36,2065  1 5261 0             TCF      TASKOVER      (4)
 0072  REF    1                36,2066  1 2146 1             TCF      P42SPOT       (5)
 0073                          36,2067   05120 1             DEC      2640          (6)
 0074  REF    3  LAST   732    E6,1422                       EBANK=  OMEGAQ
 0075  REF    2  LAST   732    36,2070   03666 1             2CADR    STEERING      (7)
 0075                          36,2071   74066 1
 0076  REF    2  LAST   732    36,2072  1 2366 1             TCF      P40SJUNK      (11)
 0077  REF    3  LAST   732    36,2073  1 2563 1             TCF      WAITABIT      (12)
 0078  REF    1                36,2074  1 2541 1             TCF      P42IGN        (13)
 0079  REF    1                36,2075  1 3420 0             TCF      P42STAGE      (14)
R0081


 0082                          36,2076   01476 0  P63TABLE   VN       0662          (0)
 0083  REF    3  LAST   731    36,2077  1 2325 0             TCF      ULLGNOT       (1)
 0084  REF    2  LAST   731    36,2100  1 2612 1             TCF      COMFAIL3      (2)
 0085  REF    1                36,2101  1 2777 0             TCF      V99RECYC      (3)
 0086  REF   38  LAST   732    36,2102  1 5261 0             TCF      TASKOVER      (4)
 0087  REF    1                36,2103  1 2151 1             TCF      P63SPOT       (5)
 0088                          36,2104   04300 0             DEC      2240          (6)
 0089  REF    5  LAST   731    E7,1455                       EBANK=  WHICH
 0090  REF    2  LAST   731    36,2105   03770 1             2CADR    SERVEXIT      (7)
 0090                          36,2106   64067 1
 0091  REF    2  LAST   731    36,2107  1 2376 0             TCF      DISPCHNG      (11)
 0092  REF    4  LAST   732    36,2110  1 2563 1             TCF      WAITABIT      (12)
 0093    REF    1                36,2111  1 2455 0             TCF      P63IGN           (13)
R0096

 0112                            36,2112   01477 1   ABRTABLE VN       0663             (0)
 0113    REF    4   LAST   732   36,2113  1 2325 0             TCF      ULLGNOT          (1)
 0114    REF    3   LAST   732   36,2114  1 2612 1             TCF      COMFAIL3         (2)
 0115    REF    2   LAST   731   36,2115  1 3062 1             TCF      GOCUTOFF         (3)
 0116    REF   39   LAST   732   36,2116  1 5261 0             TCF      TASKOVER         (4)
 0117                            36,2117  12 120 1             NOOP                      (5)
 0118                            36,2120  12 121 0             NOOP                      (6)
 0119                            36,2121  12 122 0             NOOP                      (7)
 0120                            36,2122  12 123 1             NOOP
 0121    REF    3   LAST   732   36,2123  1 2376 0             TCF      DISPCHNG         (11)
 0122    REF    5   LAST   732   36,2124  1 2563 1             TCF      WAITABIT         (12)
 0123    REF    1                36,2125  1 2531 0             TCF      ABRTIGN          (13)
R0126


R0127                                                  *****************************************
R0128                                                  GENERAL PURPOSE IGNITION ROUTINES
R0129                                                  *****************************************

 0130    REF   29   LAST   711   36,2126  0 5353 1   BURNBABY TC       PHASCHNG         GROUP 4 RESTARTS HERE
 0131                            36,2127   04024 0             OCT      04024

 0132    REF  133   LAST   716   36,2130  3 4755 1             CAF      ZERO             EXTIRPATE JUNK LEFT IN DVTOTAL
 0133    REF    4   LAST   315   36,2131  55'507 0             TS       DVTOTAL
 0134    REF    5   LAST   733   36,2132  55'510 0             TS       DVTOTAL +1

 0135    REF  190   LAST   730   36,2133  0 4616 1             TC       BANKCALL         P40AUTO MUST BE BANKCALLED EVEN FROM ITS
 0136    REF    1                36,2134   73747 1             CADR     P40AUTO            OWN BANK TO SET UP RETURN PROPERLY

 0141                            36,2135  0 0006 1   B*RNB*B* EXTEND
 0142    REF   26   LAST   729   36,2136  3 1442 1             DCA      TIG              STORE NOMINAL TIG FOR OBLATENESS COMP.
 0143    REF    2   LAST   147   36,2137  53'512 1             DXCH     GOBLTIME         AND FOR P70 OR P71.

 0173                            36,2140  0 0004 0             INHINT
 0174    REF   22   LAST   719   36,2141  0 4674 0             TC       IBNKCALL
 0175    REF    1                36,2142   75564 1             CADR     ENGINOF3
 0176                            36,2143  0 0003 1             RELINT

 0179    REF    6   LAST   732   36,2144  51'455 1             INDEX    WHICH
 0180                            36,2145  1 0005 0             TCF      5


 0182    REF    2   LAST   731   36,2146                 P42SPOT  =        P40SPOT          (5)
 0183    REF    3   LAST   733   36,2146                 P12SPOT  =        P40SPOT          (5)
 0185    REF    2   LAST   732   36,2151                 P63SPOT  =        P41SPOT          (5)      IN P63 CLOKTASK ALREADY GOING
 0186    REF    1                36,2146  4 4762 1   P40SPOT  CS       CNTDNDEX         (5)
 01861  REF 191  LAST  733   36,2147  0 4616 1            TC       BANKCALL      MUST BE BANKCALLED FOR GENERALIZED
 01862  REF   1              36,2150   74664 0            CADR     STCLOK2               RETURN
 0187   REF 102  LAST  728   36,2151  0 6037 0  P41SPOT   TC       INTPRET       (5)
 01871                       36,2152   45345 1            DLOAD    DSU
 0188   REF  27  LAST  733   36,2153   03442 0                     TIG
 0189   REF   1              36,2154   35143 1                     D29.9SEC
 01891  REF  45  LAST  729   36,2155   34041 0            STCALL   TDEC1
 01892  REF   1              36,2156   61104 0                     INITCDUW
 0190                        36,2157   45014 0            BOFF     CALL1
 0191   REF   3  LAST  706   36,2160   03347 1                     MUNFLAG
 0192   REF   1              36,2161   74200 0                     GOMIDAV
 0193   REF   6  LAST  730   36,2162   27043 0                     CSMPREC
 0194                        36,2163   64375 1            VLOAD    MXV
 0195   REF  12  LAST  710   36,2164   00025 0                     VATT1
 0196   REF  20  LAST  707   36,2165   01734 0                     REFSMMAT
 0197                        36,2166   77762 1            VSR1
 0198   REF   3  LAST  706   36,2167   25726 0            STOVL    V(CSM)        CSM VELOCITY - M/CS*2(7)
 0199   REF   9  LAST  710   36,2170   00017 1                     RATT1
 0200                        36,2171   64312 0            VSL4     MXV
 0201   REF  21  LAST  734   36,2172   01734 0                     REFSMMAT
 0202   REF   3  LAST  706   36,2173   35720 1            STCALL   R(CSM)        CSM POSITION - M*2(24)
 0203   REF   1              36,2174   67130 1                     MUNGRAV
 0204   REF   2  LAST  120   36,2175   16317 0            STODL    G(CSM)        CSM GRAVITY VEC. - M/CS*2(7)
 02042  REF  14  LAST  710   36,2176   00015 0                     TAT
 02044  REF  46  LAST  734   36,2177   00041 1            STORE    TDEC1         RELOAD TDEC1 FOR MIDTOAV.
 0205                        36,2200   77624 1  GOMIDAV   CALRB
 0206   REF   1              36,2201   27557 0                     MIDTOAV1
 0207   REF   1              36,2202  1 2211 0            TCF      CALLT-35      MADE IT IN TIME.

 0208                        36,2203  0 0006 1            EXTEND                 TIG WAS SLIPPED, SO RESET TIG TO 29.9
 0209   REF   3  LAST  195   36,2204  3 1561 1            DCA      PIPTIME1      SECONDS AFTER THE TIME TO WHICH WE DID
 0210   REF  28  LAST  734   36,2205  53'442 0            DXCH     TIG           INTEGRATE.
 0211                        36,2206  0 0006 1            EXTEND
 0212   REF   2  LAST  734   36,2207  3 3143 1            DCA      D29.9SEC
 0213   REF  29  LAST  734   36,2210  21'442 0            DAS      TIG

 0214   REF 285  LAST  721   36,2211  52 155 1  CALLT-35  DXCH     MPAC
 0215   REF   5  LAST  241   36,2212  53'500 1            DXCH     SAVET-30      DELTA-T UNTIL TIG-30
 0216                        36,2213  0 0006 1            EXTEND
 0217   REF   1              36,2214  4 3756 1            DCS      5SECDP
 0218   REF   6  LAST  734   36,2215  21'500 1            DAS      SAVET-30      DELTA-T UNTIL TIG-35
 0219                        36,2216  0 0006 1            EXTEND
 0220   REF   7  LAST  734   36,2217  3 1500 0            DCA      SAVET-30
 0221   REF   3  LAST  511   36,2220  0 5277 0            TC       LONGCALL
 0222   REF  15  LAST  316   E7,1453                      EBANK=   TTOGO
 0223   REF   3  LAST  241   36,2221   02240 0            2CADR    TIG-35
 0223                        36,2222   74067 0
 0224   REF  30  LAST  733   36,2223  0 5353 1            TC       PHASCHNG
 0225                        36,2224   20254 0            OCT      20254         4.25SPOT FOR TIG-35 RESTART.
 0226    REF   1                36,2225  0 5321 1              TC       CHECKMM
 0227                           36,2226   00077 1              DEC      63
 0228    REF 108  LAST  725     36,2227  1 5155 1              TCF      ENDOFJOB          NOT P63
 0229    REF   2  LAST  733     36,2230  4 4762 1              CS       CNTDNDEX          P63 CAN START DISPLAYING NOW.
 0230    REF   5  LAST  681     36,2231  55'163 0              TS       DISPDEX
 0231    REF 103  LAST  734     36,2232  0 6037 0              TC       INTPRET
 0232                           36,2233   51575 1              VLOAD    ABVAL
 0233    REF   2  LAST  147     36,2234   03553 1                       VN1
 0234    REF   4  LAST  315     36,2235   03472 0              STORE    ABVEL             INITIALIZE ABVEL FOR P63 DISPLAY
 0235                           36,2236   77776 1              EXIT
 0236    REF 109  LAST  735     36,2237  1 5155 1              TCF      ENDOFJOB


R0237                                                 ************************************

 0238    REF   1                36,2240  3 3756 0  TIG-35      CAF      5SEC
 0239    REF   9  LAST  519     36,2241  0 5173 1              TC       TWIDDLE
 0240    REF   2  LAST  241     36,2242   02276 0              ADRES    TIG-30

 0241    REF  31  LAST  734     36,2243  0 5353 1              TC       PHASCHNG
 0242                           36,2244   40154 0              OCT      40154             4.15SPOT FOR TIG-30 RESTART

 0243    REF   1                36,2245  4 4752 1              CS       BLANKDEX          BLANK DSKY FOR 5 SECONDS
 0244    REF   6  LAST  735     36,2246  55'163 0              TS       DISPDEX

 0245    REF   7  LAST  733     36,2247  51'455 1              INDEX    WHICH
 0246                           36,2250  4 0006 0              CS       6                 CHECK ULLAGE TIME.
 0247                           36,2251  0 0006 1              EXTEND
 0248    REF  40  LAST  733     36,2252  6 5261 1              BZMF     TASKOVER
 0249    REF   1                36,2253  3 3145 1              CAF      4.9SEC            SET UP TASK TO RESTORE DISPLAY AT TIG-30
 0250    REF  10  LAST  735     36,2254  0 5173 1              TC       TWIDDLE
 0251    REF   1                36,2255   02266 1              ADRES    TIG-30.1

 0252    REF   1                36,2256  3 5027 1              CAF      PRIO17            A NEGATIVE ULLAGE TIME INDICATES P41, IN
 0253    REF  16  LAST  716     36,2257  0 5072 1              TC       NOVAC             WHICH CASE WE HAVE TO SET UP A JOB TO
 0254    REF  16  LAST  734     E7,1453                        EBANK=   TTOGO             BLANK THE DSKY FOR FIVE SECONDS, SINCE
 0255    REF   1                36,2260   02263 1              2CADR    P41BLANK          CLOKJOB IS NOT RUNNING DURING P41.
 0255    REF   1                36,2261   74067 0
 0256    REF  41  LAST  735     36,2262  1 5261 0              TCF      TASKOVER

 0257    REF 192  LAST  734     36,2263  0 4616 1  P41BLANK    TC       BANKCALL          BLANK DSKY.
 0258    REF   1                36,2264   20456 1              CADR     CLEANDSP
 0259    REF 110  LAST  735     36,2265  1 5155 1              TCF      ENDOFJOB

 0260    REF   2  LAST  735     36,2266  3 5027 1  TIG-30.1    CAF      PRIO17            SET UP JOB  TO RESTORE DISPLAY AT TIG-30
 0261    REF  17  LAST  735     36,2267  0 5072 1              TC       NOVAC
 0262    REF  17  LAST  735     E7,1453                        EBANK=   TTOGO
 0263    REF   1                36,2270   02273 0              2CADR    TIG-30A
 0263    REF   1                36,2271   74067 0
 0264    REF  42  LAST  735     36,2272  1 5261 0              TCF      TASKOVER
 0265   REF    1                36,2273  3 3761 1  TIG-30A  CAF     V16N85B
 0266   REF  193  LAST  735     36,2274  0 4616 1           TC      BANKCALL           RESTORE DISPLAY.
 0267   REF    1                36,2275   20465 1           CADR    REGODSP            REGODSP DOES A TCF ENDOFJOB

R0268                                        ******************************************

 0269   REF    1                36,2276  3 3144 0  TIG-30   CAF     S24.9SEC
 0270   REF   11  LAST  735     36,2277  0 5173 1           TC      TWIDDLE
 0271   REF    3  LAST  241     36,2300   02352 1           ADRES   TIG-5

 0272   REF    3  LAST  735     36,2301  4 4762 1           CS      CNTDNDEX           START UP CLOKTASK AGAIN
 0273   REF    7  LAST  735     36,2302  55'163 0           TS      DISPDEX

 0274   REF    8  LAST  735     36,2303  51'455 1           INDEX   WHICH              PICK UP APPROPRIATE ULLAGE-ON TIME
 0275                           36,2304  3 0006 1           CAF     6
 0276                           36,2305  0 0006 1           EXTEND
 0277   REF    5  LAST  733     36,2306  6 2325 1           BZMF    ULLGNOT            DON'T SET UP ULLAGE IF DT IS NEG OR ZERO
 0278   REF    8  LAST  734     36,2307  55'477 0           TS      SAVET-30           SAVE DELTA-T FOR RESTART
 0279   REF   12  LAST  736     36,2310  0 5173 1           TC      TWIDDLE
 0280   REF    2  LAST  239     36,2311   02346 1           ADRES   ULLGTASK

 0281   REF   23  LAST  724     36,2312  3 6245 1           CA      THREE              RESTART PROTECT ULLGTASK (1.3SPOT)
 0282   REF   97  LAST  716     36,2313  54 001 1           TS      L
 0283   REF   24  LAST  736     36,2314  4 6245 0           CS      THREE
 0284   REF    3  LAST  216     36,2315  52 753 1           DXCH    -PHASE1
 0285   REF    5  LAST  367     36,2316  4 0025 1           CS      TIME1
 0286   REF    1                36,2317  55'053 1           TS      TBASE1

 02861  REF    9  LAST  736     36,2320  51'455 1           INDEX   WHICH
 02862                          36,2321  1 0001 1           TCF     1

 02863  REF   11  LAST  295     36,2322  4 0106 1  WANTAPS  CS      FLGWRD10           (1) FOR P42 ENSURE APSFLAG IS SET. IF IT
 02864  REF    7  LAST  295     36,2323  7 4737 1           MASK    APSFLBIT           WASN'T SET, DAP WILL BE INITIALIZED TO
 02865  REF   12  LAST  736     36,2324  26 106 1           ADS     FLGWRD10           ASCENT VALUES BY 1/ACCS IN 2 SECONDS.

 0287                           36,2325  0 0006 1  ULLGNOT  EXTEND                     (1)
 0288   REF   10  LAST  736     36,2326  5 1455 1           INDEX   WHICH
 0289                           36,2327  3 0010 0           DCA     7                  LOAD AVEGEXIT WITH APPROPRIATE 2CADR
 0290   REF    3  LAST  105     36,2330  53'253 0           DXCH    AVEGEXIT

 0291   REF   38  LAST  713     36,2331  3 4752 0           CAF     TWO                4.2SPOT RESTARTS IMMEDIATELY AT REDO4.2
 0292   REF   93  LAST  736     36,2332  54 001 1           TS      L
 0293   REF   39  LAST  736     36,2333  4 4752 1           CS      TWO                AND ALSO AT TIG-5 AT THE CORRECT TIME.
 0294   REF    3  LAST  224     36,2334  52 761 0           DXCH    -PHASE4

 0295   REF    6  LAST  736     36,2335  4 0025 1           CS      TIME1
 0296   REF    2  LAST  232     36,2336  55'061 0           TS      TBASE4             SET TBASE4 FOR TIG-5 RESTART

 02961                          36,2337  0 0006 1  REDO2.17 EXTEND
 02962  REF  10  LAST  536    36,2340  3 4755 1            DCA     NEGO             CLEAR OUT GROUP 2 SO LAMBERT CAN START
 02963  REF   4  LAST  231    36,2341  52 755 1            DXCH    -PHASE2                IF NEEDED.

 0297   REF   1               36,2342  10 763 1  REDO4.2   CCS     PHASE5           IS SERVICER GOING?
 0298   REF  43  LAST  735    36,2343  1 5261 0            TCF     TASKOVER         YES, DON'T START IT UP AGAIN.

 0299   REF  40  LAST  611    36,2344  0 4635 0            TC      POSTJUMP
 0300   REF   1               36,2345   77410 1            CADR    PREREAD          PREREAD ENDS THIS TASK


R0301                                         ****************************************

 0302   REF   1               36,2346  0 2657 1  ULLGTASK  TC      ONULLAGE         THIS COMES AT TIG-7.5 OR TIG-3.5
 0303   REF  32  LAST  735    36,2347  0 5353 1            TC      PHASCHNG
 0304                         36,2350   00001 0            OCT     1
 0305   REF  44  LAST  737    36,2351  1 5261 0            TCF     TASKOVER


R0306                                         ****************************************

 0307                         36,2352  0 0006 1  TIG-5     EXTEND
 03072  REF  11  LAST  737    36,2353  3 4755 1            DCA     NEGO             INSURE THAT GROUP 3 IS INACTIVE.
 03074  REF   2  LAST  214    36,2354  52 757 0            DXCH    -PHASE3

 03076  REF   2  LAST  735    36,2355  3 3756 0            CAF     5SEC
 0308   REF  13  LAST  736    36,2356  0 5173 1            TC      TWIDDLE
 0309   REF   2  LAST  241    36,2357   02403 1            ADRES   TIG-0

 0310   REF  56  LAST  629    36,2360  0 5516 0            TC      DOWNFLAG         RESET IGNFLAG AND ASTNFLAG
 0311   REF   1               36,2361   00153 0            ADRES   IGNFLAG            FOR LIGHT-UP LOGIC
 0312   REF  57  LAST  737    36,2362  0 5516 0            TC      DOWNFLAG
 0313   REF   1               36,2363   00154 1            ADRES   ASTNFLAG

 0318   REF  11  LAST  736    36,2364  51'455 1            INDEX   WHICH
 0319                         36,2365  1 0011 0            TCF     11

 0320   REF   1               36,2366  10 757 0  P40SJUNK  CCS     PHASE3           (11) P40 AND P42.  S40.13 IN PROGRESS?
 03202  REF   4  LAST  733    36,2367  1 2376 0            TCF     DISPCHNG         YES

 03204  REF   4  LAST  384    36,2370  3 4736 1            CAF     PRIO20
 0321   REF  27  LAST  717    36,2371  0 5105 0            TC      FINDVAC
 0322   REF  18  LAST  735    E7,1453                      EBANK=  TTOGO
 0323   REF   2  LAST  240    36,2372   02540 1            2CADR   S40.13
 0323                         36,2373   56067 0


 03232  REF  33  LAST  737    36,2374  0 5353 1            TC      PHASCHNG         3.5SPOT FOR S40.13
 03234                        36,2375   00053 1            OCT     00053
 0324   REF   1               36,2376  4 4760 0  DISPCHNG  CS      VB99DEX          (11)
 0325   REF   8  LAST  736    36,2377  55'163 0            TS      DISPDEX
 03252  REF  34  LAST  737    36,2400  0 5353 1  COMMON    TC      PHASCHNG        RESTART TIG-0 (4.7SPOT)
 03254                        36,2401   40074 0             OCT     40074
 0326   REF  45  LAST  737    36,2402  1 5261 0             TCF     TASKOVER


R0327                                            ****************************************

 0328   REF   6  LAST  704    36,2403  4 0103 1  TIG-0      CS      FLAGWRD7        SET IGNFLAG SINCE TIG HAS ARRIVED
 0329   REF   1               36,2404  7 4737 1             MASK    IGNFLBIT
 0330   REF   7  LAST  738    36,2405  26 103 1             ADS     FLAGWRD7

 0331   REF   2  LAST  735    36,2406  0 5321 1             TC      CHECKMM         IN P63 CASE, THROTTLE-UP IS ZOOMTIME
 0332                         36,2407   00077 1             DEC     63                AFTER NOMINAL IGNITION, NOT ACTUAL
 0333   REF   1               36,2410  1 2421 0             TCF     IGNYET?
 0334   REF   2  LAST  240    36,2411  3 1422 1             CA      ZOOMTIME
 0335   REF  32  LAST  716    36,2412  0 5203 0             TC      WAITLIST
 0336   REF  21  LAST  242    E7,1515                       EBANK=  DVCNTR
 03365  REF   1               36,2413   02007 1             2CADR   P63ZOOM
 03365  REF   1               36,2414   36067 0
 0337   REF   4  LAST  650    36,2415  0 5327 1             TC      2PHSCHNG
 0338                         36,2416   40033 0             OCT     40033

 0339                         36,2417   05014 1             OCT     05014
 0340                         36,2420   77777 0             OCT     77777

 0341   REF   1               36,2421  3 4740 0  IGNYET?    CAF     ASTNBIT         CHECK ASTNFLAG:  HAS ASTRONAUT RESPONDED
 0342   REF   8  LAST  738    36,2422  7 0103 1             MASK    FLAGWRD7          TO OUR ENGINE ENABLE REQUEST?
 0343                         36,2423  0 0006 1             EXTEND
 0344   REF  12  LAST  737    36,2424  5 1455 1             INDEX   WHICH
 0345                         36,2425  1 0012 0             BZF     12              BRANCH IF HE HAS NOT RESPONDED YET

 0346   REF  19  LAST  606    36,2426  4 0101 0  IGNITION   CS      FLAGWRD5        INSURE ENGONFLG IS SET.
 03461  REF   3  LAST  216    36,2427  7 4745 1             MASK    ENGONBIT
 03462  REF  20  LAST  738    36,2430  26 101 0             ADS     FLAGWRD5
 03463  REF   6  LAST  257    36,2431  4 4355 1             CS      PRIO30          TURN ON THE ENGINE.
 0347                         36,2432  0 0006 1             EXTEND
 0348   REF  22  LAST  470    36,2433  02 011 0             RAND    DSALMOUT
 0349   REF  26  LAST  562    36,2434  6 4737 0             AD      BIT13
 0350                         36,2435  0 0006 1             EXTEND
 0351   REF  23  LAST  738    36,2436  01 011 0             WRITE   DSALMOUT
 0352                         36,2437  0 0006 1             EXTEND                  SET TEVENT FOR DOWNLINK
 0353   REF  17  LAST  597    36,2440  3 0025 0             DCA     TIME2
 0354   REF   4  LAST  200    36,2441  53'345 0             DXCH    TEVENT

 0355                         36,2442  0 0006 1             EXTEND                  UPDATE TIG USING TGO FROM S40.13
 0356   REF   4  LAST  241    36,2443  3 1517 0             DCA     TGO
 0357   REF  30  LAST  734    36,2444  53'442 0             DXCH    TIG
 0358                         36,2445  0 0006 1             EXTEND
 0359   REF  18  LAST  738    36,2446  3 0025 0             DCA     TIME2
 0360   REF  31  LAST  738    36,2447  21'442 0             DAS     TIG
 03601  REF   1              36,2450   4 4742 0            CS        FLUNDBIT      PERMIT GUIDANCE LOOP DISPLAYS
 03602  REF   9  LAST  704   36,2451   7 0104 0            MASK      FLAGWRD8
 03603  REF  10  LAST  739   36,2452  54 104  0            TS        FLAGWRD8

 0361   REF  13  LAST  738   36,2453  51'455  1            INDEX     WHICH
 0362                        36,2454   1 0013 1            TCF       13

 0363                        36,2455   0 0006 1  P63IGN    EXTEND                  (13)       INITIATE BURN DISPLAYS
 0364   REF   1              36,2456   3 3137 1            DCA       DSP2CADR
 0366   REF   1              36,2457  53'253  0            DXCH      AVGEXIT

 03661  REF  15  LAST  681   36,2460   3 0005 1            CA        Z             ASSASSINATE CLOKTASK
 03662  REF   9  LAST  737   36,2461  55'163  0            TS        DISPDEX

 0370   REF   1              36,2462   4 0105 1            CS        FLAGWRD9      SET FLAG FOR P70-P71
 0371   REF   1              36,2463   7 4743 1            MASK      LETABBIT
 0372   REF   2  LAST  739   36,2464  26 105  1            ADS       FLAGWRD9

 0373   REF   9  LAST  738   36,2465   4 0103 1            CS        FLAGWRD7      SET SWANDISP TO ENABLE R10.
 0374   REF   1              36,2466   7 4741 0            MASK      SWANDBIT
 0375   REF  10  LAST  739   36,2467  26 103  1            ADS       FLAGWRD7

 03751  REF   3  LAST  285   36,2470   4 4735 0            CS        PULSES        MAKE SURE DAP IS NOT IN MINIMUM-IMPULSE
 03752  REF  16  LAST  294   36,2471   7 0111 1            MASK      DAPBOOLS        MODE, IN CASE OF SWITCH TO P66
 03753  REF  17  LAST  739   36,2472  54 111  1            TS        DAPBOOLS

 03754                       36,2473   0 0006 1            EXTEND                  INITIALIZE TIG FOR P70 AND P71.
 03755  REF  19  LAST  738   36,2474   3 0025 0            DCA       TIME2
 03756  REF  32  LAST  738   36,2475  53'442  0            DXCH      TIG

 0376   REF 134  LAST  733   36,2476   3 4755 1            CAF       ZERO          INITIALIZE WCHPHASE AND FLPASS0
 0377   REF   1              36,2477  55'351  0            TS        WCHPHASE
 03771  REF   2  LAST  149   36,2500  55'621  1            TS        WCHPHOLD      ALSO WHCPHOLD
 0378   REF  40  LAST  736   36,2501   3 4752 0            CA        TWO
 0379   REF   2  LAST  149   36,2502  55'623  0            TS        FLPASS0

 0380   REF   2  LAST  732   36,2503   1 2541 1            TCF       P42IGN
 0381   REF  21  LAST  738   36,2504   4 0101 0  P40IGN    CS        FLAGWRD5      (13)
 0382   REF   1              36,2505   7 4740 1            MASK      NOTHRBIT
 0383                        36,2506   0 0006 1            EXTEND
 0384   REF   3  LAST  739   36,2507   1 2541 1            BZF       P42IGN
 0385   REF   3  LAST  738   36,2510   3 1422 1            CA        ZOOMTIME
 0386   REF  33  LAST  738   36,2511   0 5203 0            TC        WAITLIST
 0387   REF  22  LAST  738   E7,1515                       EBANK=    DVCNTR
 03875  REF   1              36,2512    02015 1            2CADR     P40ZOOM
 03875  REF   1              36,2513    36067 0
 0388   REF   5  LAST  738   36,2514   0 5327 1  P63IGN1   TC        2PHSCHNG
 0389                        36,2515    40033 0            OCT       40033         3.3SPOT FOR ZOOM RESTART.
 0390                        36,2516    05014 1            OCT       05014         TYPE C   RESTARTS HERE IMMEDIATELY
 0391                        36,2517    77777 0            OCT       77777
 0392    REF   4  LAST  739   36,2520  1 2541 1            TCF      P42IGN
 0398    REF   6  LAST  520   36,2521  3 5015 0  P12IGN    CAF      EBANK6
 039805  REF  21  LAST  713   36,2522  54 003 0            TS       EBANK
 03981   REF   7  LAST  222   E6,1537                      EBANK=   AOSQ

 039814  REF   1              36,2523  3 1412 1            CA       IGNAOSQ           INITIALIZE DAP BIAS ACCELERATION
 039815  REF   8  LAST  740   36,2524  55'537 0            TS       AOSQ                   ESTIMATES AT P12 IGNITION.
 03982   REF   1              36,2525  3 1413 0            CA       IGNAOSR
 039825  REF   1              36,2526  55'541 1            TS       AOSR

 03983   REF   4  LAST  678   36,2527  3 5016 0            CAF      EBANK7
 039835  REF  22  LAST  740   36,2530  54 003 0            TS       EBANK
 03984   REF  23  LAST  739   E7,1515                      EBANK=   DVCNTR

 0399    REF  16  LAST  739   36,2531  3 0005 1  ABRTIGN   CA       Z                 (13) KILL CLOKTASK
 0400    REF  10  LAST  739   36,2532  55'163 0            TS       DISPDEX

 04001                        36,2533  0 0006 1            EXTEND                     CONNECT ASCENT GYIDANCE TO SERVICER.
 04002   REF   1              36,2534  3 3141 0            DCA      ATMAGADR
 04003   REF   2  LAST  739   36,2535  53'253 0            DXCH     AVGEXIT

 0401    REF  11  LAST  739   36,2536  4 0103 1            CS       FLAGWRD7          ENABLE R10.
 0402    REF   2  LAST  739   36,2537  7 4741 0            MASK     SWANDBIT
 0403    REF  12  LAST  740   36,2540  26 103 1            ADS      FLAGWRD7

 0405    REF   1              36,2541  4 4744 0  P42IGN    CS       DRIFTBIT          ENSURE THAT POWERED-FLIGHT SWITCHING
 0409    REF  18  LAST  739   36,2542  7 0111 1            MASK     DAPBOOLS            CURVES ARE USED.
 0410    REF  19  LAST  740   36,2543  54 111 1            TS       DAPBOOLS
 0411    REF   1              36,2544  3 4743 0            CAF      IMPULBIT          EXAMINE IMPULSE SWITCH
 0412    REF  18  LAST  741   36,2545  7 0076 1            MASK     FLAGWRD2
 0413    REF 219  LAST  716   36,2546  10 000 0            CCS      A
 0414    REF   1              36,2547  1 3522 0            TCF      IMPLBURN

 0415    REF  58  LAST  737   36,2550  0 5516 0  DVMONCON  TC       DOWNFLAG
 0416    REF   2  LAST  737   36,2551   00153 0            ADRES    IGNFLAG           CONNECT DVMON
 0417    REF  59  LAST  740   36,2552  0 5516 0            TC       DOWNFLAG
 0418    REF   2  LAST  737   36,2553   00154 1            ADRES    ASTNFLAG
 0419    REF  60  LAST  740   36,2554  0 5516 0            TC       DOWNFLAG
 0420    REF   1              36,2555   00161 1            ADRES    IDLEFLAG

 0421    REF  35  LAST  738   36,2556  0 5353 1            TC       PHASCHNG
 0422                         36,2557   40054 1            OCT      40054

 0423    REF  11  LAST  703   36,2560  0 5221 0            TC       FIXDELAY          TURN ULLAGE OFF HALF A SECOND AFTER
 0424                         36,2561   00062 0            DEC      50                LIGHT UP.

 0425    REF   1              36,2562  0 2653 0  ULLAGOFF  TC       NOULLAGE

 0426                         36,2563  0 0006 1  WAITABIT  EXTEND                     KILL GROUP 4
 0427    REF  12  LAST  737   36,2564  3 4755 1            DCA      NEGO
 0428    REF   4  LAST  736    36,2565  52 761 0             DXCH    -PHASE4

 0429    REF  46  LAST  738    36,2566   1 5261 0            TCF     TASKOVER


 04292   REF  41  LAST  737    36,2567  0 4635 0  TIGTASK    TC      POSTJUMP               (12)
 04293   REF   1               36,2570   36000 1             CADR    TIGTASK1

R0430                                        *****************************************

 04302                         31,214                        BANK    31
 04303   REF   1               17,2000                       SETLOC  P40S3
 04304                         17,2000                       BANK
 04305   REF   1                                             COUNT*  $$/P40

 0431    REF   6  LAST  470    17,2000  3 5026 0  TIGTASK1   CAF     PRIO16
 0432    REF   1  LAST  735    17,2001  0 5072 1             TC      NOVAC
 0433    REF   6  LAST  606    E7,1462                       EBANK=  TRKMKCNT
 0434    REF   1               17,2002   03241 0             2CADR   TIGNOW
 0434    REF   1               17,2003   74067 0
 0435    REF  36  LAST  740    17,2004  0 5353 1             TC      PHASCHNG
 0436                          17,2005   00006 1             OCT     6                  KILL GROUP 6.

 0437    REF  47  LAST  741    17,2006  1 5261 0             TCF     TASKOVER


R0438                                        *****************************************

 0441                          17,2007  0 0006 1  P63ZOOM    EXTEND
 0442    REF   1               17,2010  3 2026 1             DCA     LUNLANAD
 0443    REF   4  LAST  736    17,2011  53'253 0             DXCH    AVEGEXIT

 0445    REF  23  LAST  733    17,2012  0 4674 0             TC      IBNKCALL
 0446    REF   1               17,2013   62370 1             CADR    FLATOUT
 04462   REF   1               17,2014  1 2022 1             TCF     P40ZOOMA

 04463   REF  27  LAST  738    17,2015  3 4737 0  P40ZOOM    CAF     BIT13
 04464   REF   2  LAST  211    17,2016  54 055 0             TS      THRUST
 04465   REF  29  LAST  713    17,2017  3 4750 1             CAF     BIT4

 04466                         17,2020  0 0006 1             EXTEND
 04467   REF   8  LAST  536    17,2021  05 014 1             WOR     CHAN14

 0447    REF  37  LAST  741    17,2022  0 5353 1  P40ZOOMA   TC      PHASCHNG
 0448                          17,2023   00003 1             OCT     3
 0449    REF  48  LAST  741    17,2024  1 5261 0             TCF     TASKOVER


 044905  REF  24  LAST  740    E7,1515                       EBANK=  DVCNTR
 04491   REF   1               17,2025   02462 0  LUNLANAD   2CADR   LUNLAND
 04491   REF   1               17,2026   62067 1
 04492  REF   2  LAST  741   17,2022              ZOOM        =       P40ZOOMA
 04493                       36,2571                          BANK    36
 04494  REF   4  LAST  731   36,2000                          SETLOC  P40S
 04495                       36,2571                          BANK
 04496  REF   4 LAST  731 TO  741:    359    377*             COUNT*  $$/P40

R0450                                    ***********************************

 0451   REF  41  LAST  711   36,2571  0 5504 0  COMFAIL  TC      UPFLAG          (15)
 0452   REF   2  LAST  740   36,2572   00161 1           ADRES   IDLEFLAG
 0453   REF  42  LAST  742   36,2573  0 5504 0           TC      UPFLAG          SET FLAG TO SUPPRESS CONFLICTING DISPLAY
 0454   REF   1              36,2574   00175 1           ADRES   FLUNDISP
 0455   REF  10  LAST  443   36,2575  3 4751 0           CAF     FOUR            RESET DVMON
 0456   REF  25  LAST  741   36,2576  55'515 0           TS      DVCNTR
 0457   REF   1              36,2577  10 765 1           CCS     PHASE6          CLOCKTASK ACTIVE?
 0458                        36,2600  1 2603 1           TCF     +3              YES
 0460   REF 194  LAST  736   36,2601  0 4616 1           TC      BANKCALL        OTHERWISE, START IT UP
 0461   REF   1              36,2602   74663 1           CADR    STCLOK1
 0462   REF   1              36,2603  4 4765 0     +3    CS      VB97DEX
 0463   REF  11  LAST  740   36,2604  55'163 0           TS      DISPDEX
 0464   REF  38  LAST  741   36,2605  0 5353 1           TC      PHASCHNG        TURN OFF GROUP 4.
 0465                        36,2606   00004 0           OCT     00004
 04655  REF 111  LAST  735   36,2607  1 5155 1           TCF     ENDOFJOB

 0466   REF  14  LAST  739   36,2610  51'455 1  COMFAIL1 INDEX   WHICH
 0467                        36,2611  1 0002 1           TCF     2

 0468   REF  17  LAST  740   36,2612  3 0005 1  COMFAIL3 CA      Z               (15)      KILL CLOKTASK USING Z
 0469                        36,2613  1 2615 0           TCF      +2

 0470   REF   4  LAST  736   36,2614  4 4762 1  COMFAIL4 CS      CNTDNDEX
 0471   REF  12  LAST  742   36,2615  55'163 0           TS      DISPDEX

 0472   REF  61  LAST  740   36,2616  0 5516 0           TC      DOWNFLAG        RECONNECT DV MONITOR
 0473   REF   3  LAST  742   36,2617   00161 1           ADRES   IDLEFLAG
 0474   REF  62  LAST  742   36,2620  0 5516 0           TC      DOWNFLAG        PERMIT GUIDANCE LOOP DISPLAYS
 0475   REF   2  LAST  742   36,2621   00175 1           ADRES   FLUNDISP
 0476   REF 112  LAST  742   36,2622  1 5155 1           TCF     ENDOFJOB


 0477   REF  39  LAST  742   36,2623  0 5353 1  COMFAIL2 TC      PHASCHNG        KILL ZOOM RESTART PROTECTION
 0478                        36,2624   00003 1           OCT     00003

 0479                        36,2625  0 0004 0           INHINT
 0480   REF  10  LAST  593   36,2626  0 6027 1           TC      KILLTASK        KILL ZOOM, IN CASE IT'S STILL TO COME
 0481   REF   2  LAST  240   36,2627   36022 1           CADR    ZOOM
 0482   REF  24  LAST  741   36,2630  0 4674 0           TC      IBNKCALL        COMMAND ENGINE OFF
 0483   REF   1              36,2631   75561 1           CADR    ENGINOF4
 04832  REF  43  LAST  742   36,2632  0 5504 0           TC      UPFLAG          SET THE DRIFT BIT FOR THE DAP.
 04834  REF   1              36,2633   00312 1           ADRES   DRIFTDFL
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  0484   REF    1                  36,2634   0 2645 1             TC       INVFLAG           USE OTHER RCS SYSTEM
  0485   REF    1                  36,2635    00310 0             ADRES    ACRBTFLG
  0486   REF   44   LAST   742     36,2636   0 5504 0             TC       UPFLAG            TURN ON ULLAGE
  0487   REF    2   LAST   224     36,2637    00314 1             ADRES    ULLAGFLG
  0488   REF   35   LAST   715     36,2640   3 4753 1             CAF      BIT1
  0489                             36,2641   0 0004 0             INHINT
  0490   REF   14   LAST   737     36,2642   0 5173 1             TC       TWIDDLE
  0491   REF    4   LAST   736     36,2643    02352 1             ADRES    TIG-5
  0492   REF  113   LAST   742     36,2644   1 5155 1             TCF      ENDOFJOB


R 0493                                         ****************************************
R 0494                                         SUBROUTINES OF THE IGNITION ROUTINE
R 0495                                         ****************************************

  0496   REF  186   LAST   683     36,2645   3 0002 0  INVFLAG    CA       Q
  0497   REF    1                  36,2646   0 5522 1             TC       DEBIT
  0498                             36,2647   4 0000 0             COM
  0499                             36,2650   0 0006 1             EXTEND
  0500   REF   14   LAST   558     36,2651   06 001 0             RXOR     LCHAN
  0501   REF    1                  36,2652   1 5511 0             TCF      COMFLAG

R 0502                                         ****************************************

  0503   REF    1                  36,2653   4 4746 1  NOULLAGE   CS       ULLAGER           MUST BE CALLED IN A TASK OR UNDER INHINT
  0504   REF   20   LAST   740     36,2654   7 0111 1             MASK     DAPBOOLS
  0505   REF   21   LAST   743     36,2655   54 111 1             TS       DAPBOOLS
  0506   REF  187   LAST   743     36,2656   0 0002 0             TC       Q

R 0507                                         ****************************************

  0508   REF   22   LAST   743     36,2657   4 0111 1  ONULLAGE   CS       DAPBOOLS          TURN ON ULLAGE.  MUST BE CALLED IN
  0509   REF    2   LAST   743     36,2660   7 4746 1             MASK     ULLAGER           A TASK OR WHILE INHINTED.
  0510   REF   23   LAST   743     36,2661   26 111 1             ADS      DAPBOOLS
  0511   REF  188   LAST   743     36,2662   0 0002 0             TC       Q

R 0512                                         ****************************************

  0513   REF  135   LAST   739     36,2663   3 4755 1  STCLOK1    CA       ZERO              THIS ROUTINE STARTS THE COUNT-DOWN
  0514   REF   13   LAST   742     36,2664   55'163 0  STCLOK2    TS       DISPDEX             (CLOKTASK AND CLOKJOB).    SETTING
  0515   REF    9   LAST   572     36,2665   0 4645 1  STCLOK3    TC       MAKECADR          SETTING DISPDEX POSITIVE KILLS IT.
  0516   REF    3   LAST   736     36,2666   55'061 0             TS       TBASE4            RETURN SAVE (NOT FOR RESTARTS)
  0517                             36,2667   0 0006 1             EXTEND
  0518   REF   33   LAST   739     36,2670   3 1442 1             DCA      TIG
  0519   REF  286   LAST   734     36,2671   52 155 1             DXCH     MPAC
  0520                             36,2672   0 0006 1             EXTEND
  0521   REF   20   LAST   739     36,2673   4 0025 1             DCS      TIME2
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0522   REF 287  LAST  743   36,2674  20 155 1            DAS     MPAC       HAVE TIG - TIME2, UNDOUBTEDLY A + NUMBER
0523   REF   7  LAST  435   36,2675  0 7257 0            TC      TPAGREE    POSITIVE, SINCE WE PASSED THE
0524   REF  12  LAST  718   36,2676  3 4777 1            CAF     1SEC         45 SECOND CHECK
0525   REF 189  LAST  743   36,2677  54 002 1            TS      Q
0526   REF 288  LAST  744   36,2700  52 155 1            DXCH    MPAC
0527   REF   8  LAST  444   36,2701  7 4346 0            MASK    LOW5       RESTRICT MAGNITUDE OF NUMBER IN A
0528                        36,2702  0 0006 1            EXTEND
0529   REF 190  LAST  744   36,2703  10 002 1            DV      Q
0530   REF  99  LAST  736   36,2704  3 0001 0            CA      L          GET REMAINDER
0531   REF  41  LAST  739   36,2705  6 4752 0            AD      TWO
0532                        36,2706  0 0004 0            INHINT
0533   REF  15  LAST  743   36,2707  0 5173 1            TC      TWIDDLE
0534   REF   3  LAST  650   36,2710   02717 1            ADRES   CLOKTASK
0535   REF   6  LAST  739   36,2711  0 5327 1            TC      2PHSCHNG
0536                        36,2712   40036 0            OCT     40036      6.3SPOT FOR CLOKTASK
0537                        36,2713   05024 1            OCT     05024
0538                        36,2714   13000 0            OCT     13000

0539   REF   4  LAST  743   36,2715  3 1061 1            CA      TBASE4
0540   REF  12  LAST  573   36,2716  0 4640 1            TC      BANKJUMP


0541   REF   7  LAST  736   36,2717  4 0025 1  CLOKTASK  CS      TIME1      SET TBASE6 FOR GROUP 6 RESTART
0542   REF   1              36,2720  55'065 1            TS      TBASE6

0543   REF  14  LAST  743   36,2721  11'163 0            CCS     DISPDEX
0544   REF   1              36,2722  1 2733 0            TCF     KILLCLOK
0545                        36,2723  12 724 0            NOOP
0546   REF   3  LAST  506   36,2724  3 7715 0            CAF     PRIO27
0547   REF  19  LAST  741   36,2725  0 5072 1            TC      NOVAC
0548   REF  19  LAST  737   E7,1453                      EBANK=  TTOGO
0549   REF   1              36,2726   02737 0            2CADR   CLOKJOB
0549   REF   1              36,2727   74067 0


0550   REF  12  LAST  740   36,2730  0 5221 0            TC      FIXDELAY   WAIT A SECOND BEFORE STARTING OVER
0551                        36,2731   00144 0            DEC     100
0552   REF   4  LAST  744   36,2732  1 2717 0            TCF     CLOKTASK

0553                        36,2733  0 0006 1  KILLCLOK  EXTEND             KILL RESTART
0554   REF  13  LAST  740   36,2734  3 4755 1            DCA     NEG0
0555   REF   2  LAST  214   36,2735  52 765 1            DXCH    -PHASE6
0556   REF  49  LAST  741   36,2736  1 5261 0            TCF     TASKOVER

0557                        36,2737  0 0006 1  CLOKJOB   EXTEND
0558   REF  34  LAST  743   36,2740  4 1442 0            DCS     TIG
0559   REF  20  LAST  744   36,2741  53'454 1            DXCH    TTOGO
0560                        36,2742  0 0006 1            EXTEND
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 0561   REF  21  LAST  743   36,2743  3 0025 0               DCA     TIME2
 0562   REF  21  LAST  744   36,2744  21'454 1               DAS     TTOGO
 0563                        36,2745  0 0004 0               INHINT
 0564   REF  15  LAST  744   36,2746  11'163 0               CCS     DISPDEX          IF DISPDEX HAS BEEN SET POSITIVE BY A
 0565   REF 114  LAST  743   36,2747  1 5155 1               TCF     ENDOFJOB         TASK OR A HIGHER PRIORITY JOB SINCE THE
 0566   REF 115  LAST  745   36,2750  1 5155 1               TCF     ENDOFJOB         LAST CLOKTASK, AVOID USING IT AS AN
 0567                        36,2751  4 0000 0               COM                      INDEX.
 0568                        36,2752  0 0003 1               RELINT                   *****  DISPDEX MUST NEVER BE -0  *****
 0569   REF 220  LAST  740   36,2753  50 000 1               INDEX   A
 0570   REF   1              36,2754  1 3011 0               TCF     DISPNOT -1       ( -1 DUE TO EFFECT OF CCS )

 0571   REF   1                 4765            VB97DEX  =       OCT35            NEGATIVE OF THIS IS PROPER FOR DISPDEX

 05711  REF 136  LAST  743   36,2755  4 4755 0   -35         CS      ZERO             INDICATE VERB 97 PASTE
 05712  REF   1              36,2756  55'067 0               TS      NVWORD1
 0572   REF   1              36,2757  3 0371 1               CA      NVWORD +2        NVWROD+2 CONTAINS V06 & APPROPRIATE NOUN
 0573   REF 195  LAST  742   36,2760  0 4616 1               TC      BANKCALL
 0574   REF   1              36,2761   20473 0               CADR    CLOCPLAY
 0575   REF   1              36,2762  1 3013 1               TCF     STOPCLOK         TERMINATE CLOKTASK ON THE WAY TO POOH
 0576   REF   1              36,2763  1 2610 0               TCF     COMFAIL1
 0577   REF   1              36,2764  1 2623 0               TCF     COMFAIL2

A0583                                                                                 THIS DISPLAY IS CALLED VIA ASTNCLOK
 0584   REF   1              36,2765  3 3146 1   -25         CAF     V06N61           IT IS PRIMARILY USED BY THE CREW IN P63
 0585   REF 196  LAST  745   36,2766  0 4616 1               TC      BANKCALL         TO RESET HIS EVENT TIMER TO AGREE WITH
 0586   REF   1              36,2767   20457 0               CADR    REFLASH          TIG.
 0587   REF   2  LAST  745   36,2770  1 3013 1               TCF     STOPCLOK
 0588   REF   1              36,2771  1 3030 0               TCF     ASTNRETN
 0589                        36,2772  1 2764 1               TCF     -6

 0590   REF   1                 4762            CNTDNDEX =       LOW4             OCT17; NEGATIVE PROPER FOR DISPDEX

 0591   REF  15  LAST  742   36,2773  51'455 1   -17         INDEX   WHICH            THIS DISPLAY COMES UP AT ONE SECOND
 0592                        36,2774  3 0000 1               CAF     0                INTERVALS.  IT IS NORMALLY OPERATED
 0593   REF 197  LAST  745   36,2775  0 4616 1               TC      BANKCALL         BETWEEN TIG-30 SECONDS AND TIG-5 SECONDS
 0594   REF   2  LAST  736   36,2776   20465 1               CADR    REGODSP          REGODSP DOES ITS OWN TCF ENDOFJOB

 0595   REF   2  LAST  467      4760            VB99DEX  =       ELEVEN           OCT13; NEGATIVE PROPER FOR DISPDEX

 05955                       36,2777            V99RECYC EQUALS

 05956  REF  20  LAST  557   36,2777  4 4743 1   -13         CS      BIT9             INDICATE VERB 99 PASTE
 05957  REF   2  LAST  745   36,3000  55'067 0               TS      NVWORD1
 0596   REF  16  LAST  745   36,3001  51'455 1               INDEX   WHICH            THIS IS THE "PLEASE ENABLE ENGINE"
 0597                        36,3002  3 0000 1               CAF     0                DISPLAY; IT IS INITIATED AT TIG-5 SEC.
 0598   REF 198  LAST  745   36,3003  0 4616 1               TC      BANKCALL         THE DISPLAY IS A V99NXX, WHERE XX IS THE
 0599   REF   2  LAST  745   36,3004   20473 0               CADR    CLOCPLAY         NOUN THAT HAD PREVIOUSLY BEEN DISPLAYED
 0600   REF   3  LAST  745   36,3005  1 3013 1               TCF     STOPCLOK         TERMINATE  GOTOPOOH TURNS OFF ULLAGE.
 0601   REF   1              36,3006  1 3041 0               TCF     *PROCEED
 0602   REF   1              36,3007  1 3044 0               TCF     *ENTER
 0606    REF  42  LAST  744       4752               BLANKDEX =       TWO              NEGATIVE OF THIS IS PROPER FOR DISPDEX

 0607    REF 199  LAST  745   36,3010  0 4616 1   -2        TC       BANKCALL         BLANK DSKY.  THE DSKY IS BLANKED FOR
 0608    REF   2  LAST  735   36,3011   20456 1             CADR     CLEANDSP         5 SECONDS AT TIG-35 TO INDICATE THAT
 0609    REF 116  LAST  745   36,3012  1 5155 1  DISPNOT    TCF      ENDOFJOB         AVERAGE G IS STARTING.


 0610    REF   1              36,3013  0 3015 0  STOPCLOK   TC       NULLCLOK         STOP CLOKTASK & TURN OFF ULLAGE ON THE
 0611    REF  23  LAST  730   36,3014  1 6001 1             TCF      GOTOPOOH             WAY TO POO  (GOTOPOOH RELINTS)

 0612                         36,3015  0 0004 0  NULLCLOK   INHINT
 0613                         36,3016  0 0006 1             EXTEND
 0614    REF   1              36,3017  23'142 1             QXCH     P40/RET
 0615    REF   2  LAST  740   36,3020  0 2653 0             TC       NOULLAGE         TURN OFF ULLAGE...
 0616    REF  11  LAST  742   36,3021  0 6027 1             TC       KILLTASK            DON'T LET IT COME ON, EITHER...
 0617    REF   3  LAST  736   36,3022   74346 0             CADR     ULLGTASK
 0618    REF  40  LAST  742   36,3023  0 5353 1             TC       PHASCHNG                  NOT EVEN IF THERE'S A RESTART.
 0619                         36,3024   00001 0             OCT      1
 0620    REF  18  LAST  742   36,3025  3 0005 1             CA       Z                KILL CLOKTASK
 0621    REF  16  LAST  745   36,3026  55'163 0             TS       DISPDEX
 0622    REF   2  LAST  746   36,3027  0 1142 1             TC       P40/RET


 06222   REF  41  LAST  746   36,3030  0 5353 1  ASTNRETN   TC       PHASCHNG
 06224                        36,3031   04024 0             OCT      04024
 0623    REF 137  LAST  745   36,3032  3 4755 1             CAF      ZERO             STOP DISPLAYING BUT KEEP RUNNING.
 06231   REF  17  LAST  746   36,3033  55'163 0             TS       DISPDEX
 06232   REF   1              36,3034  3 5023 0             CAF      PRIO13
 0625    REF  28  LAST  737   36,3035  0 5105 0             TC       FINDVAC
 0626    REF   2  LAST  124   E5,1757                       EBANK=   STARIND
 0627    REF   1              36,3036   03210 1             2CADR    ASTNRET
 0627    REF   1              36,3037   64065 0
 0628    REF 117  LAST  746   36,3040  1 5155 1             TCF      ENDOFJOB


 0629    REF  45  LAST  743   36,3041  0 5504 0  *PROCEED   TC       UPFLAG
 0630    REF   3  LAST  740   36,3042   00154 1             ADRES    ASTNFLAG

 0631    REF   1              36,3043  1 3102 0             TCF      IGNITE


 0632                         36,3044  0 0004 0  *ENTER     INHINT
 0633    REF  17  LAST  745   36,3045  51'455 1             INDEX    WHICH
 0634                         36,3046  1 0003 0             TCF      3


 0635    REF   2  LAST  211   36,3047  3 4644 0  GOPOST     CAF      PRIO12           (3)  MUST BE LOWER PRIORITY THAN CLOKJOB
 0636    REF  29  LAST  746   36,3050  0 5105 0             TC       FINDVAC
 0637    REF  22  LAST  745   E7,1453                       EBANK=   TTOGO
 0639    REF   2  LAST  241   36,3051   03223 1             2CADR    POSTBURN
 0638                         36,3052   74067 0
 06382                          36,3053  0 0004 0           INHINT                  SET UP THE DAP FOR COASTING FLIGHT.
 06383  REF  25  LAST  742      36,3054  0 4674 0           TC       IBNKCALL
 06384  REF   2  LAST  230      36,3055   40204 0           CADR     ALLCOAST
 0639   REF   2  LAST  746      36,3056  0 3015 0           TC       NULLCLOK
 0640   REF  42  LAST  746      36,3057  0 5353 1           TC       PHASCHNG       4.13 RESTART FOR POSTBURN
 0641                           36,3060   00134 1           OCT      00134

 0642   REF 118  LAST  746      36,3061  1 5155 1           TCF      ENDOFJOB


 0643   REF   3  LAST  735      36,3062  3 5027 1  GOCUTOFF CAF      PRIO17         (3)
 0644   REF  30  LAST  746      36,3063  0 5105 0           TC       FINDVAC
 0645   REF   5  LAST  738      E7,1516                     EBANK=   TGO
 0646   REF   1                 36,3064   02424 1           2CADR    CUTOFF
 0646   REF   1                 36,3065   30067 0
 0649   REF  63  LAST  742      36,3066  0 5516 0           TC       DOWNFLAG
 0650   REF   3  LAST  742      36,3067   00175 1           ADRES    FLUNDISP

 06502                          36,3070  0 0004 0           INHINT                  SET UP THE DAP FOR COASTING FLIGHT.
 06504  REF  26  LAST  747      36,3071  0 4674 0           TC       IBNKCALL
 06506  REF   3  LAST  747      36,3072   40204 0           CADR     ALLCOAST
 0651   REF   3  LAST  747      36,3073  0 3015 0           TC       NULLCLOK
 0652   REF  43  LAST  747      36,3074  0 5353 1           TC       PHASCHNG
 0653                           36,3075   07024 0           OCT      07024
 0654                           36,3076   17000 1           OCT      17000
 0655   REF   6  LAST  747      E7,1516                     EBANK=   TGO
 0656   REF   2  LAST  747      36,3077   02424 1           2CADR    CUTOFF
 0656                           36,3100   30067 0
 0657   REF 119  LAST  747      36,3101  1 5155 1           TCF      ENDOFJOB


 0658   REF  13  LAST  740      36,3102  4 0103 1  IGNITE   CS       FLAGWRD7       (2)
 0659   REF   2  LAST  738      36,3103  7 4737 1           MASK     IGNFLBIT
 0660   REF 221  LAST  745      36,3104  10 000 0           CCS      A
 0661   REF   1                 36,3105  1 3116 0           TCF      IGNITE1
 0662   REF  36  LAST  743      36,3106  3 4753 1           CAF      BIT1
 0663                           36,3107  0 0004 0           INHINT
 0664   REF  16  LAST  744      36,3110  0 5173 1           TC       TWIDDLE
 0665   REF   2  LAST  241      36,3111   02426 0           ADRES    IGNITION

 0666   REF   1                 36,3112  3 4360 0           CAF      OCT23          IMMEDIATE RESTART AT IGNITION.
 0667   REF 100  LAST  744      36,3113  54 001 1           TS       L
 0668                           36,3114  4 0000 0           COM
 0669   REF   5  LAST  741      36,3115  52 761 0           DXCH     -PHASE4

 0670   REF   5  LAST  742      36,3116  4 4762 1  IGNITE1  CS       CNTDNDEX       RESTORE OLD DISPLAY.
 0671   REF  18  LAST  746      36,3117  55'1 3 0           TS       DISPDEX

 0672   REF 120  LAST  747      36,3120  1 5155 1           TCF      ENDOFJOB
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R0673                                                  ****************************************

 0674   REF  29  LAST  662   36,3121  0 5567 0  P40ALM    TC      ALARM            PROGRAM SELECTION NOT CONSISTENT WITH
 0675                        36,3122   01706 1            OCT     1706             VEHICLE CONFIGURATION

 0676   REF   4  LAST  662   36,3123  3 5006 1  REP40ALM  CAF     V05N09           (14)
 0677   REF 200  LAST  746   36,3124  0 4616 1            TC      BANKCALL
 0678   REF  21  LAST  730   36,3125   20476 0            CADR    GOFLASH

 0679   REF  24  LAST  746   36,3126  1 6001 1            TCF     GOTOPOOH         V34E  TERMINATE
 0680                        36,3127  1 3131 0            TCF      +2              PROCEED  CHECK FOR P42
 0681   REF   2  LAST  732   36,3130  1 3123 0            TCF     REP40ALM         V32E  REDISPLAY ALARM

 0682   REF  18  LAST  746   36,3131  51'455 1            INDEX   WHICH            FOR P42, ALLOW CREW TO PROCEED EVEN
 0683                        36,3132  1 0014 0            TCF     14               THOUGH VEHICLE IS UNSTAGED

R0684                                                  ****************************************


 0685                        31,2144                      BANK    31
 0686   REF   1              35,2000                      SETLOC  P40S2
 0687                        35,3747                      BANK

 0688   REF   1                                           COUNT*  $$/P40

 0689   REF  10  LAST  743   35,3747  0 4645 1  P40AUTO   TC      MAKECADR         HELLO THERE.
 0690   REF   4  LAST  474   35,3750  55'164 1            TS      TEMPR60          FOR GENERALIZED RETURN TO OTHER BANKS.
 0691   REF 201  LAST  748   35,3751  0 4616 1  P40A/P    TC      BANKCALL         SUBROUTINE TO CHECK PGNCS CONTROL
 0692   REF   3  LAST  518   35,3752   54255 1            CADR    G+N,AUTO         AND AUTO STABILIZATION MODES
 0693   REF 222  LAST  747   35,3753  10 000 0            CCS     A                +0  INDICATES IN PGNCS, IN AUTO
 0694   REF   1              35,3754  1 3766 1            TCF     TURNITON         + INDICATES NOT IN PGNCS AND/OR AUTO
 0695   REF   8  LAST  736   35,3755  3 4737 0            CAF     APSFLBIT         ARE WE ON THE DESCENT STAGE?
 0696   REF  13  LAST  736   35,3756  7 0106 1            MASK    FLGWRD10
 0697   REF 223  LAST  748   35,3757  10 000 0            CCS     A
 0698   REF   1              35,3760  1 3773 0            TCF     GOBACK           RETURN
 0699   REF  31  LAST  718   35,3761  3 4747 1            CAF     BIT5             YES, CHECK FOR AUTOTHROTTLE MODE
 0700                        35,3762  0 0006 1            EXTEND
 0701   REF   4  LAST  475   35,3763  02 030 0            RAND    CHAN30
 0702                        35,3764  0 0006 1            EXTEND
 0703   REF   2  LAST  748   35,3765  1 3773 0            BZF     GOBACK           IN AUTOTHROTTLE MODE -- RETURN
 0704   REF   1              35,3766  3 3775 1  TURNITON  CAF     P40A/PMD         DISPLAY V50N25 P1=203  PLEASE PERFORM
 0705   REF 202  LAST  748   35,3767  0 4616 1            TC      BANKCALL         CHECKLIST 203  TURN ON PGNCS ETC.
 0706   REF   3  LAST  513   35,3770   20623 1            CADR    GOPERF1
 0707   REF  25  LAST  748   35,3771  1 6001 1            TCF     GOTOPOOH         V34E  TERMINATE
 0708   REF   1              35,3772  1 3751 0            TCF     P40A/P           RECYCLE
 0709   REF   5  LAST  748   35,3773  3 1164 0  GOBACK    CA      TEMPR60
 0710   REF  13  LAST  744   35,3774  0 4640 1            TC      BANKJUMP         GOODBYE.  COME AGAIN SOON.


 0711                        35,3775   00203 0  P40A/PMD  OCT     00203
 0712                         36,3133                        BANK    36
 0713   REF    5  LAST   742  36,2000                        SETLOC  P40S
 0714                         36,3133                        BANK

 0715   REF    5 LAST  742 TO  748:    226    603*           COUNT*  $$/P40

R0716                                      ************************************
R0717                                      CONSTANTS FOR THE IGNITION ROUTINE
R0718                                      ************************************

 0719   REF    1              36,2105             SERVCADF =       P63TABLE  +7

 0720   REF    1              36,3133   02036 0   P40ADRES ADRES   P40TABLE

 0721   REF    1              36,3134   02046 1   P41ADRES ADRES   P41TABLE -5

 0722   REF    1              36,3135   02061 1   P42ADRES ADRES   P42TABLE

 0723   REF   26  LAST   742  E7,1515                        EBANK=  DVCNTR
 0724   REF    1              36,3136   03471 0   DSP2CADR 2CADR   P63DISPS -2
 0724   REF    1              36,3137   62067 1


 0727   REF   27  LAST   749  E7,1515                        EBANK=  DVCNTR
 0728   REF    1              36,3140   03642 1   ATMAGADR 2CADR   ATMAG
 0728   REF    1              36,3141   70067 1
 0729   REF   26  LAST   748     6001             ?        =       GOTOPOOH

 0730                         36,3142   00000 1   D29.9SEC 2DEC    2990
 0730                         36,3143   05656 1


 0731                         36,3144   04672 0   S24.9SEC DEC     2490


 0732                         36,3145   00752 1   4.9SEC   DEC     490

 0733   REF   32  LAST   748     4747             OCT20    =       BIT5

 07331                        36,3146   01475 0   V06N61   VN      0661
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P0735              KILLTASK
R0736     MOD NO: NEW PROGRAM
R0737     MOD BY: CUVELLI

R0738     FUNCTIONAL DESCRIPTION:

R0739        KILLTASK IS USED TO REMOVE A TASK FROM THE WAITLIST BY SUBSTITUTING ANULL TASK CALLED 'NULLTASK' (OF COURSE),
R0741     WHICH MERELY DOES A TC TASKOVER. IF THE SAME TASK IS SCHEDULED MORE THAN ONCE, ONLY THE ONE WHICH WILL OCCUR
R0743     FIRST IS REMOVED. IF THE TASK IS NOT SCHEDULED, KILLTASK TAKES NO ACTION AND RETURNS WITH NO ALARM. KILLTASK
R0745     LEAVES INTERRUPTS INHIBITED SO CALLER MUST RELINT

R0746     CALLING SEQUENCE:

A0748                                                 L          TC       KILLTASK         IN FIXED-FIXED
A0749                                                 L+1        CADR     ????????         CADR (NOT 2CADR) OF TASK TO BE REMOVED.
A0750                                                 L+2       (RELINT)                   RETURN

R0751     EXIT MODE:  AT L+2 OF CALLING SEQUENCE.

R0752     ERASABLE INITIALIZATION= NONE.

R0753     OUTPUT:  2CADR OF NULLTASK IN LST2

R0754     DEBRIS:  ITEMP1 - ITEMP4, A,L,Q.

 0755     REF  19  LAST  221   E3,1410                           EBANK= LST2
 0756                             6027                           BLOCK  3                   KILLTASK MUST BE IN FIXED-FIXED.
 0757     REF   2  LAST  516      6000                           SETLOC FFTAG6
 0758                             6027                           BANK
 0759     REF   1                                                COUNT* $$/KILL
 0760     REF   1                 6027  3 6036 1  KILLTASK CA     KILLBB
 07605                            6030  0 0004 0           INHINT
 0761     REF 224  LAST  748      6031  22 000 1           LXCH   A
 0762     REF 191  LAST  744      6032  50 002 0           INDEX  Q
 0763                             6033  3 0000 1           CA     0                   GET CADR.
 0764     REF  16  LAST  584      6034  22 006 1           LXCH   BBANK
 0765     REF   1                 6035  1 2200 0           TCF    KILLTSK2            CONTINUE IN SWITCHED FIXED

 0766     REF  20  LAST  750   E3,1410                     EBANK= LST2
 0767     REF   2  LAST  750      6036   56063 1  KILLBB   BBCON  KILLTSK2


 0768                          27,2200                     BANK   27

 0769     REF   3  LAST   44   27,2000                     SETLOC P40S1
 0770                          27,2200                     BANK
 0771     REF   1                                          COUNT* $$/KILL

 0772     REF  10  LAST  544   27,2200  22 062 0  KILLTSK2 LXCH   ITEMP2              SAVE CALLER'S BBANK
 0773   REF 192  LAST  750   27,2201  24 002 0            INCR     Q
 0774                        27,2202  0 0006 1            EXTEND
 0775   REF  29  LAST  612   27,2203  22 061 0            QXCH     ITEMP1           RETURN 2CADR IN ITEMP1,ITEMP2

 0776   REF  16  LAST  560   27,2204  54 063 0            TS       ITEMP3           CADR IS IN A
 0777   REF   5  LAST  455   27,2205  7 5012 0            MASK     LOW10
 0778   REF  21  LAST  431   27,2206  6 4741 1            AD       BIT11
 0779   REF   7  LAST  559   27,2207  54 064 1            TS       ITEMP4           GENADR OF TASK

 0780   REF   6  LAST  751   27,2210  4 5012 0            CS       LOW10
 0781   REF  17  LAST  751   27,2211  7 0063 0            MASK     ITEMP3
 0782   REF  18  LAST  751   27,2212  54 063 0            TS       ITEMP3           FBANK OF TASK

 0783                        27,2213  22 007 0            ZL
 0784   REF 101  LAST  747   27,2214  50 001 0  ADRSCAN   INDEX    L
 0785   REF  21  LAST  750   27,2215  4 1410 1            CS       LST2
 0786   REF   8  LAST  751   27,2216  6 0064 0            AD       ITEMP4           COMPARE GENADRS
 0787                        27,2217  0 0006 1            EXTEND
 0788   REF   1              27,2220  1 2232 1            BZF      TSTFBANK         IF THEY MATCH, COMPARE FBANKS
 0789   REF   1              27,2221  4 4747 0  LETITLIV  CS       LSTLIM
 0790   REF 102  LAST  751   27,2222  6 0001 0            AD       L
 0791                        27,2223  0 0006 1            EXTEND                    ARE WE DONE?
 0792   REF   1              27,2224  1 2230 0            BZF      DEAD             YES - DONE, SO RETURN
 0793   REF 103  LAST  751   27,2225  24 001 0            INCR     L
 0794   REF 104  LAST  751   27,2226  24 001 0            INCR     L
 0795   REF   1              27,2227  1 2214 0            TCF      ADRSCAN          CONTINUE LOOP.

 0796   REF  30  LAST  751   27,2230  52 062 1  DEAD      DXCH     ITEMP1
 0797                        27,2231  52 006 0            DTCB

 0798   REF   7  LAST  751   27,2232  4 5012 0  TSTFBANK  CS       LOW10
 0799   REF 105  LAST  751   27,2233  50 001 0            INDEX    L
 0800   REF  22  LAST  751   27,2234  7 1411 0            MASK     LST2 +1          COMPARE FBANKS ONLY.
 0801                        27,2235  0 0006 1            EXTEND
 0802   REF  19  LAST  751   27,2236  60 063 1            SU       ITEMP3
 0803                        27,2237  0 0006 1            EXTEND
 0804   REF   1              27,2240  1 2242 0            BZF      KILLDEAD         MATCH - KILL IT.
 0805   REF   1              27,2241  1 2221 0            TCF      LETITLIV         NO MATCH - CONTINUE.

 0806   REF   1              27,2242  3 4353 0  KILLDEAD  CA       TCTSKOVR
 0807   REF 106  LAST  751   27,2243  50 001 0            INDEX    L
 0808   REF  23  LAST  751   27,2244  55 1410 1           TS       LST2             REMOVE TASK BY INSERTING TASKOVER
 0809   REF   2  LAST  751   27,2245  1 2230 0            TCF      DEAD

 0810   REF  33  LAST  749      4747                LSTLIM    EQUALS   BIT5             DEC 16
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R0001   PROGRAM DESCRIPTION  P40BOTH     DECEMBER 22, 1966
R0002   MOD 03 BY PETER ADLER            MARCH 3, 1967
R0003   CALLED VIA JOB FROM V37E

R0004   FUNCTIONAL DESCRIPTION

R0005             1)  TO COMPUTE A PREFERRED IMU ORIENTATION AND A PREFERRED VEHICLE ATTITUDE FOR A LM DPS
R0007                 THRUSTING MANEUVER.

R0008             3)  TO DO THE VEHICLE MANEUVER TO THE THRUSTING ATTITUDE.

R0009             4)  TO CONTROL THE PGNCS DURING COUNTDOWN, IGNITION, THRUSTING, AND THRUST TERMINATION OF A
R0011                 PGNCS CONTROLLED DPS MANEUVER.

R0012             5)  IN POSTBURN--ZERO RENDEZVOUS COUNTER, MAINTAIN VG CALCULATIONS FOR POSSIBLE RCS MANEUVER,
R0014                            SET MAXIMUM DEADBAND IN DAP, RESET STEERLAW CSTEER TO ZERO.

R0016             NOTE:  P42, WHICH IS IN THIS LOG SECTION, DOES THE SAME FOR AN APS BURN, AND P41 DOES 1-3 FOR
R0018                    RCS PLUS DISPLAYS PARAMETERS FOR MANUAL CONTROL.

R0019   SUBROUTINES USED

R0020             R02       IMU STATUS CHECK
R0021             S40.1     COMPUTATION OF THRUST DIRECTION
R0022             S40.13    LENGTH OF BURN
R0023             S40.2,3   PREFERRED IMU ORIENATTION
R0024             S40.8     X PRODUCT STEERING
R0025             S40.9     LAMBERT VTOGAIN
R0026             R60LEM    ATTITUDE MANEUVER
R0027             LEMPREC   EXTRAPOLATE STATE VECTOR
R0028             PREREAD   AVERAGE G, SERVICER
R0029             ALLCOAST  DAP COASTING INITIALIZATION
R0030             CLOKTASK  ERGO CLOCKJOB--COUNT DOWN
R0031             PHASCHNG, INTPRET, FLAGUP, FLAGDOWN, WAITLIST, LONGCALL, GOFLASH, GOFLASHR, GOPERF1, ALARM,
R0033             PRIOLARM, GOTOPOOH, ENDOFJOB, BANKCALL, SETMAXDB, SETMINDB, CHECKMM, FLATOUT, OUTFLAT,
R0035             KILLTASK, SGNAGREE, TPAGREE, ETC.

R0036   RESTARTS VIA GROUP 4

R0037   DISPLAYS

R0038             V50N25  203 A/P TO PGNCS, AUTO THROTTLE MODE, AUTO ATTITUDE CONTROL
R0040             V06N40  TTI, VG, DELTAVM (DISPLAYED ONCE/SECOND BY CLOKTASK)
R0041             V50N99  PLEASE PERFORM ENGINE ON ENABLE
R0042             V06N40  TG (TIME TO GO TO CUTOFF), VG, DELTAVM--ONCE/SECOND
R0043             V16N40  FINAL VALUES OF TG, VG, DELTAVM
R0044             V16N85  COMP OF VG (BODY AXES) FOR POSS. RCS MANUAL MANEUVER
R0045             V05N09  POSSIBLE ALARMS
R0046             V50N07  PLEASE SELECT P00
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R0047              VIA R30

R0048              V06N44  HAPC, PERI, TFF
R0049              V06N35  TIME TO PERIGEE, HMS

R0050    ALARM OR ABORT EXIT MODES

R0051              PROGRAM ALARM, FLASHING DISPLAY OF ALARM CODE 1706 IF P40 SELECTED WITH DESCENT UNIT STAGED.
R0053              V34E (TERMINATE) IS THE ONLY RESPONSE ACCEPTED. TC GOTOPOOH.

R0054              PROGRAM ALARM, FLASH CODE 1703:  TIG LESS THAN 45 SECS AWAY.  V34E=  GOTOPOOH OR V33E=  SLIP
R0056              TIG BY 45 SECS.

R0057    ERASABLE INITIALIZATION
R0058    DEBRIS
R0059    OUTPUT

R0060              SEE SUBROUTINES F.G.:  S40.1, S40.2,3, S40.13, S40.8, S40.9, TRIMGIMB
R0062              XDELVFLG = 1 FOR EXT DELV COMPUTATION
R0063                       = 0 FOR AIMPT (LAMBERT) COMP

 0064   REF   2 LAST   38 TO   38:     10     10*            COUNT* $$/P40
 0065   REF  19  LAST  748   E7,1455                         EBANK= WHICH

 0066                        36,3147                         BANK    36
 0067   REF   6  LAST  749   36,2000                         SETLOC P40S
 0068                        36,3147                         BANK

 0069   REF   4  LAST  747   36,3147  0 5353 1  P40LM        TC      PHASCHNG
 00692                       36,3150    04024 0              OCT     04024

 00694  REF   1              36,3151  3 3133 0               CAF     P40ADRES          INITIALIZATION FOR BURNBABY.
 0070   REF  20  LAST  753   36,3152  55'455 0               TS      WHICH

 0071   REF  14  LAST  748   36,3153  3 0106 0               CA      FLGWRD10
 0072   REF   9  LAST  748   36,3154  7 4737 1               MASK    APSFLBIT
 0073   REF 225  LAST  750   36,3155  10 000 0               CCS     A
 0074   REF   1              36,3156  1 3121 1               TCF     P40ALM
 0079   REF 203  LAST  748   36,3157  0 4616 1               TC      BANKCALL          GO DO IMU STATUS CHECK ROUTINE.
 0080   REF   5  LAST  502   36,3160   11254 1               CADR    R02BOTH

 00801  REF  24  LAST  743   36,3161  4 0111 1               CS      DAPBOOLS          INITIALIZE DVMON
 00802  REF   5  LAST  294   36,3162  7 4737 1               MASK    CSMDOCKD
 00803  REF 226  LAST  753   36,3163  10 000 0               CCS     A
 00804  REF   1              36,3164  3 2020 1               CAF     THRESH1
 00805  REF   1              36,3165  6 2021 0               AD      THRESH3
 00806  REF   2  LAST  105   36,3166  55'251 1               TS      DVTHRUSH
 00807  REF  11  LAST  742   36,3167  3 4751 0               CAF     FOUR
 00808  REF  28  LAST  749   36,3170  55'515 0               TS      DVCNTR
 0081    REF 104  LAST  735   36,3171  0 6037 0            TC       INTPRET        LOAD CONSTANTS FOR DPS BURN
 0082                         36,3172   43175 0            VLOAD    CLEAR          LOAD F, MDOT, TDECAY
 0083    REF   1              36,3173   34001 1                     FDPS
 0084    REF   1              36,3174   02663 0                     NCTHROTL
 0085    REF   2  LAST  143   36,3175   03735 0            STORE    F
 00852                        36,3176   77735 0            SLOAD
 00854   REF   1              36,3177   26002 1                     DPSVEX
 00856                        36,3200   70476 0  P40IN     DCOMP    SR1
 0086    REF   1              36,3201   37743 0            STCALL   VEX            LOAD EXHAUST VELOCITY FOR TGO COMP.
 0087    REF   1              36,3202   56246 1                     S40.1          COMPUTES UT AND VGTIG
 0088                         36,3203   77624 1            CALL
 0089    REF   1              36,3204   56413 1                     S40.2,3        COMPUTES PREFERRED IMU ORIENTATION
 0090                         36,3205   77776 1            EXIT

 00901                        36,3206  0 0004 0            INHINT
 00902   REF  27  LAST  747   36,3207  0 4674 0            TC       IBNKCALL
 00903   REF   1              36,3210   40142 1            CADR     PFLITEDB       ZERO ATTITUDE ERRORS, SET DB TO ONE DEG.

 0091    REF   1              36,3211  0 3213 1            TC       P40SXT4


R0092                                                   ************************
 0093    REF   1              36,3212  1 2126 1            TCF      BURNBABY
R0094                                                   ************************


 0095                         36,3213  0 0006 1  P40SXT4   EXTEND
 0096    REF   3  LAST  746   36,3214  23'142 1            QXCH     P40/RET
 0100                         36,3215  0 0003 1  P41MANU   RELINT

 0101    REF  64  LAST  747   36,3216  0 5516 0            TC       DOWNFLAG       CLEAR 3AXISFLG -- R60 WILL USE VECPOINT.
 0102    REF   6  LAST  519   36,3217   00124 0            ADRES    3AXISFLG

 0103    REF 204  LAST  753   36,3220  0 4616 1            TC       BANKCALL
 0104    REF   4  LAST  519   36,3221   54123 0            CADR     R60LEM         DO ATTITUDE MANEUVER ROUTINE
 0105    REF   4  LAST  754   36,3222  0 1142 1            TC       P40/RET


 0106    REF   7  LAST  741   E7,1462                      EBANK=   TRKMKCNT
 0107    REF  19  LAST  746   36,3223  3 0005 1  POSTBURN  CA       Z
 0108    REF  10  LAST  747   36,3224  55'163 0            TS       DISPDEX
 0109                         36,3225  0 0006 1            EXTEND
 0110    REF   1              36,3226  3 2056 0            DCA      ACADN85
 0111    REF   5  LAST  741   36,3227  53'253 0            DXCH     AVEGEXIT
 0112    REF   1              36,3230  3 3760 0            CAF      V16N40
 0113    REF 205  LAST  754   36,3231  0 4616 1            TC       BANKCALL
 0114    REF   4  LAST  725   36,3232   20635 0            CADR     GOFLASHR
 0115    REF   1              36,3233  0 3256 0            TC       TERM40
 0116    REF   2  LAST  741   36,3234  1 3241 1            TCF      TIGNOW
 0117    REF   3  LAST  746   36,3235  0 3223 1            TC       POSTBURN
 0118    REF  45  LAST  753   36,3236  0 5353 1  P40PHS1   TC       PHASCHNG
 0119                         36,3237   00014 1            OCT      00014
 0120    REF 121  LAST  747   36,3240  1 5155 1            TCF      ENDOFJOB

 0121                         36,3241  0 0004 0  TIGNOW    INHINT
 01211   REF  29  LAST  754   36,3242  0 4674 0            TC       IBNKCALL
 01212   REF   4  LAST  519   36,3243   40153 1            CADR     ZATTEROR
 0122    REF  29  LAST  755   36,3244  0 4674 0            TC       IBNKCALL
 0123    REF   3  LAST  519   36,3245   40140 0            CADR     SETMINDB
 0124                         36,3246  0 0003 1            RELINT
 0125    REF   2  LAST  736   36,3247  3 3761 1            CAF      V16N85B
 0126    REF 206  LAST  754   36,3250  0 4616 1            TC       BANKCALL
 0127    REF   1              36,3251   20462 0            CADR     REFLASHR
 0128    REF   2  LAST  754   36,3252  0 3256 0            TC       TERM40
 0129    REF   3  LAST  755   36,3253  1 3256 1            TCF      TERM40
 0130                         36,3254  0 3247 0            TC       -5

 01305   REF   1              36,3255  1 3236 1            TCF      P40PHS1

 0131                         36,3256  0 0006 1  TERM40    EXTEND
 0132    REF   1              36,3257  3 2106 1            DCA      SERVCADR
 0133    REF   6  LAST  754   36,3260  53'253 0            DXCH     AVEGEXIT
 0134    REF 138  LAST  746   36,3261  3 4755 1            CAF      ZERO
 0135    REF   8  LAST  754   36,3262  55'462 1            TS       TRKMKCNT            ZERO RENDZVS CNTERS
 0136    REF  20  LAST  754   36,3263  3 0005 1            CA       Z
 0137    REF  20  LAST  754   36,3264  55'163 0            TS       DISPDEX
 0138                         36,3265  0 0004 0            INHINT
 0139    REF  30  LAST  755   36,3266  0 4674 0            TC       IBNKCALL
 0140    REF   6  LAST  519   36,3267   40123 0            CADR     RESTORDB
 0141                         36,3270  0 0003 1            RELINT
 0142    REF  27  LAST  749   36,3271  0 6001 0            TC       GOTOPOOH

 0143    REF  21  LAST  [illegible]  E7,1455                     EBANK=   WHICH
 0144    REF   1                                           COUNT*   $$/P41
 0145    REF   1              36,3272  3 3134 1  P41LM     CAF      P41ADRES          INITIALIZATION FOR BURNBABY
 0146    REF  22  LAST  755   36,3273  55'455 0            TS       WHICH

 0147    REF 207  LAST  755   36,3274  0 4616 1            TC       BANKCALL
 0148    REF   6  LAST  753   36,3275   11254 1            CADR     R02BOTH

 0149    REF 105  LAST  754   36,3276  0 6037 0            TC       INTPRET           BOTH LM
 0150                         36,3277   71214 0            BON      DLOAD             IF NJETSFLAG IS SET, LOAD 2 JET F
 0151    REF   1              36,3300   00700 0                     NJETSFLG
 0152    REF   1              36,3301   75305 0                     P41FJET1
 0153    REF   1              36,3302   34015 1                     FRCS4             IF NJETSFLAG IS CLEAR, LOAD 4 JET F

 0154    REF   3  LAST  754   36,3303   37735 1  P41FJET   STCALL   F
 0155    REF   1              36,3304   75310 1                     P41IN

 0156                         36,3305   77745 1  P41FJET1  DLOAD
 0157    REF   1                36,3306   34017 0                       FRCS2
 0158    REF   4  LAST  755     36,3307   03735 0              STORE    F

 0159                           36,3310   77624 1   P41IN      CALL
 0160    REF   2  LAST  754     36,3311   56246 1                       S40.1               BOTH
 0164                           36,3312   77624 1   P41NORM    CALL
 0165    REF   2  LAST  754     36,3313   56413 1                       S40.2,3             CALCULATE PREFERRED IMU ORIENTATION AND
 0166                           36,3314   77776 1              EXIT                         SET PFRATFLG.

 0169                           36,3315  0 0004 0              INHINT
 0170    REF  31  LAST  755     36,3316  0 4674 0              TC       IBNKCALL
 0171    REF   5  LAST  755     36,3317   40153 1              CADR     ZATTEROR            ZERO ATTITUDE ERRORS
 0172    REF  32  LAST  756     36,3320  0 4674 0              TC       IBNKCALL
 0173    REF   4  LAST  755     36,3321   40140 0              CADR     SETMINDB            SET 0.3 DEGREE DEADBAND
 0174    REF   2  LAST  754     36,3322  0 3213 1              TC       P40SXT4

 0175    REF 106  LAST  755     36,3323  0 6037 0              TC       INTPRET
 0176                           36,3324   45175 0              VLOAD    CALL                TRANSFORM VELOCITY-TO-BE-GAINED AT TIG
 0177    REF   3  LAST  194     36,3325   03701 1                       VGTIG               FROM REFERENCE COORDINATES TO LM BODY-
 0178    REF   1                36,3326   57267 0                       S41.1               AXIS COORDINATES FOR V16N85 DISPLAY.
 0179    REF   6  LAST  316     36,3327   03502 0              STORE    VGBODY              (SCALED AT 2 (+7) METERS/CENTISECOND)
 0180                           36,3330   77776 1              EXIT

 0181    REF   3  LAST  755     36,3331  3 3761 1              CAF      V16N85B
 0182    REF 208  LAST  755     36,3332  0 4616 1              TC       BANKCALL
 0183    REF   1                36,3333   20446 0              CADR     GODSPRET


 01831   REF   6  LAST  703     36,3334  3 5017 1              CAF      PRIO5
 01832   REF  21  LAST  755     36,3335  55'163 0              TS       DISPDEX             FOR SAFETY ONLY
 01833   REF  31  LAST  747     36,3336  0 5105 0              TC       FINDVAC
 01834   REF   3  LAST  243     E7,1700                        EBANK=   VGPREV
 01835   REF   1                36,3337   03361 0              2CADR    DYNMDISP
 01835   REF   1                36,3340   74067 0
 01836   REF   7  LAST  744     36,3341  0 5327 1              TC       2PHSCHNG
 0184                           36,3342   00076 0              OCT      00076               GROUP 6 RESTARTS AT REDO6.7
 0185                           36,3343   04024 0              OCT      04024               GROUP 4 RESTARTS HERE

R0186                                                     ************************
 0187    REF   1                36,3344  1 2135 0.             TCF      B*RNB*B*
A01871                                                    ************************


 01872   REF  13  LAST  744     36,3345  3 4777 1   BLNKWAIT   CAF      1SEC
 01873   REF 209  LAST  756     36,3346  0 4616 1              TC       BANKCALL
 01874   REF  14  LAST  718     36,3347   01735 1              CADR     DELAYJOB

 01875   REF  22  LAST  756     36,3350  3 1163 1   REDO6.7    CA       DISPDEX             ON A RESTART, DO NOT PUT UP DISPLAY IF
 01876   REF  43  LAST  746     36,3351  6 4752 0              AD       TWO                 BLANKING (BETWEEN TIG-35 AND TIG-30)
R0188                                                     ************************
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018801                        36,3352  0 0006 1            EXTEND
018802 REF   1                36,3353  1 3345 1            BZF     BLNKWAIT

018803 REF   4  LAST  756     36,3354  3 3761 1            CAF     V16N85B
018804 REF 210  LAST  756     36,3355  0 4616 1            TC      BANKCALL
018805 REF   2  LAST  756     36,3356   20446 0            CADR    GODSPRET

018806 REF   7  LAST  756     36,3357  3 5017 1            CAF     PRIO5
018807 REF  12  LAST  706     36,3360  0 5146 1            TC      PRIOCHNG

018808 REF  23  LAST  756     36,3361  3 1163 1  DYNMDISP  CA      DISPDEX         A NON-POSITIVE DISPDEX INDICATES PAST
018809                        36,3362  0 0006 1            EXTEND                  TIG-35, SO SERVICER WILL BE DOING THE
01881  REF 122  LAST  755     36,3363  6 5155 0            BZMF    ENDOFJOB        UPDATING OF NOUN 85. STOP DYNMDISP.
018811 REF 107  LAST  756     36,3364  0 6037 0            TC      INTPRET
018812                        36,3365   45175 0            VLOAD   CALL
018813 REF   4  LAST  756     36,3366   03701 1                    VGPREV
018814 REF   2  LAST  756     36,3367   57267 0                    S41.1
018815 REF   7  LAST  756     36,3370   03502 0            STORE   VGBODY
018816                        36,3371   77776 1            EXIT
018817 REF  14  LAST  756     36,3372  3 4777 1            CAF     1SEC
018818 REF 211  LAST  757     36,3373  0 4616 1            TC      BANKCALL
018819 REF  15  LAST  756     36,3374   01735 1            CADR    DELAYJOB
01882  REF   2  LAST  756     36,3375  1 3361 1            TCF     DYNMDISP


0189   REF 108  LAST  757     36,3376  0 6037 0  CALCN85   TC      INTPRET
0190                          36,3377   77624 1            CALL
0191   REF   1                36,3400   75511 0                    UPDATEVG
0192                          36,3401   45175 0            VLOAD   CALL
0193   REF   5  LAST  757     36,3402   03701 1                    VGPREV
0194   REF   3  LAST  757     36,3403   57267 0                    S41.1
0195   REF   8  LAST  757     36,3404   03502 0            STORE   VGBODY
0196                          36,3405   77776 1            EXIT
0197   REF  42  LAST  741     36,3406  0 4635 0            TC      POSTJUMP
0198   REF   3  LAST  732     36,3407   65770 1            CADR    SERVEXIT

0199   REF   1                                             COUNT*  $$/P42
0200   REF  23  LAST  755     E7,1455                      EBANK=  WHICH

0201   REF  46  LAST  755     36,3410  0 5353 1  P42LM     TC      PHASCHNG
02012                         36,3411   04024 0            OCT     04024

02014  REF   1                36,3412  3 3135 0            CAF     P42ADRES        INITIALIZATION FOR BURNBABY.
0202   REF  24  LAST  757     36,3413  55'455 0            TS      WHICH

0203   REF  15  LAST  753     36,3414  4 0106 1            CS      FLGWRD10
0204   REF  10  LAST  753     36,3415  7 4737 1            MASK    APSFLBIT
0205   REF 227  LAST  753     36,3416  10 000 0            CCS     A
0208   REF   2  LAST  753     36,3417  0 3121 0            TC      P40ALM
0209   REF 212  LAST  757     36,3420  0 4616 1  P42STAGE  TC      BANKCALL
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 0210     REF   7  LAST  755     36,3421    11254 1                CADR     RO2BOTH
 02101    REF   1                36,3422  3 6000 1                CAF      THRESH2          INITIALIZE DVMON
 02102    REF   3  LAST  753     36,3423  55'251 1                TS       DVTHRUSH
 02103    REF  12  LAST  753     36,3424  3 4751 0                CAF      FOUR
 02104    REF  29  LAST  753     36,3425  55'515 0                TS       DVCNTR

 0211     REF 109  LAST  757     36,3426  0 6037 0                TC       INTPRET
 0212                            36,3427   77214 0                SET      VLOAD            LOAD FAPS, MDOTAPS, AND ATDECAY INTO
 0213     REF   6  LAST  730     36,3430   01072 0                         AVFLAG           F, MDOT, AND TDECAY BY VECTOR LOAD.
 0214     REF   1                36,3431   34007 1                         FAPS
 0215     REF   5  LAST  756     36,3432   03735 0                STORE    F
 0216                            36,3433   52135 1                SLOAD    GOTO
 02162    REF   1                36,3434   26001 1                         APSVEX
 02164    REF   1                36,3435   75200 1                         P40IN

 0217     REF  25  LAST  757     E7,1455                          EBANK=   WHICH

 0218     REF   1                                                 COUNT*   $$/P47
 0219     REF 213  LAST  757     36,3436  0 4616 1    P47L4       TC       BANKCALL
 0220     REF   8  LAST  758     36,3437   11254 1                CADR     RO2BOTH
 0221     REF 110  LAST  758     36,3440  0 6037 0                TC       INTPRET
 0222                            36,3441   77624 1                CALRB
 0223     REF   1                36,3442   27553 1                         MIDTOAV2

 0224     REF 289  LAST  744     36,3443  3 0155 0                CA       MPAC +1
 0225     REF  17  LAST  747     36,3444  0 5173 1                TC       TWIDDLE
 0226     REF   1                36,3445   03447 0                ADRES    STARTP47

 02261    REF 123  LAST  757     36,3446  1 5155 1                TCF      ENDOFJOB

 0227     REF  47  LAST  757     36,3447  0 5353 1    STARTP47    TC       PHASCHNG
 02391                           36,3450   05014 1                OCT      05014
 02392                           36,3451   77777 0                OCT      77777

 02393                           36,3452  0 0006 1                EXTEND
 0240     REF   1                36,3453  3 3764 1                DCA      ACADN83
 0241     REF   7  LAST  755     36,3454  53'253 0                DXCH     AVEGEXIT
 0242     REF   5  LAST  737     36,3455  3 4736 1                CAF      PRIO20
 0243     REF  32  LAST  756     36,3456  0 5105 0                TC       FINDVAC
 0244     REF   4  LAST  316     E7,1622                          EBANK=   DELV1MU
 0245     REF   1                36,3457   03513 0                2CADR    P47BODY
 0245     REF   1                36,3460   74067 0
 0246     REF   2  LAST  241     36,3461  1 2342 1                TCF      REDO4.2          CHECKS PHASE 5 AND GOES TO PREREAD
A0247                                                                                       SEE TIG-30 IN BURNBABY.

 0248     REF 111  LAST  758     36,3462  0 6037 0    CALCN83     TC       INTPRET
 0249                            36,3463   53375 0                VLOAD    VAD
 0250     REF   1                36,3464   03502 0                         DELVCTL
 0251     REF   2  LAST  147     36,3465   03527 1                         DELVREF
 0252     REF  13  LAST  727     36,3466   03656 1                STORE    DELVSIN          TEMP STORAGE FOR RESTARTS
 0253                            36,3467   77624 1               CALL
 0254    REF   4  LAST  757      36,3470   57267 0                        S41.1
 0255    REF   5  LAST  758      36,3471   03623 0               STORE    DELVIMU
 0256                            36,3472   77776 1               EXIT
 02561   REF  48  LAST  758      36,3473  0 5353 1               TC       PHASCHNG
 02562                           36,3474   10035 0               OCT      10035           REREADAC AND HERE

 02563   REF 112  LAST  758      36,3475  0 6037 0               TC       INTPRET
 02564                           36,3476   77775 1               VLOAD
 02565   REF  14  LAST  758      36,3477   03656 1                        DELVSIN
 02566   REF   2  LAST  758      36,3500   03502 0               STORE    DELVCTL
 02567                           36,3501   77776 1               EXIT

 0257    REF  43  LAST  757      36,3502  0 4635 0               TC       POSTJUMP
 0258    REF   4  LAST  757      36,3503   65770 1               CADR     SERVEXIT

 0259    REF   1                 36,3504  3 3762 1   P47BOD      CAF      V16[illegible]3
 0260    REF 214  LAST  758      36,3505  0 4616 1               TC       BANKCALL
 0261    REF   5  LAST  754      36,3506   20635 0               CADR     GOFLASHR
 0262    REF  28  LAST  755      36,3507  0 6001 0               TC       GOTOPOOH
 0263    REF  29  LAST  759      36,3510  0 6001 0               TC       GOTOPOOH

 02631   REF   2  LAST  758      36,3511  1 3513 1               TCF      P47BODY

 02632   REF   2  LAST  755      36,3512  1 3236 1               TCF      P40PHS1

 0264    REF 113  LAST  759      36,3513  0 6037 0   P47BODY     TC       INTPRET
 0265                            36,3514   77775 1               VLOAD
 0266    REF   5  LAST  721      36,3515   06522 1                        HI6ZEROS
 0267    REF   5  LAST  759      36,3516   03623 0               STORE    DELVIMU
 0268    REF   3  LAST  759      36,3517   03502 0               STORE    DELVCTL
 0269                            36,3520   77776 1               EXIT
 0270    REF   1                 36,3521  0 3504 0               TC       P47BOD

 0271    REF   6 LAST  749 TO  750:     12    615*               COUNT*   $$/P40
 0272    REF   7  LAST  747      36,3522  3 1517 0   IMPLBURN    CA       TGO +1
 02721   REF   1                 36,3523  0 3735 0               TC       GETDT
 0273    REF  18  LAST  758      36,3524  0 5173 1               TC       TWIDDLE
 0274    REF   2  LAST  241      36,3525   03542 1               ADRES    ENGOFTSK
 0275    REF  65  LAST  754      36,3526  0 5516 0               TC       DOWNFLAG        TURN OFF IGNFLAG
 0276    REF   3  LAST  740      36,3527   00153 0               ADRES    IGNFLAG
 0277    REF  66  LAST  759      36,3530  0 5516 0               TC       DOWNFLAG        TURN OFF ASTNFLG
 0278    REF   4  LAST  746      36,3531   00154 1               ADRES    ASTNFLAG
 0279    REF  67  LAST  759      36,3532  0 5516 0               TC       DOWNFLAG        TURN OFF IMPULSW
 0280    REF   1                 36,3533   00044 1               ADRES    IMPULSW
 0281    REF  49  LAST  759      36,3534  0 5353 1               TC       PHASCHNG        RESTART PROTECT ENGOFTSK (ENGINOFF)
 0282                            36,3535   40114 1               OCT      40114

 0283    REF  13  LAST  744      36,3536  0 5221 0               TC       FIXDELAY        WAIT HALF A SECOND
 0284                            36,3537   00062 0               DEC      50
 0285   REF   3  LAST  746   36,3540  0 2653 0           TC       NOULLAGE            TURN OFF ULLAGE

 0286   REF  50  LAST  744   36,3541  0 5261 1           TC       TASKOVER

 0287   REF  33  LAST  756   36,3542  0 4674 0  ENGOFTSK TC       IBNKCALL            THIS CODING ALLOWS ENGINOFF ET AL TO BE
 0288   REF   1              36,3543   75545 1           CADR     ENGINOFF            USED BOTH BY WAITLIST AND BY TC IBNKCALL
 0289   REF  51  LAST  760   36,3544  0 5261 1           TC       TASKOVER

 0290   REF   3  LAST  746   36,3545  3 4644 0  ENGINOFF CAF      PRIO12              MUST BE LOWER PRIO THAN CLOCKJOB
 0291   REF  33  LAST  758   36,3546  0 5105 0           TC       FINDVAC
 0292   REF   9  LAST  755   E7,1462                     EBANK=   TRKMKCNT
 0293   REF   4  LAST  754   36,3547   03223 1           2CADR    POSTBURN
 0293                        36,3550   74067 0

 0294   REF  37  LAST  747   36,3551  3 4753 1  ENGINOF2 CAF      BIT1
 0295   REF  34  LAST  739   36,3552  0 5203 0           TC       WAITLIST
 0296   REF   4  LAST  732   E6,1422                     EBANK=   OMEGAQ
 0297   REF   1              36,3553   03606 1           2CADR    COASTSET
 0297   REF   1              36,3554   74066 1
 0298   REF  14  LAST  747   36,3555  4 0103 1  ENGINOF1 CS       FLAGWRD7            SET THE IDLE BIT.
 0299   REF   1              36,3556  7 4745 1           MASK     IDLEFBIT
 0300   REF  15  LAST  760   36,3557  26 103 1           ADS      FLAGWRD7

 0301   REF   4  LAST  760   36,3560  0 2653 0           TC       NOULLAGE

 0302                        36,3561  0 0006 1  ENGINOF4 EXTEND
 0303   REF  22  LAST  745   36,3562  3 0025 0           DCA      TIME2
 0304   REF   5  LAST  738   36,3563  53'345 0           DXCH     TEVENT

 0305   REF   4  LAST  738   36,3564  4 4745 1  ENGINOF3 CS       ENGONBIT            INSURE ENGONFLG IS CLEAR.
 03051  REF  22  LAST  739   36,3565  7 0101 0           MASK     FLAGWRD5
 03052  REF  23  LAST  760   36,3566  54 101 0           TS       FLAGWRD5
 03053  REF   7  LAST  738   36,3567  4 4355 1           CS       PRIO30              ENGINOF3 IS USED AS A PRE-ENGINE ARM
 0306                        36,3570  0 0006 1           EXTEND                       SUBROUTINE.
 0307   REF  24  LAST  738   36,3571  02 011 0           RAND     DSALMOUT
 0308   REF   6  LAST  758   36,3572  6 4736 1           AD       PRIO20              TURN OFF THE ENGINE - DPS OR APS
 0309                        36,3573  0 0006 1           EXTEND
 0310   REF  25  LAST  760   36,3574  01 011 0           WRITE    DSALMOUT

 0314   REF  28  LAST  753   36,3575  4 0111 1           CS       DAPBOOLS            TURN OFF TRIM GIMBAL
 0315   REF   1              36,3576  7 4736 0           MASK     USEQRJTS
 0316   REF  29  LAST  760   36,3577  26 111 1           ADS      DAPBOOLS

 0317   REF   1              36,3600  4 4737 1           CS       HIRTHROT            ZERO AUTO-THROTTLE WHENEVER THE ENGINE
 0319   REF   3  LAST  741   36,3601  54 055 0           TS       THRUST              IS TURNED OFF.
 0320   REF  30  LAST  741   36,3602  3 4750 1           CAF      BIT4                THE HARDWARE DOES SO ONLY WHEN THE
 0321                        36,3603  0 0006 1           EXTEND                       ENGINE IS DISARMED.
 0322   REF   9  LAST  741   36,3604  05 014 1           WOR      CHAN14

 0323   REF   3  LAST  612   36,3605  0 4707 0           TC       ISWRETRN
 0324    REF  34  LAST  760   36,3606  0 4674 0  COASTSET TC      IBNKCALL          DO DAP COASTING INITIALIZATION
 0325    REF   4  LAST  747   36,3607   40204 0           CADR    ALLCOAST
 0326    REF  52  LAST  760   36,3610  0 5261 1           TC      TASKOVER

 0327    REF   5  LAST  760   E6,1422                     EBANK=  OMEGAQ
 0328                         36,3611   45020 1  UPDATEVG STQ     CALL
 0329    REF   3  LAST  142   36,3612   03665 1                   QTEMP1
 0330    REF   1              36,3613   56447 0                   S40.8             X-PRODUCT STEERING
 0331                         36,3614   43014 0           BON     BON
 03311   REF   6  LAST  727   36,3615   01307 1                   XDELVFLG
 03312   REF   4  LAST  761   36,3616   03665 1                   QTEMP1
 03313   REF   3  LAST  687   36,3617   03705 0                   NORMSW
 03314   REF   1              36,3620   75633 0                   180SETUP
 03315                        36,3621   45345 1           DLOAD   DSU
 03316   REF   6  LAST  706   36,3622   01235 1                   PIPTIME
 03317   REF   1              36,3623   03763 0                   TIGSAVE
 03318                        36,3624   50025 0           DSU     BMN
 03319   REF   1              36,3625   03432 1                   TNEWA
 0332    REF   1              36,3626   75656 0                   GETRANS
 03321                        36,3627   43345 1           DLOAD   DAD
 03322   REF   2  LAST  761   36,3630   03763 0                   TIGSAVE
 03323   REF   2  LAST  761   36,3631   03432 1                   TNEWA
 0333    REF   1              36,3632   03765 0           STORE   TIGSAVEP
 0336                         36,3633   77776 1  180SETUP EXIT
 03361   REF   1              36,3634  10 755 1           CCS     PHASE2
 03362   REF   1              36,3635  1 3663 0           TCF     NO.9
 0337    REF   4  LAST  297   36,3636  3 4737 0           CAF     PRIO10
 0338                         36,3637  0 0004 0           INHINT
 0339    REF  34  LAST  760   36,3640  0 5105 0           TC      FINDVAC
 0340    REF   2  LAST  143   E7,1706                     EBANK=  VG
 0341    REF   1              36,3641   02707 0           2CADR   S40.9             LAMBERT VTOGAIN
 0341    REF   1              36,3642   56067 0
 0342    REF   8  LAST  756   36,3643  0 5327 1           TC      2PHSCHNG
 0343                         36,3644   00172 0           OCT     00172             2.17SPOT FOR S40.9
 0344                         36,3645   10035 0           OCT     10035             HERE AND REREADAC AFTER RESTART

 0347    REF 114  LAST  759   36,3646  0 6037 0  ENDSTEER TC      INTPRET
 034701                       36,3647   77745 1           DLOAD
 034702  REF   2  LAST  761   36,3650   03765 0                   TIGSAVEP
 03471   REF   3  LAST  761   36,3651   27763 0           STOVL   TIGSAVE
 03472   REF   7  LAST  717   36,3652   01221 1                   RN
 03473   REF   9  LAST  692   36,3653   26323 1           STOVL   RINIT
 03474   REF   7  LAST  717   36,3654   01227 1                   VN
 03475   REF   8  LAST  692   36,3655   02331 1           STORE   VINIT
 03476                        36,3656   45345 1  GETRANS  DLOAD   DSU
 03477   REF   9  LAST  675   36,3657   03631 0                   TPASS4
 03478   REF   7  LAST  761   36,3660   01235 1                   PIPTIME
 0348    REF   7  LAST  689   36,3661   37452 0           STCALL  DELLT4
 0349    REF   5  LAST  761   36,3662   03665 1                   QTEMP1
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03491  REF 115  LAST  761   36,3663  0 6037 0  NO.9      TC       INTPRET
03492                       36,3664   77650 1            GOTO
03493  REF   6  LAST  761   36,3665   03665 1                     QTEMP1
0350   REF 116  LAST  762   36,3666  0 6037 0  STEERING  TC       INTPRET

0351                        36,3667   77624 1            CALL
0352   REF   2  LAST  757   36,3670   75611 0                     UPDATEVG
0353                        36,3671   77776 1            EXIT

0354   REF  30  LAST  758   E7,1515                      EBANK=   DVCNTR
0355                        36,3672  0 0004 0  NSTEER    INHINT
0356   REF   5  LAST  740   36,3673  3 5016 0            CA       EBANK7
0357   REF  23  LAST  740   36,3674  54 003 0            TS       EBANK
0359   REF  19  LAST  740   36,3675  4 0076 1            CS       FLAGWRD2       CHECK IMPULSE SWITCH.  IT IS SET EITHER
0360   REF   2  LAST  740   36,3676  7 4743 1            MASK     IMPULBIT       BY S40.13 IF TBURN<6 SECS OR BY S40.8 IF
0361   REF 228  LAST  757   36,3677  10 000 0            CCS      A              STEERING IS ALMOST DONE.

0362                        36,3700  1 3705 1            TCF       +5            IMPULSW = 0     EXIT
0363   REF  16  LAST  760   36,3701  4 0103 1            CS       FLAGWRD7       IMPULSW = 1     WHY?  CHECK IDLEFLAG
0364   REF   2  LAST  760   36,3702  7 4745 1            MASK     IDLEFBIT          (IDLEFLAG = 0 --> DVMON ON)
0365   REF 229  LAST  762   36,3703  10 000 0            CCS      A
0366                        36,3704  1 3707 0            TCF       +3            DVMON ON-->THRUSTING-->IMPULSW VIA S40.8
0367   REF  44  LAST  759   36,3705  0 4635 0            TC       POSTJUMP       DVMON OFF-->IMPULSW ON VIA S40.13-->EXIT
0368   REF   5  LAST  759   36,3706   65770 1            CADR     SERVEXIT

03681  REF  35  LAST  761   36,3707  0 4674 0            TC       IBNKCALL
03682  REF   3  LAST  363   36,3710   40165 1            CADR     STOPRATE

0369   REF  68  LAST  759   36,3711  0 5516 0            TC       DOWNFLAG       TURN OFF IMPULSW
0370   REF   2  LAST  759   36,3712   00044 1            ADRES    IMPULSW

0371   REF  46  LAST  746   36,3713  0 5504 0            TC       UPFLAG
0372   REF   4  LAST  742   36,3714   00161 1            ADRES    IDLEFLAG       TURN OFF DVMON

0373                        36,3715  0 0004 0            INHINT
0374                        36,3716  0 0006 1            EXTEND
0375   REF  35  LAST  744   36,3717  3 1442 1            DCA      TIG
0376   REF 290  LAST  758   36,3720  52 155 1            DXCH     MPAC
0377                        36,3721  0 0006 1            EXTEND
0378   REF  23  LAST  760   36,3722  4 0025 1            DCS      TIME2
0379   REF 291  LAST  762   36,3723  20 155 1            DAS      MPAC
0380   REF   8  LAST  744   36,3724  0 7257 0            TC       TPAGREE
0381   REF 292  LAST  762   36,3725  30 155 0            CAE      MPAC +1
0382   REF   2  LAST  759   36,3726  0 3735 0            TC       GETDT
0391   REF  19  LAST  759   36,3727  0 5173 1            TC       TWIDDLE
0392   REF   3  LAST  759   36,3730   03542 1            ADRES    ENGOFTSK
0393   REF   9  LAST  761   36,3731  0 5327 1            TC       2PHSCHNG
0394                        36,3732   40114 1            OCT      40114          ENGOFTSK (ENGINOFF)
0395                        36,3733   00035 1            OCT      00035          SERVICER--REREADAC
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 0396   REF 124  LAST  758   36,3734  1 5155 1              TCF      ENDOFJOB

 0397   REF 230  LAST  762   36,3735  10 000 0  GETDT       CCS      A
 0398                        36,3736  1 3741 1              TCF      +3
 0399                        36,3737  1 3741 1              TCF      +2
 0400   REF 139  LAST  755   36,3740  3 4755 1              CAF      ZERO
 0401   REF  84  LAST  725   36,3741  6 4753 1              AD       ONE
 0402   REF 107  LAST  751   36,3742  56 0001 0             XCH      L
 0403   REF 140  LAST  763   36,3743  3 4755 1              CAF      ZERO
 0404   REF   8  LAST  759   36,3744  53'517 1              DXCH     TGO
 0405   REF   9  LAST  763   36,3745  3 1517 0              CA       TGO +1
 0406   REF 193  LAST  751   36,3746  0 0002 0              TC       Q


R0424   ********************************************************************************

 0425                        36,3747   00000 1  SEC15DP     OCT      00000              DON'T SEPARATE
 0426                        36,3750   02734 0  SEC15       DEC      1500               DON'T SEPARATE
 0427                        36,3751   00000 1  SEC30DP     2DEC     3000
 0427                        36,3752   05670 0
 0428                        36,3753   00000 1  SEC45DP     OCT      00000              DON'T MOVE FROM JUST BEFORE SEC45
 0429                        36,3754   10624 0  SEC45       DEC      4500
 0430                        36,3755   00000 1  5SECDP      OCT      00000              DON'T MOVE FROM JUST BEFORE 5SEC
 0431                        36,3756   00764 1  5SEC        DEC      500
 0432                        36,3757   05050 1  26SECS      DEC      2600
 0437                        36,3760   04050 0  V16N40      VN       1640
 0438                        36,3761   04125 0  V16N85B     VN       1685
 0439                        36,3762   04123 0  V1683       VN       1683
 0440   REF  15  LAST  757      4777            SEC01       =        1SEC
 0441   REF   2  LAST  749   36,2055            ACADN85     =        P41TABLE +2

 0442   REF   7  LAST  759   E7,1622                        EBANK=   DELVIMU
 0443   REF   1              36,3763   03462 1  ACADN83     2CADR    CALCN83
 0443   REF   1              36,3764   74067 0
R0444   **************************************************
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P0445    PROGRAM DESCRIPTION S40.1        DATE15NOV66
R0446    MOD NO2          LOG SECTION  P40-P47
R0447    MOD BY ZELDIN AND ADAPTED BY TALAYCO
R0448    FUNCTIONAL DESCRIPTION
R0449             COMPUTE INITIAL THRUST DIRECTION(UT) AND INITIAL VALUE OF VG
R0450             VECTOR(VGTIG).
R0451    CALLING SEQUENCE
R0452          L CALL
R0453         L+1         S40.1
R0454    NORMAL EXIT MODE
R0455             AT L+2 OF CALLING SEQUENCE (GOTO L+2)  NORMAL RETURN OR
R0456             ERROR RETURN IF NOSOFLAG =1
R0457    SUBROUTINES CALLED
R0458             LEMPREC
R0459             INITVEL
R0460             CALCGRAV
R0461             MIDGIM
R0462    ALARM OR ABORT EXIT MODES
R0463         L+2 OF CALLING SEQUENCE,UNSOLVABLE CONIC IF NOSOFLAG=1
R0464    ERASABLE INITIALIZATION REQUIRED
R0465                     WEIGHT/G  ANTICIPATED VEHICLE MASS          DP  B16KGM
R0466             XDELVFLG       1=DELTA-V MANEUVER,0=AIMPT STEER
R0467              F          THRUST F   ENGINE USED
R0468          IF DELTA-V MANEUVER
R0469             DELVSIN   SPECIFIED DELTA-V REQUIRED IN
R0470                       INERTIAL COORDS. OF ACTIVE VEHICLE
R0471                       AT TIME OF IGNITION                   VECTOR B7M/CS
R0472             DELVSAB   MAG. OF DELVSIN                       DP     B7M/CS
R0473             RTIG      POSITION AT TIME OF IGNITION         VECTOR B29M
R0474             VTIG      VELOCITY AT TIME OF IGNITION         VECTOR B7M/CS
R0475          IF AIMPT STEER
R0476             TIG       TIME OF IGNITION                      DP     B28CS
R0477             RTARG     POSITION TARGET TIME                 VECTOR B29M
R0478             CSTEER    C FOR STEER LAW                       DP     B2
R0479             DLTARG    TARGET TIME-IGNITION TIME            DP     B28CS
R0480    OUTPUT
R0481          UT           DESIRED THRUST DIRECTION              VECT. B2M/(CS.CS)
R0482          VGTIG        INITIAL VALUE OF VELOCITY
R0483                       TO BE GAINED (INERT. COORD.)          VECTOR B7M/CS
R0484          DELVLVC      VGTIG IN LOC. VERT. COORDS.                  B7M/CS
R0485             BDT   V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R0486             -GDT  FOR S40.13                                    VECT  B7M/CS
R0487          RTIG         CALC IN S40.1B(AIMPT) FOR S40.2,3  VECTOR B29M
R0488                       POSITION AT TIME OF IGNITION
R0489    DEBRIS      QTEMP1
R0490          MPAC,QPRET
R0491          PUSHLIST
 0492                         14,2347                     BANK   14
 0493    REF   4  LAST  750   27,2000                     SETLOC P40S1
 0494                         27,2246                     BANK
 0495    REF   1                                               COUNT*  $$/S40.1
 0496                       27,2246   71220 1  S40.1    STQ     DLOAD
 0497    REF   3  LAST  617  27,2247   03632 0                   QTEMP
 0498    REF  36  LAST  762  27,2250   03442 0                   TIG
 04981   REF   4  LAST  761  27,2251   03763 0           STORE   TIGSAVE
 0499                       27,2252   77614 1  DELVTEST BOFF
 0500    REF   7  LAST  761  27,2253   01347 0                   XDELVFLG
 0501    REF   1             27,2254   56336 1                   S40.1B
 0502                       27,2255   77201 1  CALCTHET SETPD   VLOAD
 0503                       27,2256   00001 0                   0
 0504    REF   6  LAST  652  27,2257   03650 1                   VTIG
 0505    REF   9  LAST  761  27,2260   02331 1           STORE   VINIT
 0506                       27,2261   53435 0           VXV     UNIT
 0507    REF   8  LAST  653  27,2262   03642 1                   RTIG
 0508    REF   3  LAST  144  27,2263   27673 0           STOVL   UT                UP IN UT
 0509    REF   9  LAST  765  27,2264   03642 1                   RTIG
 0510    REF  10  LAST  761  27,2265   02323 1           STORE   RINIT
 0511                       27,2266   55236 0           VSQ     PDDL
 0512                       27,2267   00045 0                   36D
 0513                       27,2270   56205 0           DMP     DDV
 0514    REF   1             27,2271   16412 1                   THETACON
 0515                       27,2272   41205 0           DMP     DMP
 0516    REF   4  LAST  645  27,2273   03664 0                   DELVSAB
 0517    REF   1             27,2274   01245 0                   WEIGHT/G
 0518                       27,2275   77671 1           DDV
 0519    REF   6  LAST  758  27,2276   03735 0                   F
 0520                       27,2277   24017 1           STOVL   14D
 0521    REF  15  LAST  759  27,2300   03656 1                   DELVSIN

 0522                       27,2301   74241 0           DOT     VXSC
 0523    REF   4  LAST  765  27,2302   03673 0                   UT
 0524    REF   5  LAST  765  27,2303   03673 0                   UT
 0525                       27,2304   41552 0           VSL2    PUSH              (DELTAV.UP)UP SCALED AT 2(+7) P.D.L. 0
 0526                       27,2305   65245 1           BVSU    PDDL              DELTA VP SCALED AT 2(+7) P.D.L. 6
 0527    REF  16  LAST  765  27,2306   03656 1                   DELVSIN
 0528                       27,2307   00017 1                   14D
 0529                       27,2310   63356 1           SIN     PDVL
 0530                       27,2311   00007 0                   6D
 0531                       27,2312   53435 0           VXV     UNIT
 0532    REF   6  LAST  765  27,2313   03673 0                   UT
 0533                       27,2314   45561 1           VXSC    STADR
 0534    REF   4  LAST  756  27,2315   50076 0           STOVL   VGTIG             UNIT(VPXUP)SIN(THETAT/2) IN VGTIG.
 0535                       27,2316   65256 0           UNIT    PDDL              UNIT(DELTA VP) IN P.D.L. 6
 0536                       27,2317   00017 1                   14D
 0537                       27,2320   74346 0           COS     VXSC
 0538                       27,2321   74255 0           VAD     VXSC
 0539    REF   5  LAST  765  27,2322   03701 1                   VGTIG
 0540                       27,2323   00045 0                   36D
 0541                       27,2324   53352 0           VSL2    VAD
 0542                       27,2325   77626 0           STADR
 0543   REF   6  LAST  765   27,2326   74076 0             STORE  VGTIG          VG IGNITION SCALED AT 2(+7)M/CS

 0544                        27,2327   77656 1             UNIT
 0545   REF   7  LAST  765   27,2330   27673 0             STOVL  UT             THRUST DIRECTION SCALED AT 2(+1)
 0546   REF   7  LAST  766   27,2331   03701 1                    VGTIG
 0547                        27,2332   45006 0             PUSH   CALL
 0548   REF   2  LAST  653   27,2333   15733 1                    GET.LVC        VGTIG IN LV COOR AT 2(+7)M/CS IN DELVLVC
 0552                        27,2334   77650 1             GOTO
 0553   REF   4  LAST  765   27,2335   03632 0                    QTEMP
 0554                        27,2336   77745 1  S40.18     DLOAD
 0555   REF  37  LAST  765   27,2337   03442 0                    TIG
 0556   REF  47  LAST  734   27,2340   00041 1             STORE  TDEC1
 0557                        27,2341   77621 1             BDSU
 0558   REF  10  LAST  761   27,2342   03631 0                    TPASS4
 0559   REF [illegible] LAST  761   27,2343   37452 0             STCALL DELLT4         INTERCEPT TIME - TIG.
 0560   REF   9  LAST  730   27,2344   27057 0                    LEMPREC
 0561                        27,2345   40375 1             VLOAD  SETPD          LOAD STATE VECTOR AT TIG FOR INITVEL.
 0562   REF  27  LAST  727   27,2346   00001 0                    RATT
 0563                        27,2347   00001 0                    0
 0564   REF  10  LAST  765   27,2350   03642 1             STORE  RTIG
 0565   REF  11  LAST  765   27,2351   02323 1             STORE  RINIT
 05651                       27,2352   77656 1             UNIT
 05652  REF   2  LAST  147   27,2353   27537 0             STOVL  UNIT/R/
 0566   REF  22  LAST  726   27,2354   00007 0                    VATT
 05665  REF   7  LAST  765   27,2355   03650 1             STORE  VTIG
 0567   REF  10  LAST  765   27,2356   02331 1             STORE  VINIT
 0568                        27,2357   65345 0             DLOAD  PDDL           NUMIT = 0
 0569   REF  11  LAST  677   27,2360   06522 1                    ZEROVECS
 0570   REF   1              27,2361   16406 1                    EPS1
 0571                        27,2362   43214 1             BOFF   DAD
 0572   REF   4  LAST  761   27,2363   03745 1                    NORMSW
 0573   REF   1              27,2364   56366 1                    SMALLEPS
 0574   REF   1              27,2365   16410 0                    EPS2           EPSILON4 = 10 DEGREES OR 45 DEGREES.
 0575                        27,2366   66006 1  SMALLEPS   PUSH   SXA,1
 0576   REF  13  LAST  698   27,2367   02776 0                    RTX1
 0577                        27,2370   45134 0             SXA,2  CALL
 0578   REF  12  LAST  699   27,2371   02777 1                    RTX2
 0579   REF   3  LAST  674   27,2372   22000 1                    INITVEL
 0580                        27,2373   41575 0             VLOAD  PUSH
 0581   REF  14  LAST  727   27,2374   02366 0                    DELVEET3       VGTIG = VR - VN.
 0582   REF   8  LAST  766   27,2375   03701 1             STORE  VGTIG
 0583                        27,2376   77656 1             UNIT                  UT = UNIT (VGTIG)
 0584   REF   8  LAST  766   27,2377   17673 0             STODL  UT
 0585                        27,2400   00045 0                    36D
 0586   REF   4  LAST  653   27,2401   37664 1             STCALL VGDISP         CONVERT VGTIG (IN PUSHLIST ) TO LOCAL
 0587   REF   3  LAST  766   27,2402   15733 1                    GET.LVC        VERTICAL COORDINATES.
 0588                        27,2403   77650 1             GOTO
 0589   REF   5  LAST  766   27,2404   03632 0                    QTEMP

 0590                        27,2405   00707 1  EPS1       2DEC*  2.777777778 E-2*  10 DEGREES AT 1 REVOLUTION.
 0590                        27,2406   03434 1
 0591                          27,2407   03070 0   EPS2       2DEC*  9.722222222 E-2*  35 DEGREES AT 1 REVOLUTION.
 0591                          27,2410   34344 0
 0592                          27,2411   00024 1   THETACON 2DEC    .31830989 B-8
 0592                          27,2412   13714 1
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R0593   SUBROUTINE NAME: S40.2,3          MOD. NO. 3 DATE: APRIL 4, 1967

R0594   MODIFICATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0595   MOD. NO. 4:  JULY 18, 1967:  PETER ADLER (MIT/IL)

R0596   MOD. NO. 5:  OCTOBER 18, 1967:  PETER ADLER (MIT/IL)

R0597   ORIGINALLY BY: SAYDEAN ZELDIN (MIT INSTRUMENTATION LAB) AND RICHARD TALAYCO (SYSTEM DEVELOPMENT CORP)

R0599   S40.2,3 COMPUTES "POINTVSM" WHICH IS THE HALF-UNIT DESIRED THRUST VECTOR IN STABLE-MEMBER COORDINATES FROM "UT"
R0601   WHICH IS THE SAME VECTOR IN REFERENCE COORDINATES.  IT DETERMINES THE CORRECT VALUES FOR "SCAXIS" USING THE +X
R0603   AXIS FOR DPS, APS, AND RCS BURNS.  THE "WINGS-LEVEL HEADS-UP" LM ORIENTATION IS THEN COMPUTED IN REFERENCE
R0605   COORDINATES.  THESE VECTORS ALSO DEFINE THE "PREFERRED IMU ORIENTATION".  UPON COMPLETION OF THIS CALCULATION,
R0607   THE "PREFERRED ATTITUDE COMPUTED" FLAG IS SET (PFRATFLG).


R0608   CALLING SEQUENCE:

A0609                                                 L          CALL                        INTERPRETIVE CALL.
A0610                                                 L +1              S40.2,3
A0611                                                 L +2     (RETURN)                      GIMBAL ANGLE VECTOR IN MPAC.

R0612   SUBROUTINES CALLED:  NONE.

R0613   NORMAL RETURN:  L +2 (SEE CALLING SEQUENCE ABOVE).

R0614   ALARM/ABORT MODES:  NONE.

R0615   INPUT:

R0616            1. REFSMMAT               MATRIX FROM REFERENCE TO STABLE-MEMBER COORDINATES SCALED AT 2.
R0618            2. UT                     HALF-UNIT DESIRED THRUST DIRECTION.
R0619            3. RTIG                   POSITION AT TIG IN REFERENCE COORDINATES.

R0621   OUTPUT:

R0622            1. : XSCREF :             WINGS-LEVEL HEADS-UP LM ORIENTATION
R0623               : YSCREF :             IN REFERENCE COORDINATES
R0624               : ZSCREF :             (PREFERRED IMU ORIENTATION).
R0625            2. POINTVSM               DESIRED THRUST DIRECTION IN STABLE-MEMBER COORDINATES.
R0627            3. SCAXIS                 HALF-UNIT OF AXIS TO ALIGN IN STABLE-MEMBER COORDINATES.
R0629            4. PFRATFLG               INTERPRETIVE FLAG.  ON:  PREFERRED ORIENTATION COMPUTED; OFF:  NOT COMPUTED.

R0631   DEBRIS:  NONE.
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 0632   REF   1                                          COUNT*  $$/S40.2
 0633                        27,2413   77775 1  S40.2,3  VLOAD                     UT: DESIRED THRUST DIRECTION (HALF-UNIT)
 0634   REF   9  LAST  766   27,2414   03673 0                   UT                (PUT INTO TOP OF PUSH-DOWN-LIST.)
 0635                        27,2415   76521 0           MXV     VSL1              TRANSFORM THRUST DIRECTION TO STABLE-
 0636   REF  22  LAST  734   27,2416   01734 0                   REFSMMAT          MEMBER FROM REFERENCE COORDS (RESCALE).
 0637   REF   5  LAST  518   27,2417   27773 1           STOVL   POINTVSM          SAVE FOR "VECPOINT" ROUTINE (LEMMANU).
 0638   REF   6  LAST  580   27,2420   06520 0                   UNITX             SCAXIS SET TO +X, FOR P40 AND P42 AND
 0639   REF  22  LAST  518   27,2421   27765 0           STOVL   SCAXIS            FOR P41 IF RCS NOT -X,+Y,-Y,+Z,-Z.

 0640   REF  10  LAST  769   27,2422   03673 0                   UT                ASSUME +X BURN ALWAYS, EVEN FOR RCS.
 0641   REF   1              27,2423   03607 0  PLUSX    STORE   XSCREF            XSCREF = UT (DESIRED THRUST DIRECTION.)
 0642                        27,2424   53435 0           VXV     UNIT              RTIG = POSITION AT TIME-OF-IGNITION.
 0643   REF  11  LAST  766   27,2425   03642 1                   RTIG              YSCREF = UNIT(UT X RTIG)
 06431                       27,2426   46125 0           PDDL    BHIZ
 06432                       27,2427   00045 0                   36D               TEST MAGNITUDE OF UT X RTIG
 06433  REF   1              27,2430   56441 0                   FIXY              IF SMALL, USE UT X VTIG AS YSC
 06434                       27,2431   45575 1  STORY    VLOAD   STADR
 0644   REF   1              27,2432   74162 1           STORE   YSCREF
 0645                        27,2433   76435 1           VXV     VSL1              COMPUTE (YSCREF X XSCREF),BUT FOR A
 0646   REF   2  LAST  769   27,2434   03607 0                   XSCREF            RIGHT HANDED SYSTEM, NEED (X CROSS Y).
 0647                        27,2435   77676 0           VCOMP                     ZSCREF = - (YSCREF X XSCREF)
 0648   REF   1              27,2436   03623 0           STORE   ZSCREF                   = + (XSCREF X YSCREF)

 0649                        27,2437   43414 1           SET     RVQ
 0650   REF   1              27,2440   01073 1                   PFRATFLG
 06501                       27,2441   47375 0  FIXY     VLOAD   VXV               IN THIS CASE,
 06502  REF   3  LAST  769   27,2442   03607 0                   XSCREF            YSCREF = UNIT(XSCREF X VTIG)
 06503  REF   8  LAST  766   27,2443   03650 1                   VTIG
 06504                       27,2444   41456 0           UNIT    PUSH
 06505                       27,2445   77650 1           GOTO
 06506  REF   1              27,2446   56431 1                   STORY
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P0651   SUBROUTINE S40.8

R0652   MODIFIED APRIL 3, 1968  BY  PETER ADLER  MIT/IL

R0653   DESCRIPTION

R0654         S40.8 UPDATES THE VELOCITY-TO-BE-GAINED VECTOR, VG, (AND FOR LAMBERT TARGETTED BURNS ALSO EXTRAPOLATES VG
R0655   USING THE BDT VECTOR)  COMPUTES THE TIME FOR ISSUING THE ENGINE OFF COMMAND, TGO, AND CALLS THE ROUTINE
R0658   "FINDCDUW", WHICH GENERATES STEERING COMMANDS FOR THE DAP.

R0659   CALLING SEQUENCE

R0660   L-1         CALL
R0661   L                   S40.8
R0662   L+1                             INTERPRETIVE RETURN

R0663   ALARM

R0664         IF VG . DELVREF IS NEGATIVE (VG AND DELVREF OVER 90 DEGREES APART), BYPASS TGO AND STEERING COMPUTATIONS
R0666   AND SET ALARM 1407.  RETURN TO CALLER NORMALLY.

R0667   INPUT AND INITIALIZATION

R0668   VGPREV            REFERENCE        2(7) M/CS
R0669   DELVREF           REFERENCE        2(7) M/CS
R0670   BDT               REFERENCE        2(7) M/CS
R0671   TDECAY            TAIL-OFF TIME    2(28)  CS
R0672   XDELVFLG          1 = EXTERNAL DELTA-V:  0 = LAMBERT (AIMPOINT)
R0673   STEERSW           1 = DO STEERING AND TGO COMPUTATIONS; 0 = VG UPDATE ONLY
R0674   FIRSTFLG          1 = GONE TO LAMBERT AT LEAST ONCE;  0 = HAVEN'T GONE TO LAMBERT YET

R0676   NOTE:  VGTIG EQUALS VGPREV

R0677   OUTPUT

R0678   STEERSW           SEE INPUT
R0679   IMPULSW           1 = ENGINE OFF IN TGO CENTISECONDS;  0 = CONTINUE BURN
R0680   TGO               TIME TO CUT-OFF 2(28)   CS
R0681   SEE FINDCDUW FOR STEERING OUTPUTS.

R0682   SUBROUTINE CALLED

R0683         FINDCDUW

R0684   DEBRIS

R0685         MPACS, PUSHLIST


 0686   REF    1                                          COUNT* $$/S40.8
 0687                          27,2447   77614 1  S40.8     BOF                         GENERATE VR IF NOT EXTERNAL DELTA-V BURN
 0688   REF    8  LAST  765    27,2450   01347 0                      XDELVFLG
 0689   REF    1               27,2451   56731 1                      RASTEER1
 0690                          27,2452   52375 1            VLOAD     VSU
 0691   REF    6  LAST  757    27,2453   03701 1                      VGPREV
 0692   REF    3  LAST  758    27,2454   03527 1                      DELVREF
 0693   REF    3  LAST  761    27,2455   03707 1  VGAIN*    STORE     VG                  VELOCITY TO BE GAINED SCALED AT (7)M/CS
 0694                          27,2456   76521 0            MXV       VSL1
 0695   REF   23  LAST  769    27,2457   01734 0                      REFSMMAT
 0696   REF    3  LAST  200    27,2460   03254 1            STORE     UNFC/2
 0707                          27,2461   51575 1  BDTOK     VLOAD     ABVAL
 0708   REF    4  LAST  771    27,2462   03707 1                      VG
 0709   REF    5  LAST  766    27,2463   03664 0            STORE     VGDISP
 0710                          27,2464   77201 1  TGOCALC   SETPD     VLOAD
 0711                          27,2465   00001 0                      0
 0712   REF    5  LAST  771    27,2466   03707 1                      VG
 0713   REF    7  LAST  771    27,2467   27701 1            STOVL     VGPREV
 0714   REF    4  LAST  771    27,2470   03527 1                      DELVREF
 0715                          27,2471   57414 1            BOFF      VCOMP
 0716   REF    1               27,2472   01344 0                      STEERSW
 0717   REF    5  LAST  711    27,2473   00052 0                      QPRET
 0718                          27,2474   77656 1            UNIT
 0719                          27,2475   41441 0            DOT       PUSH
 0720   REF    4  LAST  771    27,2476   03707 1                      VG
 0721                          27,2477   56244 0            BPL       DDV
 0722   REF    1               27,2500   56526 0                      ALARMIT             DELV IS MORE THAN 90 DEGREES FROM VG.
 0723   REF    2  LAST  754    27,2501   03743 1                      VEX
 0724                          27,2502   41215 1            DAD       DMP
 0725   REF   12  LAST  669    27,2503   06520 0                      DPHALF
 0726                          27,2504   56261 1            SR        DDV
 0727                          27,2505   20613 1                      10D
 0728                          27,2506   00045 0                      36D
 0729                          27,2507   43205 1            DMP       DAD
 0730   REF    1               27,2510   16535 0                      -FOURDT
 0731   REF    1               27,2511   03741 0                      TDECAY
 0732   REF   10  LAST  763    27,2512   03517 1            STORE     TGO
 0733                          27,2513   77615 0            DAD
 0734   REF    8  LAST  761    27,2514   01235 1                      PIPTIME
 0735   REF   38  LAST  766    27,2515   17442 0            STODL     TIG
 0736   REF   11  LAST  771    27,2516   03517 1                      TGO
 0737                          27,2517   51025 1            DSU       BPL
 0738   REF    1               27,2520   16537 1                      FOURSECS            400 CS
 0739   REF    1               27,2521   41111 1                      FINDCDUW -2
 0740                          27,2522   43014 0            SET       CLRGO
 0741   REF    3  LAST  762    27,2523   01066 0                      IMPULSW
 0742   REF    2  LAST  771    27,2524   01224 1                      STEERSW
 0743   REF    6  LAST  771    27,2525   00052 0                      QPRET

 0744                          27,2526   77776 1  ALARMIT   EXIT
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0745   REF  30  LAST  748   27,2527  0 5567 0            TC       ALARM
0746                        27,2530   01407 0            OCT      01407
0747   REF 117  LAST  762   27,2531  0 6037 0            TC       INTPRET
0748                        27,2532   77650 1            GOTO                         SKIP TGO COMPUTATION BUT CALL FINDCDUW.
07485  REF   2  LAST  771   27,2533   61111 1                     FINDCDUW -2         FINDCDUW WILL EXIT TO UPDATEVG +3.

0749                        27,2534   77715 1  -FOURDT   2DEC     -800 B-18           -4 (200 CS.)  B (-18)
0749                        27,2535   77777 0
0751                        27,2536   00000 1  FOURSECS  2DEC     400                 400 CS SCALED AT 2(+28)CS
0751                        27,2537   00620 0
07515  REF   3  LAST  771   E7,1742            2VEXHUST  =        VEX
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R0752   NAME      S40.13 - TIMEBURN
R0753   FUNCTION         (1) DETERMINE WHETHER A GIVEN COMBINATION OF VELOCITY TO
R0754                    BE GAINED AND ENGINE CHOICE RESULT IN A BURN TIME
R0755                    SUFFICIENT TO ALLOW STEERING AT THE VEHICLE DURING THE
R0756                    BURN
R0757                    (2) THE MAGNITUDE OF THE RESULTING BURN TIME -- IF IT
R0758                    IS SHORT --  AND THE ASSOCIATED TIME OF THE ENGINE OFF
R0759                    SIGNAL
R0760   CALLING SEQUENCE  VIA FINDVAC AS A NEW JOB
R0761   INPUT            VGTIG VELOCITY TO BE GAINED VECTOR (METERS/CS) AT +7
R0762                    WEIGHT/G MASS OF VEHICLE IN KGM AT +16
R0763                    F  APS ENGINE THRUST IN M.NEWTONS AT +7
R0764                    AND ALSO FOR RCS ENGINE
R0765                    MDOT RATE OF DECREASE OF VEHICLE MASS DURING ENGINE
R0766                    BURN IN KILOGRAMS/CS  AT +3 . THIS SCALING MAY
R0767                    REQUIRE MODIFICATION FOR SATURN BURNS.
R0768             ENG1FLAG    SWITCH TO DECIDE WHETHER APS OR DPS ENGINE IS USED
R0769                     =0    DPS
R0770                     =1    APS
R0771   OUTPUT           IMPULSW  ZERO FOR STEERING
R0772                             ONE FOR ATTITUDE HOLD
R0773                    NOTHROTL  ZERO FOR THROTTLING
R0774                              ONE  TO INHIBIT THROTTLING
R0775                    TGO  TIME TO BURN IN CS
R0776             THE QUANTITY M.NEWTON = 10000 NEWTONS WILL BE USED TO EXPRESS
R0777                    FORCE

 0778   REF  12  LAST  771   E7,1516                        EBANK=  TGO
 0779   REF   1                                             COUNT*  $$/40.13
 0780   REF 115  LAST  772   27,2540  0 6037 0   S40.13     TC      INTPRET
 0781                        27,2541   43001 1              SETPD   CLEAR
 0782                        27,2542   00001 0                      00D
 0783   REF   4  LAST  771   27,2543   01266 1                      IMPULSW         ASSUME NO STEERING UNTIL FOUND OTHERWISE
 0784                        27,2544   51575 1              VLOAD   ABVAL
 0785   REF   9  LAST  766   27,2545   03701 1                      VGTIG           VELOCITY TO BE GAINED AT +7
 0786                        27,2546   41325 0              PDDL    DMP             00D = MAG OF VGTIG AT +7
 0787   REF   1              27,2547   21021 1                      4SEC(17)        CORRECT VG FOR 4 SECS OF 2 JET ULLAGE
 0788   REF   2  LAST  756   27,2550   34017 0                      FRCS2
 0789                        27,2551   72471 0              DDV     SL1             SCALE
 0790   REF   2  LAST  765   27,2552   01245 0                      WEIGHT/G
 0791                        27,2553   41421 0              BDSU    PUSH
 0792                        27,2554   43014 0              BOFF    SET
 0793   REF   1              27,2555   05342 1                      APSFLAG
 0794   REF   1              27,2556   56626 0                      S40.13D         FOR DPS ENGINE
 0795   REF   2  LAST  754   27,2557   02463 1                      NOTHROTL
 0796                        27,2560   56345 0              DLOAD   DDV             00D = MAG OF VGTIG CORRECTED
 0797   REF   1              27,2561   16001 1                      K1VAL           M.NEWTONS-CS AT +24
 0798   REF   3  LAST  773   27,2562   01245 0                      WEIGHT/G
 0799                        27,2563   50021 1              BDSU    BMN
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  0800                              27,2564   00001 0                          OOD
  0801    REF    1                  27,2565   56610 0                          S40.131            TGO LESS THAN 100 CS
  0802                              27,2566   41325 0              PDDL        DMP                02D = TEMP1 AT +7
  0803    REF    2  LAST   143      27,2567   03737 1                          MDOT

R0804     MDOT REPRESENTS THE RATE OF DECREASE OF VEHICLE MASS DURING ENGINE
R0805     BURN IN KILOGRAMS/CS .  WHEN  SATURN IS USED , THE SCALING MAY
R0806     REQUIRE ADJUSTMENT

  0807    REF    1                  27,2570   16700 1                          3.5SEC             350 CS AT +14
  0808                              27,2571   65221 0              BDSU        PDDL
  0809    REF    4  LAST   773      27,2572   01245 0                          WEIGHT/G
  0810    REF    7  LAST   765      27,2573   03735 0                          F
  0811                              27,2574   60405 0              DMP         SR2                SCALE
  0812    REF    1                  27,2575   16702 0                          5SECS
  0813                              27,2576   41471 0              DDV         PUSH               04D = TEMP2
  0814                              27,2577   [illegible]1021 0              BDSU        BPL
  0815                              27,2600   00003 1                          02D
  0816    REF    2  LAST   773      27,2601   56626 0                          S40.13D
  0817                              27,2602   55345 0              DLOAD       BDDV
  0818                              27,2603   43205 1              DMP         DAD
  0819    REF    2  LAST   774      27,2604   16702 0                          5SECS
  0820    REF    1                  27,2605   16676 1                          1SEC2D             100 CS AT +14
  0821                              27,2606   77650 1              GOTO
  0822    REF    1                  27,2607   56616 0                          S40.132
  0823                              27,2610   41345 0   S40.131    DLOAD       DMP
  0824    REF    5  LAST   774      27,2611   01245 0                          WEIGHT/G
  0825                              27,2612   41542 1              SR1         PUSH
  0826                              27,2613   56215 1              DAD         DDV
  0827    REF    1                  27,2614   16003 0                          K2VAL              M.NEWTON CS AT +24
  0828    REF    1                  27,2615   16005 0                          K3VAL              M.NEWTON CS AT +10
  0829                              27,2616   77414 0   S40.132    SET         EXIT
  0830    REF    5  LAST   773      27,2617   01066 0                          IMPULSW
  0831    REF    9  LAST   762      27,2620   0 7257 0  S40.132*   TC          TPAGREE
  0832    REF  293  LAST   762      27,2621   3 0154 1             CA          MPAC
  0833    REF  108  LAST   763      27,2622   56 001 0             XCH         L
  0834    REF  141  LAST   763      27,2623   3 4755 1             CA          ZERO
  0835    REF   13  LAST   773      27,2624   53'517 1             DXCH        TGO
  0836    REF    1                  27,2625   1 2650 1             TCF         S40.134

  0837                              27,2626   41345 0   S40.13D    DLOAD       DMP                FOR DPS ENGINE
  0838                              27,2627   00001 0                          OOD
  0839    REF    6  LAST   774      27,2630   01245 0                          WEIGHT/G
  0840                              27,2631   43006 0              PUSH        BCN
  0841    REF    2  LAST   773      27,2632   05302 0                          APSFLAG
  0842    REF    1                  27,2633   56671 1                          APSTGO
  0843                              27,2634   43071 0              DDV         CLEAN
  0844    REF    1                  27,2635   16007 1                          S40.136
  0845    REF    3  LAST   773      27,2636   02663 0                          NOTHROTL
  0846                              27,2637   41400 0              BOV         PUSH
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 0847   REF    1              27,2640   56653 1                    S40.130V
 0848                         27,2641   51025 1  S40.137   DSU      BPL
 0849   REF    1              27,2642   16704 0                     6SEC                600.0 CS AT +14
 0850   REF    1              27,2643   56661 0                     S40.138
 0851                         27,2644   52015 1            DAD      GOTO
 0852   REF    2  LAST  775   27,2645   16704 0                     6SEC
 0853   REF    2  LAST  774   27,2646   56616 0                     S40.132
 0854                         27,2647   77776 1  S40.133   EXIT
 0855   REF   50  LAST  759   27,2650 0 5353 1  S40.134   TC       PHASCHNG
 0856                         27,2651   00003 1            OCT      00003
 0857   REF  125  LAST  763   27,2652 0 5155 0            TC       ENDOFJOB
 0858                         27,2653   40545 1  S40.130V  DLOAD    SR4                 RECOMPUTE TGO IN TIME2 UNITS
 0859                         27,2654   77671 1            DDV
 0860   REF    1              27,2655   16011 0                     S40.136_            S40.136 SHIFTED LEFT 10
 0861   REF   14  LAST  774   27,2656   03517 1            STORE    TGO
 0862                         27,2657   77776 1            EXIT
 0863   REF    2  LAST  774   27,2660 1 2650 1            TCF      S40.134             REJOIN COMMON CODING FOR RESTART PROTECT

 0864                         27,2661   51025 1  S40.138   DSU      BPL
 0865   REF    1              27,2662   16706 1                     89SECS
 0866   REF    1              27,2663   56666 1                     STORETGO
 0867                         27,2664   77614 1            SET
 0868   REF    4  LAST  774   27,2665   02463 1                     NOTHROTL
 0869                         27,2666   77745 1  STORETGO  DLOAD                        LOAD TGO AT 2(14)
 0870                         27,2667   77776 1            EXIT
 0871   REF    1              27,2670 1 2620 0            TCF      S40.132*

 0872                         27,2671   62471 1  APSTGO    DDV      SL2
 0873   REF    2  LAST  758   27,2672   34007 1                     FAPS
 08735                        27,2673   77650 1            GOTO
 0874   REF    2  LAST  775   27,2674   56667 0                     STORETGO +1
 0878                         27,2675   00144 0  1SEC2D    2DEC     100.0 B-14          100.0 CS AT +14
 0878                         27,2676   00000 1
 0879                         27,2677   01274 1  3.5SEC    2DEC     350.0 B-13          350 CS AT +13
 0879                         27,2700   00000 1
 0880                         27,2701   00764 1  5SECS     2DEC     500.0 B-14          500.0 CS AT +14
 0880                         27,2702   00000 1
 0881                         27,2703   01130 1  6SEC      2DEC     600.0 B-14          600.0 CS AT +14
 0881                         27,2704   00000 1
 0886                         27,2705   21304 0  89SECS    2DEC     8900.0 B-14
 0886                         27,2706   00000 1
R0888   FUNCTION      (1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED
R0889                 VECTORS FOR USE DURING AIMPOINT MANEUVERS EVERY TWO
R0890                 COMPUTATION CYCLES (4 SECONDS).
R0891                 (2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL
R0892                 CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED
R0893                 THROUGH ONE 2-SECOND INTERVAL INTO THE FUTURE.
R0894   CALLING SEQ VIA FINDVAC AS NEW JOB.
R0895   INPUT         RN         - ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.
R0896                 VN         - ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7
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R0897              VRPREV   - LAST COMPUTED VELOCITY REQUIRED VECTOR IN
R0898                         METERS/CS AT +7.
R0899              TIG      - TIME OF IGNITION IN CS AT +28.
R0900              DLTARG   - COMPUTATION CYCLE INTERVAL = 200 CS AT +28.
R0901              PIPTIME  - TIME OF RN AND VN IN CS AT +28.
R0902              GDT/2    - HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO
R0903                         ACCERERATION OF GRAVITY IN METERS/CS AT +7.
R0904              DELVREF  - CHANGE IN VELOCITY DURING LAST 2 SEC IN
R0905                         METERS/CS AT +7.
R0906    OUTPUT    VGPREV   - VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.
R0907              VGDISP   - MAG OF VGPREV FOR DISPLAY PURPOSES.
R0908              VRPREV   - VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.
R0909              BDT      - B VECTOR IN METERS/CS AT +7.
R0910    SUBROUTINES USED  -  INITVEL
 0911    REF   8  LAST  771   E7,1700                          EBANK= VGPREV
 0912    REF   2 LAST   44 TO   44:       2      2*            COUNT* $$/S40.9
 0913    REF 119  LAST  773   27,2707  0 6037 0  S40.9      TC     INTPRET
 0914                         27,2710   77601 0             SETPD
 0915                         27,2711   00001 0                    00D
 0925                         27,2712   71214 0             SET    DLOAD
 0926    REF   7  LAST  758   27,2713   01072 0                    AVFLAG          SET AVFLAG FOR LEM ACTIVE
 0927    REF   6  LAST  759   27,2714   06522 1                    HI6ZEROS
 0928                         27,2715   77725 1             PDDL
 0929    REF   2  LAST  766   27,2716   16406 1                    EPS1
 0930                         27,2717   43214 1             BOFF   DAD             EPSILON4 = 10 OR 45 DEGREES.
 0931    REF   5  LAST  766   27,2720   03745 1                    NORMSW
 0932    REF   1              27,2721   56723 1                    EPSSMALL
 0933    REF   2  LAST  766   27,2722   16410 0                    EPS2
 0934                         27,2723   45006 0  EPSSMALL  PUSH   CALL
 0935    REF   1              27,2724   22002 0                    HAVEGUES
 0936                         27,2725   77776 1  ENDS40.9  EXIT
 0937    REF  51  LAST  775   27,2726  0 5353 1             TC     PHASCHNG
 0938                         27,2727   00002 0             OCT    2
 0939    REF 126  LAST  775   27,2730  1 5155 1             TCF    ENDOFJOB


 0940                         27,2731   51575 1  RASTEER1  VLOAD  ABVAL
 0941    REF   8  LAST  761   27,2732   01221 1                    RN
 0942                         27,2733   53744 0             LXC,2  SL*
 0943    REF  13  LAST  766   27,2734   02777 1                    RTX2
 0944                         27,2735   57576 1                    0,2
 0945    REF   2  LAST  143   27,2736   27715 1             STOVL  RMAG
 0946    REF   8  LAST  690   27,2737   03444 0                    RTARG
 0947                         27,2740   47051 0             VSU    RTB
 0948    REF   9  LAST  776   27,2741   01221 1                    RN
 0949    REF   3  LAST  705   27,2742   21724 0                    NORMUNX1
 0950    REF   1              27,2743   17656 1             STODL  IC
 0951                         27,2744   00045 0                    36D             C(36D) = ABVAL(C)
 0952                         27,2745   53674 1             XAD,2  SL*
 0953    REF  16  LAST  726   27,2746   00046 0                    X1
 0954                             27,2747   57576 1                  0,2
 0955                             27,2750   00037 0         STORE    30D
 0956                             27,2751   41301 0         NORM     DMP
 0957   REF   13   LAST   714     27,2752   00050 1                  X2
 0958   REF    3   LAST   776     27,2753   03715 1                  RMAG
 0959                             27,2754   57101 0         NORM     XAD,2
 0960   REF   17   LAST   776     27,2755   00047 1                  X1
 0961   REF   18   LAST   777     27,2756   00046 0                  X1
 0962                             27,2757   77734 1         SXA,2
 0963   REF    1                  27,2760   03766 0                  MUSCALE
 0964   REF    2   LAST   143     27,2761   17725 1         STODL    R1C                                  2(+58 -X)
 0965                             27,2762   00037 0                  30D
 0966                             27,2763   65342 1         SR1      PDDL
 0967   REF    4   LAST   777     27,2764   03715 1                  RMAG
 0968                             27,2765   65342 1         SR1      PDDL
 0969   REF    4   LAST   686     27,2766   03723 1                  RTMAG
 0970                             27,2767   43342 0         SR1      DAD
 0971                             27,2770   45415 0         DAD      STADR
 0972   REF    1                  27,2771   74044 1         STORE    SS             SS = (R1 + R2 +C )/2
 0973                             27,2772   41225 1         DSU      DMP
 0974                             27,2773   00037 0                  30D
 0975   REF    3   LAST   690     27,2774   03721 0                  MU/A
 0976                             27,2775   77621 1         BDSU
 0977   REF    3   LAST   690     27,2776   03717 0                  MUASTEER
 0978                             27,2777   45325 1         PDDL     DSU
 0979   REF    2   LAST   777     27,3000   03733 0                  SS
 0980   REF    5   LAST   777     27,3001   03715 1                  RMAG
 0981                             27,3002   70501 1         NORM     SR1
 0982   REF   19   LAST   777     27,3003   00047 1                  X1
 0983                             27,3004   41271 0         DDV      DMP
 0984   REF    3   LAST   777     27,3005   03725 1                  R1C
 0985                             27,3006   53664 0         XSU,2    SL*
 0986   REF   20   LAST   777     27,3007   00046 0                  X1
 0987                             27,3010   57575 1                  1,2
 0988                             27,3011   77754 1         LXA,2
 0989   REF    2   LAST   777     27,3012   03766 0                  MUSCALE
 0990                             27,3013   75366 0         SQRT     SIGN
 0991   REF    3   LAST   688     27,3014   02673 1                  GEOMSGN
 0992                             27,3015   00041 1         STORE    32D            + OR - A
 0993                             27,3016   41345 0         DLOAD    DMP
 0994   REF    3   LAST   777     27,3017   03733 0                  SS
 0995   REF    4   LAST   777     27,3020   03721 0                  MU/A
 0996                             27,3021   77621 1         BDSU
 0997   REF    4   LAST   777     27,3022   03717 0                  MUASTEER
 0998                             27,3023   45325 1         PDDL     DSU
 0999   REF    4   LAST   777     27,3024   03733 0                  SS
 1000   REF    5   LAST   777     27,3025   03723 1                  RTMAG
 1001                             27,3026   70501 1         NORM     SR1
 1002   REF   21   LAST   777     27,3027   00047 1                  X1
 1003                             27,3030   41271 0         DDV      DMP
 1004   REF    4   LAST   777    27,3031    03725 1                     PIC
 1005                            27,3032    53664 0           XSU,2      SL*
 1006   REF   22   LAST   777    27,3033    00046 0                      X1
 1007                            27,3034    57575 1                      1,2
 1008                            27,3035    65366 1           SQRT       PDDL              -B (NO SIGN)
 1009   REF    5   LAST   777    27,3036    03733 0                      SS
 1010                            27,3037    56225 1           DSU        DDV
 1011                            27,3040    00037 0                      30D
 1012   REF    6   LAST   778    27,3041    03733 0                      SS
 1013                            27,3042    41566 1           SQRT       PUSH
 1014                            27,3043    67542 0           SR1        ASIN
 1015                            27,3044    65205 0           DMP        PDDL
 1016   REF    1                 27,3045    17216 1                      2PI+3
 1017                            27,3046    56325 0           PDDL       DDV
 1018                            27,3047    00037 0                      30D
 1019   REF    7   LAST   778    27,3050    03733 0                      SS
 1020                            27,3051    77600 1           BOV
 1021                            27,3052    57053 0                      +1
 1022                            27,3053    41366 1           SQRT       DMP
 1023                            27,3054    44242 0           SR3        BDSU
 1024                            27,3055    65365 1           SIGN       PDDL
 1025   REF    4   LAST   777    27,3056    02673 1                      GEOMSGN
 1026   REF    2   LAST   778    27,3057    17216 1                      2PI+3
 1027                            27,3060    45302 1           SR2        DSU
 1028                            27,3061    65205 0           DMP        PDDL
 1029   REF    8   LAST   778    27,3062    03733 0                      SS
 1030   REF    9   LAST   778    27,3063    03733 0                      SS
 1031                            27,3064    75442 1           SR3        SQRT
 1032                            27,3065    77605 1           DMP
 1033                            27,3066    52525 1           PDDL       SL3
 1034   REF    5   LAST   777    27,3067    03717 0                      MUASTEER
 1035                            27,3070    55366 1           SQRT       BDDV
 1036                            27,3071    43225 0           DSU        DAD
 1037   REF   11   LAST   766    27,3072    03631 0                      TPASS4
 1038   REF    9   LAST   771    27,3073    01235 1                      PIPTIME
 1039                            27,3074    14037 0           STODL      30D
 1040                            27,3075    77765 0           SIGN
 1041                            27,3076    00037 0                      30D               B WITH SIGN
 1042                            27,3077    00037 0           STORE      30D
 1043                            27,3100    77214 0           BON        VLOAD
 1044   REF    6   LAST   776    27,3101    03705 0                      NORMSW
 1045   REF    1                 27,3102    57123 0                      180MESS
 1046   REF    2   LAST   776    27,3103    03656 1                      IC
 1047                            27,3104    53451 1           VSU        UNIT
 1048   REF    3   LAST   766    27,3105    03537 0                      UNIT/R/
 1049                            27,3106    63361 0           VXSC       PDVL
 1050                            27,3107    00037 0                      30D
 1051   REF    3   LAST   778    27,3110    03656 1                      IC
 1052                            27,3111    53455 0           VAD        UNIT
 1053   REF    4   LAST   778    27,3112    03537 0                      UNIT/R/
 1054                         27,3113   53361 0  GETVRVG1 VXSC     VAD
 1055                         27,3114   00041 1                    32D
 1056                         27,3115   53744 0  GETVRVG2 LXC,2    VSR*
 1057   REF  14  LAST  776    27,3116   02777 1                    RTX2
 1058                         27,3117   57177 1                    0 -1,2
 1059   REF   9  LAST  727    27,3120   02337 1           STORE    VIPRIME
 1060                         27,3121   77650 1           GOTO
 1061   REF   1               27,3122   57166 1                    ASTREND -2
 1062                         27,3123   50375 0  180MESS  VLOAD    DOT
 1063   REF   4  LAST  778    27,3124   03656 1                    IC
 1064   REF   5  LAST  778    27,3125   03537 0                    UNIT/R/
 1065                         27,3126   77240 1           BMN      VLOAD
 1066   REF   1               27,3127   57146 0                    NEGPROD
 1067   REF   5  LAST  779    27,3130   03656 1                    IC
 1068                         27,3131   63362 0           VSR1     PDVL
 1069   REF   6  LAST  779    27,3132   03537 0                    UNIT/R/
 1070                         27,3133   53362 0           VSR1     VAD
 1071                         27,3134   77656 1           UNIT
 1072                         27,3135   57406 1           PUSH     VCOMP               FOR A
 1073                         27,3136   75235 1           VXV      SIGN
 1074   REF   4  LAST  667    27,3137   02674 0                    UN
 1075   REF   5  LAST  778    27,3140   02673 1                    GEOMSGN
 1076                         27,3141   74256 0           UNIT     VXSC
 1077                         27,3142   00037 0                    30D
 1078                         27,3143   77715 1           PDVL                         UNIT(IC-IR)       +-B
 1079                         27,3144   77650 1           GOTO
 1080   REF   1               27,3145   57113 0                    GETVRVG1
 1081                         27,3146   74575 0  NEGPROD  VLOAD    VSR1
 1082   REF   7  LAST  779    27,3147   03537 0                    UNIT/R/
 1083                         27,3150   74515 0           PDVL     VSR1
 1084   REF   6  LAST  779    27,3151   03656 1                    IC
 1085                         27,3152   53451 1           VSU      UNIT
 1086                         27,3153   77606 1           PUSH
 1087                         27,3154   75235 1           VXV      SIGN
 1088   REF   5  LAST  779    27,3155   02674 0                    UN                  FOR B
 1089   REF   6  LAST  779    27,3156   02673 1                    GEOMSGN
 1090                         27,3157   74256 0           UNIT     VXSC
 1091                         27,3160   00041 1                    32D
 1092                         27,3161   77715 1           PDVL
 1093                         27,3162   53361 0           VXSC     VAD
 1094                         27,3163   00037 0                    30D
 1095                         27,3164   77650 1           GOTO
 1096   REF   1               27,3165   57115 0                    GETVRVG2
 1097                         27,3166   77651 0           VSU
 1098   REF   3  LAST  735    27,3167   03553 1                    VN1
 1099   REF  15  LAST  766    27,3170   02366 0  ASTREND  STORE    DELVEET3
 1100                         27,3171   53135 0  FIRSTTME SLOAD    BZE
 1101   REF  15  LAST  779    27,3172   03000 1                    RTX2
 1102   REF   1               27,3173   57177 1                    GETGOBL
 1103                         27,3174   52175 0           VLOAD    GOTO                NO OBLATENESS COMP IF IN MOON SPHERE
 1104   REF  16  LAST  779    27,3175   02366 0                     DELVEET3
 1105   REF   1               27,3176   57212 1                     NOGOBL
 1106                         27,3177   53575 0  GETGOBL   VLOAD    UNIT               CALCULATE OBLATENESS TERM.
 1107   REF  10  LAST  776    27,3200   01221 1                     RN
 1108                         27,3201   45345 1            DLOAD    DSU
 1109   REF  10  LAST  778    27,3202   01235 1                     PIPTIME                        2
 1110   REF   3  LAST  733    27,3203   03512 1                     GOBLTIME           G     = -(MU/R  )(UNITGOBL)(T - TIO)
 1111                         27,3204   56205 0            DMP      DDV                 OBL
 1112   REF   1               27,3205   16023 1                     EARTHMU
 1113                         27,3206   00043 0                     34D                34D = /RN/ (2) FROM UNIT OPERATION.
 1114                         27,3207   53361 0            VXSC     VAD
 1115   REF   1               27,3210   03521 1                     UNITGOBL
 1116   REF  17  LAST  780    27,3211   02366 0                     DELVEET3            OUTPUT FROM INITVEL  VG = VR - VN
 1117   REF  18  LAST  780    27,3212   02366 0  NOGOBL    STORE    DELVEET3           VG = VR + GOBL - VN
 1118                         27,3213   77650 1            GOTO
 1119   REF   1               27,3214   56455 0                     VGAIN*


 1120                         27,3215   31103 1  2PI+3     2DEC     3.141592653 B-2
 1120                         27,3216   36652 0
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P1121    TRIMGIMB       (FORMERLY S40.6)
R1122    MOD 0     24 FEB 67      PETER ADLER
R1123    FUNCTION:
R1124              TRIMS DPS ENGINE TO MINIMIZE THRUST/CG OFFSET. ENGINE IS GIMBALLED TO FULL + PITCH AND + ROLL (TO LOCK)
R1126              FOR REFERENCE AND IS THEN BROUGHT BACK TO TRIM POSITION BY RUNNING FOR THE PROPER TIMES (TO BE
R1128              SPECIFIED BY GAEC) IN - PITCH AND - ROLL.
R1129    CALLING SEQUENCE:
R1130              VIA WAITLIST FROM R03
R1131    INPUT:
R1132              PITTIME      TIME TO RUN FROM FULL + PITCH TO TRIM  (CS)
R1133              ROLLTIME     TIME TO RUN FROM FULL + ROLL  TO TRIM  (CS)
R1134    SUBROUTINES USED:
R1135              WAITLIST, FIXDELAY, VARDELAY, FLAGUP, FLAGDOWN, NOVAC

 1136    REF   1                                                COUNT*  $$/S40.6
 1137    REF   3  LAST  314    E6,1401                          EBANK=  ROLLTIME           OCTAL MASKS:  PRIO5=05000 EBANK5=02400

 1138    REF  69  LAST  762    27,3217  0 5516 0  TRIMGIMB TC        DOWNFLAG           GMBDRVSW FLAG IS SET WHEN EITHER ROLL OR
 1139    REF   1               27,3220   00137 1                ADRES   GMBDRVSW           PITCH IS COMPLETED, WHICHEVER IS FIRST.

 1140    REF   8  LAST  757    27,3221  4 5017 0                CS      PRIO5              TURN OFF - PITCH, - ROLL, IF ON.
 1141                          27,3222  0 0006 1                EXTEND
 1142    REF  43  LAST  607    27,3223  03 012 1                WAND    CHAN12
 1143    REF   3  LAST  595    27,3224  3 5014 1                CAF     EBANK5             TURN ON + PITCH, + ROLL.
 1144                          27,3225  0 0006 1                EXTEND
 1145    REF  44  LAST  781    27,3226  05 012 1                WOR     CHAN12
 1146    REF  14  LAST  759    27,3227  0 5221 0                TC      FIXDELAY           WAIT ONE MINUTE TO MAKE SURE ENGINE IS
 1147                          27,3230   13560 0                DEC     6000               AT FULL + PITCH AND FULL + ROLL
 1148    REF   4  LAST  781    27,3231  4 5014 0                CS      EBANK5             TURN OFF + PITCH, + ROLL.
 1149                          27,3232  0 0006 1                EXTEND
 1150    REF  45  LAST  781    27,3233  03 012 1                WAND    CHAN12
 1151    REF   9  LAST  781    27,3234  3 5017 1                CAF     PRIO5              TURN ON - PITCH, - ROLL.
 1152                          27,3235  0 0006 1                EXTEND
 1153    REF  46  LAST  781    27,3236  05 012 1                WOR     CHAN12
 1154    REF   2  LAST  314    27,3237  31'402 0                CAE     PITTIME            GET TIME TO SHUT OFF - PITCH AND SET UP
 1155    REF  20  LAST  762    27,3240  0 5173 1                TC      TWIDDLE            TWIDDLE-TASK TO TURN IT OFF THEN
 1156    REF   1               27,3241   03260 0                ADRES   PITCHOFF

 1157    REF   4  LAST  781    27,3242  31'401 0                CAE     ROLLTIME           GET TIME TO SHUT OFF - ROLL AND GO AWAY
 1158    REF   6  LAST  605    27,3243  0 5224 0                TC      VARDELAY           UNTIL THEN
 1159    REF  27  LAST  706    27,3244  4 4740 1                CS      BIT12
 1160                          27,3245  0 0006 1                EXTEND
 1161    REF  47  LAST  781    27,3246  03 012 1                WAND    CHAN12             SHUT OFF ROLL
 1162    REF   3  LAST  707    27,3247  3 0102 1  ROLLOVER CA        FLAGWRD6           IF HERE INLINE (ROLL DONE) IS PITCH DONE
 1163    REF   1               27,3250  7 4742 0                MASK    GMBDRBIT           IF HERE FROM PITCHOFF, IS ROLL DONE?
 1164                          27,3251  0 0006 1                EXTEND
 1165    REF   2  LAST  781    27,3252  1 3264 0                BZF     PITCHOFF +4        NO.  SET FLAG, ROLL OR PITCH DONE.
 1166    REF   5  LAST  761    27,3253  3 4737 0                CAF     PRIO10             RETURN TO R03
 1167    REF  20  LAST  744    27,3254  0 5072 1                TC      NOVAC
 1168    REF   3  LAST  593    E7,1471                          EBANK=  WHOCARES
 1169   REF    1                 27,3255    02323 1              2CADR   TRIMDONE
 1169   REF    1                 27,3256    02067 1
 1170   REF   53   LAST   761    27,3257   0 5261 1              TC      TASKOVER
 1171   REF   30   LAST   606    27,3260   4 4742 0   PITCHOFF   CS      BIT10
 1172                            27,3261   0 0006 1              EXTEND
 1173   REF   48   LAST   781    27,3262   03 012 1              WAND    CHAN12           SHUT OFF PITCH
 1174   REF    1                 27,3263   1 3247 1              TCF     ROLLOVER         SEE IF ROLL HAS FINISHED ALSO.
 1175   REF   47   LAST   762    27,3264   0 5504 0              TC      UPFLAG           ROLL DONE; OR PITCH DONE; BUT NOT BOTH.
 1176   REF    2   LAST   731    27,3265    00137 1              ADRES   GMBDRVSW
 1177   REF   54   LAST   782    27,3266   0 5261 1              TC      TASKOVER
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R1178    SUBROUTINE NAME: S41.1          MOD. NO. 0  DATE: FEBRUARY 28, 1967

R1179                                    MOD. NO. 1  DATE: JANUARY 23, 1968: BY PETER ADLER (MIT/IL)

R1181    AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R1182    S41.1 PERFORMS THE COORDINATE SYSTEM TRANFORMATION FROM THE REFERENCE FRAME TO THE BODY OF THE LM.
R1184    SPECIFICALLY, IT IS USED TO TRANSFORM A VELOCITY (SCALED AT 2(+7) METERS/CENTISECOND) FROM REFERENCE TO LM AXIS
R1186    COORDINATES.  FIRST THE VECTOR IS TRANSFORMED TO THE STABLE MEMBER COORDINATES BY THE MATRIX REFSMMAT.  THIS
R1188    LEAVES THE VECTOR IN MPAC, SCALED AT 2(+8) METERS/CENTISECOND.  THEN
R1189    THE SUBROUTINE CDUTRIG IS CALLED TO SET UP THE DOUBLE-PRECISION CDU VECTOR ALONG WITH ITS SINES AND COSINES.
R1191    THE VECTOR IS THEN TRANSFORMED FROM STABLE MEMBER COORDINATES TO SPACECRAFT (OR LM) COORDINATES BY THE
R1193    SUBROUTINE *SMNB*.  FINALLY( THE VECTOR IS RESCALED TO 2(+7) METERS/CENTISECOND, AND CONTROL IS RETURNED TO THE
R1195    CALLER WITH C(MPAC) = VELOCITY(LM).

R1196    CALLING SEQUENCE:

A1197                                                L          VLOAD  CALL
A1198                                                L +1              VELOCITY(REF)    SCALED AT 2(+7)M/CS IN REFERENCE COORDS.
A1199                                                L +2              S41.1
A1200                                                L +3       STORE  VELOCITY(LM)     SCALED AT 2(+7)M/CS IN LM BODY AXIS SYS.

R1201    SUBROUTINES CALLED:

R1202               1.  CDUTRIG,
R1203                      WHICH CALLS CDULOGIC.
R1204               2.  *SMNB*

R1205    NORMAL RETURN: L +3 (SEE CALLING SEQUENCE, ABOVE.)

R1206    ALARM/ABORT MODES: NONE.

R1207    RESTART PROTECTION: NONE.
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P1208   INPUT:

R1209             1.  REFSMMAT.
R1210             2.  CDUX, CDUY, CDUZ.
R1211             3.  VELOCITY (REF) IN MPAC.

R1212   OUTPUT:

R1213             1.  CDUSPOT:  DOUBLE PRECISION CDU VECTOR, ORDERED Y,Z,X.
R1214             2.  SINCDU:   HALF SINES OF CDUSPOT COMPONENTS.
R1215             3.  COSCDU:   HALF COSINES OF CDUSPOT COMPONENTS.
R1216             4.  MPAC:     VELOCITY(LM) (SCALED AT 2(+7) METERS/CENTISECOND)

R1217   DEBRIS: NONE.

R1218   CHECKOUT STATUS: CODED.

 1219   REF   1                                       COUNT* $$/S41.1
 1220                        27,3267   76521 0  S41.1     MXV     VSL1          CONVERT VECTOR IN MPAC FROM REF AT 2(+7)
 1221   REF  24  LAST  771   27,3270   01734 0                    REFSMMAT      TO SM AND RESCALE DUE TO HALFUNIT MATRIX
 1222                        27,3271   77650 1            GOTO                  CONVERT TO BODY AT 2(+7) USING PRESENT
 1223   REF   2  LAST  518   27,3272   47646 0                    CDU*SMNB      CDU ANGLES.  CDU*SMNB WILL RETURN
A1224                                                                           VIA RVQ TO THE CALLER OF S41.1
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 0001                       32,2776                       BANK    32
 0002   REF   3  LAST  600  32,2000                       SETLOC  F2DPS*32
 0003                       32,2776                       BANK

 0004   REF   1             E7,1621                       EBANK=  E2DPS

R0005                                           ****************************************
R0006                                           P63: THE LUNAR LANDING, BRAKING PHASE
R0007                                           ****************************************

 0008   REF   1                                           COUNT*  $$/P63

 0009   REF  52  LAST  776  32,2776  0 5353 1   P63LM     TC      PHASCHNG
 0010                       32,2777   04024 0             OCT     04024

 0011   REF 215  LAST  759  32,3000  0 4616 1             TC      BANKCALL         DO IMU STATUS CHECK ROUTINE R02
 0012   REF   9  LAST  758  32,3001   11254 1             CADR    R02BOTH

 0013   REF   1             32,3002  3 3253 0             CAF     P63ADRES         INITIALIZE WHICH FOR BURNBABY
 0014   REF  26  LAST  758  32,3003  55'455 0             TS      WHICH

 00141  REF   1             32,3004  3 2000 0             CAF     DPSTHRSH         INITIALIZE DVMON
 00142  REF   4  LAST  758  32,3005  55'251 1             TS      DVTHRUSH
 00143  REF  13  LAST  758  32,3006  3 4751 0             CAF     FOUR
 00144  REF  31  LAST  762  32,3007  55'515 0             TS      DVCNTR

 0015   REF  85  LAST  763  32,3010  4 4753 0             CS      ONE              INITIALIZE WCHPHASE AND FLPASS0
 0016   REF   2  LAST  739  32,3011  55'351 0             TS      WCHPHASE

 0017   REF 142  LAST  774  32,3012  3 4755 1             CA      ZERO
 00175  REF   3  LAST  739  32,3013  55'623 0             TS      FLPASS0

 0018   REF  56  LAST  606  32,3014  4 4736 0             CS      BIT14
 0019                       32,3015  0 0006 1             EXTEND
 0020   REF  49  LAST  782  32,3016  03 012 1             WAND    CHAN12           REMOVE TRACK-ENABLE DISCRETE.

 0023   REF 120  LAST  776  32,3017  0 6037 0   FLAGORGY  TC      INTPRET          DIONYSIAN FLAG WAVING
 0024                       32,3020   43014 0             CLEAR   CLEAR
 0025   REF   5  LAST  775  32,3021   02663 0                     NOTHROTL
 0026   REF   1             32,3022   03271 0                     REDFLAG
 0030                       32,3023   43014 0             CLEAR   SET
 0031   REF   1             32,3024   05660 1                     LRBYPASS
 0032   REF   4  LAST  734  32,3025   03067 0                     MUNFLAG
 0033                       32,3026   43014 0             CLEAR   CLEAR
 0034   REF   3  LAST  502  32,3027   00266 0                     P25FLAG          TERMINATE P25 IF IT IS RUNNING.
 0035   REF   4  LAST  565  32,3030   00270 1                     RNDVZFLG         TERMINATE P20 IF IT IS RUNNING

A0036                                                                              ****************************************

 0037                       32,3031   77201 1   IGNALG    SETPD   VLOAD            FIRST SET UP INPUTS FOR RP-TO-R:-
 0038                          32,3032   00001 0                    0                   AT 0D LANDING SITE IN MOON FIXED FRAME
 0039    REF   6  LAST  717    32,3033   02023 1                    RLS                 AT 6D ESTIMATED TIME OF LANDING
 0040                          32,3034   41525 0           PDDL     PUSH                MPAC NON-ZERO TO INDICATE LUNAR CASE
 0041    REF   3  LAST  200    32,3035   02401 0                    TLAND
 0042    REF   2  LAST  149    32,3036   37625 1           STCALL   TPIP               ALSO SET TPIP FOR FIRST GUIDANCE PASS
 0043    REF   1               32,3037   55716 1                    RP-TO-R
 0044                          32,3040   64312 0           VSL4     MXV
 0045    REF  25  LAST  784    32,3041   01734 0                    REFSMMAT
 0046    REF   3  LAST  200    32,3042   37635 0           STCALL   LAND
 0047    REF   1               32,3043   46432 0                    GUIDINIT           GUIDINIT INITIALIZES WM AND /LAND/
 0048                          32,3044   45345 1           DLOAD    DSU
 0049    REF   4  LAST  786    32,3045   02401 0                    TLAND
 0050    REF   1               32,3046   25260 1                    GUIDDURN
 0051    REF  48  LAST  766    32,3047   34041 0           STCALL   TDEC1              INTEGRATE STATE FORWARD TO THAT TIME
 0052    REF  10  LAST  766    32,3050   27057 0                    LEMPREC
 0053                          32,3051   77331 0           SSP      VLOAD
 00531   REF   1               32,3052   03647 1                    NIGNLOOP
 00532                         32,3053   00050 1                    40D
 0057    REF   7  LAST  769    32,3054   06520 0                    UNITX
 0058    REF   2  LAST  122    32,3055   26603 0           STOVL    CG
 0059    REF   4  LAST  580    32,3056   06516 0                    UNITY
 0060    REF   3  LAST  786    32,3057   26611 0           STOVL    CG    +6
 0061    REF   7  LAST  705    32,3060   06514 1                    UNITZ
 0062    REF   4  LAST  786    32,3061   16617 0           STODL    CG    +14
 00621   REF   1               32,3062   25256 1                    99999CON
 00622   REF   4  LAST  315    32,3063   27665 1           STOVL    DELTAH             INITIALIZE DELTAH FOR V16N68 DISPLAY
 00623   REF  12  LAST  766    32,3064   06522 1                    ZEROVECS
 00624   REF   4  LAST  771    32,3065   17254 1           STODL    UNFC/2             INITIALIZE TRIM VELOCITY CORRECTION TERM
 0063    REF   7  LAST  776    32,3066   06522 1                    HI6ZEROS
 0065    REF   3  LAST  200    32,3067   03643 0           STORE    TTF/8

 0066                          32,3070   77745 1  IGNALOOP DLOAD
 0067    REF  15  LAST  734    32,3071   00015 0                    TAT
 0068    REF   4  LAST  734    32,3072   27561 0           STOVL    PIPTIME1
 0073    REF  10  LAST  734    32,3073   00017 1                    RATT1
 0074                          32,3074   64312 0           VSL4     MXV
 0075    REF  26  LAST  786    32,3075   01734 0                    REFSMMAT
 0076    REF   5  LAST  598    32,3076   37521 0           STCALL   R
 0077    REF   2  LAST  734    32,3077   67130 1                    MUNGRAV
 0078    REF   4  LAST  678    32,3100   35237 1           STCALL   GDT/2
 0079    REF   1               32,3101   62454 0                    ?GUIDSUB           WHICH DELIVERS N PASSES OF GUIDANCE

R0080    DDUMCALC IS PROGRAMMED AS FOLLOWS:-

R0081                                           2                                                  -
R0083               (RIGNZ - RGU )/16 + 16(RGU  )KIGNY/B8 + (RGU - RIGNX)KIGNX/B4 + (ABVAL(VGU) - VIGN)KIGNV/B4
R0085                           2               1                0
R0086         DDUM = -------------------------------------------------------------------------------------------
R0088                                                     10
R0089                                                    2   (VGU  - 16 VGU  KIGNX/B4)
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L        THE LUNAR LANDING                                                                          USER'S PAGE NO.   3       E7 S3

R0090                                                                2          0

R0091    THE NUMERATOR IS SCALED IN METERS AT 2(28).   THE DENOMINATOR IS A VELOCITY IN UNITS OF 2(10)M/CS.
R0093    THE QUOTIENT IS THUS A TIME IN UNITS OF 2(18) CENTISECONDS.   THE FINAL SHIFT RESCALES TO UNITS OF 2(28) CS.
R0095    THERE IS NO DAMPING FACTOR.   THE CONSTANTS KIGNX/B4, KIGNY/B8 AND KIGNV/B4 ARE ALL NEGATIVE IN SIGN.

 0097    REF   2  LAST  786   32,3102  55646 0  DDUMCALC TS       NIGNLOOP
 00971   REF 121  LAST  785   32,3103  06037 0           TC       INTPRET
 00972                        32,3104  57345 1           DLOAD    DMPR                FORM DENOMINATOR FIRST
 0098    REF   3  LAST  200   32,3105  03627 1                    VGU
 0099    REF   2  LAST  121   32,3106  02501 1                    KIGNX/B4
 0100                         32,3107  44232 1           SL4R     BDSU
 0101    REF   4  LAST  787   32,3110  03633 1                    VGU   +4
 0102                         32,3111  45325 1           PDDL     DSU
 0103    REF   2  LAST  121   32,3112  02477 1                    RIGNZ
 0104    REF   2  LAST  200   32,3113  02643 1                    RGU   +4
 0105                         32,3114  65222 0           SR4R     PDDL
 0106    REF   3  LAST  787   32,3115  02641 0                    RGU   +2
 0107                         32,3116  57316 1           DSQ      DMPR
 0108    REF   2  LAST  121   32,3117  02503 0                    KIGNY/B8
 0109                         32,3120  65232 1           SL4R     PDDL
 0110    REF   4  LAST  787   32,3121  02637 1                    RGU
 0111                         32,3122  57225 0           DSU      DMPR
 0112    REF   2  LAST  121   32,3123  02475 0                    RIGNX
 0113    REF   3  LAST  787   32,3124  02501 1                    KIGNX/B4
 0114                         32,3125  51515 1           PDVL     ABVAL
 0115    REF   5  LAST  787   32,3126  03627 1                    VGU
 0116                         32,3127  57225 0           DSU      DMPR
 0117    REF   2  LAST  121   32,3130  02473 0                    VIGN
 0118    REF   2  LAST  121   32,3131  02505 0                    KIGNV/B4
 0119                         32,3132  43215 0           DAD      DAD
 0120                         32,3133  56215 1           DAD      DDV
 0121                         32,3134  77661 0           SRR
 0122                         32,3135  21613 0                    10D

 0123                         32,3136  43206 1           PUSH     DAD
 0124    REF   5  LAST  786   32,3137  03561 0                    PIPTIME1
 0125    REF  49  LAST  786   32,3140  14041 1           STODL    TDEC1               STORE NEW GUESS FOR NEXT INTEGRATION
 0126                         32,3141  45246 0           ABS      DSU
 0127    REF   1              32,3142  25262 0                    DDUMCRIT
 0128                         32,3143  45040 1           BMN      CALL
 0129    REF   1              32,3144  65163 0                    DDUMGOOD
 0130    REF  26  LAST  710   32,3145  27414 0                    INTSTALL
 0131                         32,3146  43014 0           SET      SET
 0132    REF  14  LAST  710   32,3147  01473 0                    INTYPFLG
 0133    REF  13  LAST  711   32,3150  00063 1                    MOONFLAG
 0134                         32,3151  77745 1           DLOAD
 0136    REF   6  LAST  787   32,3152  03561 0                    PIPTIME1
 0137    REF  12  LAST  710   32,3153  25517 0           STOVL    TET                 HOPEFULLY ?GUIDSUB DID NOT
 0138    REF  11  LAST  786   32,3154  00017 1                    RATT1                 CLOBBER RATT1 AND VATT1
 0139   REF  12  LAST  710   32,3155   25535 0            STOVL   RCV
 0140   REF  13  LAST  734   32,3156   00025 0                    VATT1
 0141   REF  10  LAST  710   32,3157   35543 0            STCALL  VCV
 0142   REF   7  LAST  710   32,3160   27107 1                    INTEGRVS
 0143                        32,3161   77650 1            GOTO
 0144   REF   1              32,3162   65070 0                    IGNALOOP

 0145                        32,3163   54335 0  DDUMGOOD  SLOAD   SR
 0146   REF   4  LAST  739   32,3164   03423 1                    ZOOMTIME
 0147                        32,3165   20617 0                    14D
 0148                        32,3166   77621 1            BDSU
 0149   REF  50  LAST  787   32,3167   00041 1                    TDEC1
 0150   REF  39  LAST  771   32,3170   27442 0            STOVL   TIG                  COMPUTE DISTANCE LANDING SITE WILL BE
 0151   REF   3  LAST  598   32,3171   03527 1                    V                      OUT OF LM'S ORBITAL PLANE AT IGNITION:
 0152                        32,3172   53435 0          , VXV     UNIT                   SIGN IS + IF LANDING SITE IS TO THE
 0153   REF   6  LAST  786   32,3173   03521 1                    R                      RIGHT, NORTH; - IF TO THE LEFT, SOUTH.
 0154                        32,3174   72441 0            DOT     SL1
 0155   REF   4  LAST  786   32,3175   03635 1                    LAND
 0156   REF   3  LAST  315   32,3176   26627 0  R60INIT   STOVL   OUTOFPLN             INITIALIZATION FOR CALCMANU
 0157   REF   5  LAST  786   32,3177   03254 1                    UNFC/2
 0158   REF   3  LAST  122   32,3200   02631 1            STORE   R60VSAVE             STORE UNFC/2 TEMPORARILY IN R60SAVE
 0162                        32,3201   77776 1            EXIT
A0163                                                                                  ***************************************

 0164   REF  53  LAST  785   32,3202  0 5353 1  IGNALGRT  TC      PHASCHNG             PREVENT REPEATING IGNALG
 0165                        32,3203   04024 0            OCT     04024

 0166   REF   1              32,3204  4 4362 0  ASTNCLOK  CS      ASTNDEX
 0167   REF 216  LAST  785   32,3205  0 4616 1            TC      BANKCALL
 0168   REF   2  LAST  734   32,3206   74664 0            CADR    STCLOK2
 0169   REF 127  LAST  776   32,3207  1 5155 1            TCF     ENDOFJOB             RETURN IN NEW JOB AND IN EBANK FIVE

 0170   REF 122  LAST  787   32,3210  0 6037 0  ASTNRET   TC      INTPRET
 0171                        32,3211   47131 1            SSP     RTB                  GO PICK UP DISPLAY AT END OF P51:
 0172   REF   2  LAST  124   32,3212   02747 1                    QMAJ                   "PROCEED" WILL DO A FINE ALIGNMENT
 0173   REF   1              32,3213   65215 1            FCADR   P63SPOT2               " ENTER " WILL RETURN TO P63SPOT2
 0174   REF   1              32,3214   31135 1                    R51P63
 0175                        32,3215   53575 0  P63SPOT2  VLOAD   UNIT                 INITIALIZE KALCMANU FOR BURN ATTITUDE
 01751  REF   4  LAST  788   32,3216   02631 1                    R60VSAVE
 01752  REF   6  LAST  769   32,3217   27773 1            STOVL   POINTVSM
 01753  REF   8  LAST  786   32,3220   06520 0                    UNITX
 01754  REF  23  LAST  769   32,3221   03765 0            STORE   SCAXIS
 01755                       32,3222   77776 1            EXIT

 01756  REF   6  LAST  762   32,3223  3 5016 0            CAF     EBANK7
 01757  REF  24  LAST  762   32,3224  54 003 0            TS      EBANK

 0176                        32,3225  0 0004 0            INHINT
 0177   REF  36  LAST  762   32,3226  0 4674 0            TC      IBNKCALL
 0178   REF   2  LAST  754   32,3227   40142 1            CADR    PFLITEDB
 0179                          32,3230   0 0003 1             RELINT

 0180  REF 217  LAST  788      32,3231   0 4616 1             TC       BANKCALL
 0181  REF   5  LAST  754      32,3232    54123 0             CADR     R60LEM

 0182  REF  54  LAST  788      32,3233   0 5353 1             TC       PHASCHNG         PREVENT RECALLING R60
 0183                          32,3234    04024 0             OCT      04024

 0184  REF  39  LAST  681      32,3235   3 4746 0   P63SPOT3  CA       BIT6             IS THE LR ANTENNA IN POSITION 1 YET
 0185                          32,3236   0 0006 1             EXTEND
 0186  REF  21  LAST  604      32,3237   02 033 0             RAND     CHAN33
 0187                          32,3240   0 0006 1             EXTEND
 0188  REF   1                 32,3241   1 3247 1             BZF      P63SPOT4         BRANCH IF ANTENNA ALREADY IN POSITION 1

 0189  REF   1                 32,3242   3 3254 1             CAF      CODE500          ASTRONAUT: PLEASE CRANK THE
 0190  REF 218  LAST  789      32,3243   0 4616 1             TC       BANKCALL                    SILLY THING AROUND
 0191  REF   4  LAST  748      32,3244    20623 1             CADR     GOPERF1
 0192  REF  30  LAST  759      32,3245   1 6001 1             TCF      GOTOPOOH         TERMINATE
 0193  REF   1                 32,3246   1 3235 1             TCF      P63SPOT3         PROCEED     SEE IF HE'S LYING

 0194  REF 219  LAST  789      32,3247   0 4616 1   P63SPOT4  TC       BANKCALL         ENTER       INITIALIZE LANDING RADAR
 0195  REF   1                 32,3250    67721 1             CADR     SETPOS1

 0196  REF  45  LAST  762      32,3251   0 4635 0             TC       POSTJUMP         OFF TO SEE THE WIZARD...
 0197  REF   2  LAST  754      32,3252    74126 1             CADR     BURNBABY


R0198                                            ----------------------------------------

R0199                                                   CONSTANTS FOR P63LM AND IGNALG


 0200  REF   2  LAST  749      32,3253    02076 1   P63ADRES GENADR P63TABLE


 0202  REF   2  LAST  458          4362             ASTNDEX  =        MD1              OCT 25:  INDEX FOR CLOKTASK


 0203                          32,3254    00500 1   CODE500  OCT      00500


 02035                         32,3255    00035 1   99999CON 2DEC     30479.7 B-24
 02035                         32,3256    30373 0


 0204                          32,3257    00004 0   GUIDDURN 2DEC     +      66440             GUIDDURN    +6.64400314E+ 2
 0204                          32,3260    01610 1
 0205                          32,3261    00000 1   DDUMCRIT 2DEC     +8 B-28          CRITERION FOR IGNALG CONVERGENCE
 0205                          32,3262    00010 0
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P0207                                            *************************************
R0208                                            P68: LANDING CONFIRMATION
R0209                                            *************************************

 0210                         31,2144                              BANK    31
 0211   REF   2  LAST   39    31,2000                              SETLOC  F2DPS*31
 0212                         31,2144                              BANK

 0213   REF   1                                                    COUNT*  $$/P6567

 0214   REF  55  LAST  789    31,2144   0 5353 1  LANDJUNK TC      PHASCHNG
 0215                         31,2145    04024 0           OCT     04024

 02151                        31,2146   0 0004 0           INHINT
 0216   REF 220  LAST  789    31,2147   0 4616 1           TC      BANKCALL         ZERO ATTITUDE ERROR
 0217   REF   6  LAST  756    31,2150    40153 1           CADR    ZATTEROR

 0219   REF 221  LAST  791    31,2151   0 4616 1           TC      BANKCALL         SET 5 DEGREE DEADBAND
 0220   REF   1               31,2152    40127 1           CADR    SETMAXDB

 0221   REF 123  LAST  788    31,2153   0 6037 0           TC      INTPRET          TO INTERPRETIVE AS TIME IS NOT CRITICAL
 0222                         31,2154    43014 0           SET     CLEAR
 0223   REF  14  LAST  656    31,2155    04067 1                   SURFFLAG
 0224   REF   1               31,2156    04666 0                   LETABORT
 0225                         31,2157    77214 0           SET     VLOAD
 0226   REF   3  LAST  774    31,2160    05062 0                   APSFLAG
 0230   REF  11  LAST  780    31,2161    01221 1                   RN
 0231   REF   3  LAST  657    31,2162    16032 1           STODL   ALPHAV
 0232   REF  11  LAST  780    31,2163    01235 1                   PIPTIME
 0233                         31,2164    45014 0           SET     CALL
 0234   REF   3  LAST  656    31,2165    01463 1                   LUNAFLAG
 0235   REF   2  LAST  657    31,2166    26351 1                   LAT-LONG
 0236                         31,2167    77201 1           SETPD   VLOAD            COMPUTE RLS AND STORE IT AWAY
 0237                         31,2170    00001 0                   0
 0238   REF  12  LAST  791    31,2171    01221 1                   RN
 0239                         31,2172    65352 0           VSL2    PDDL
 0240   REF  12  LAST  791    31,2173    01235 1                   PIPTIME
 0241                         31,2174    45006 0           PUSH    CALL
 0242   REF   1               31,2175    51670 1                   R-TO-RP
 0243   REF   7  LAST  786    31,2176    02023 1           STORE   RLS
 0244                         31,2177    77776 1           EXIT
 0245   REF   1               31,2200   3 2215 0           CAF     V06N43*          ASTRONAUT: NOW LOOK WHERE YOU ENDED UP
 0246   REF 222  LAST  791    31,2201   0 4616 1           TC      BANKCALL
 0247   REF  22  LAST  748    31,2202    20476 0           CADR    GOFLASH
 0248   REF  31  LAST  789    31,2203   1 6001 1           TCF     GOTOPOOH         TERMINATE
 0249                         31,2204   1 2206 0           TCF     +2               PROCEED
 0250                         31,2205   1 2200 0           TCF     -5               RECYCLE

 0251   REF 124  LAST  791    31,2206   0 6037 0           TC      INTPRET
 0252                             31,2207   77775 1            VLOAD                    INITIALIZE GSAV AND (USING REFMF)
 0253    REF   9  LAST  788       31,2210   06520 0                    UNITX             YNBSAV, ZNBSAV AND ATTFLAG FOR P57
 0254    REF   5  LAST  202       31,2211   36231 1            STCALL  GSAV
 0255    REF   1                  31,2212   33506 1                    REFMF
 0256                             31,2213   77776 1            EXIT

 0257    REF  32  LAST  791       31,2214  1 6001 1            TCF     GOTOPOOH         ASTRONAUT: PLEASE SELECT P57


 0258                             31,2215   01453 1  V06N43*   VN      0643
 0001                       31,2216                    BANK    31

 0002    REF   2  LAST  40  31,2000                    SETLOC  FTHROT

 0003                       31,2216                    BANK

 0004    REF   2  LAST  149 E7,1612                    EBANK=  PIF

 0005    REF   2 LAST  40 TO  40:      5      5*       COUNT*  $$/THROT
R0006    * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

R0008         HERE FC, DESIRED THRUST, AND FP, PRESENT THRUST, UNWEIGHTED, ARE COMPUTED.


 0010    REF   3  LAST  211  31,2216  3 1246 0  THROTTLE CA      ABDELV            COMPUTE PRESENT ACCELERATION IN UNITS OF
 0011                        31,2217  0 0006 1           EXTEND                      2(-4) M/CS/CS, SAVING SERVICER TROUBLE
 0012    REF   1             31,2220  7 2417 0           MP      /AF/CNST
 0013                        31,2221  0 0006 1     +3    EXTEND
 0014    REF   2  LAST  149  31,2222  23'607 1           QXCH    RTNHOLD
 0015    REF   1             31,2223  0 2400 1  AFDUMP   TC      MASSMULT
 0016    REF   1             31,2224  53'470 1           DXCH    FP                FP = PRESENT THRUST
 0017                        31,2225  0 0006 1           EXTEND
 0018    REF   2  LAST  140  31,2226  3 1464 0           DCA     /AFC/
 0019    REF   2  LAST  793  31,2227  0 2400 1           TC      MASSMULT
 0020    REF   3  LAST  200  31,2230  55'615 0           TS      FC                FC = THRUST DESIRED BY GUIDANCE
 0021    REF   2  LAST  140  31,2231  53'466 0           DXCH    FCODD             FCODD = WHAT IT IS GOING TO GET


R0022         IF IT HAS BEEN LESS THAN 3 SECONDS SINCE THE LAST THROTTLING, AUGMENT FP USING THE FWEIGHT CALCULATED THEN.


 0024    REF   2  LAST  149  31,2232  4 1617 1           CS      TTHROT            THIS CODING ASSUMES A FLATOUT WITHIN
 0025    REF   8  LAST  744  31,2233  6 0025 0           AD      TIME1              80 SECONDS BEFORE FIRST THROTTLE CALL
 0026    REF  13  LAST  557  31,2234  7 4733 0           MASK    POSMAX
 0027                        31,2235  4 0000 0           COM
 0028    REF   1             31,2236  6 5002 0           AD      3SECS
 0029                        31,2237  0 0006 1           EXTEND
 0030    REF   1             31,2240  6 2244 1           BZMF    WHERETO           BRANCH IF (TIME1-TTHROT +1) > 3 SECONDS
 0031                        31,2241  0 0006 1           EXTEND
 0032    REF   2  LAST  149  31,2242  3 1611 0           DCA     FWEIGHT
 0033    REF   2  LAST  793  31,2243  21'470 1           DAS     FP


R0034         THIS LOGIC DETERMINES THE THROTTLING IN THE REGION 10% - 94%.   THE MANUAL THROTTLE, NOMINALLY SET AT
R0036    MINIMUM BY ASTRONAUT OR MISSION CONTROL PROGRAMS, PROVIDES THE LOWER BOUND.   A STOP IN THE THROTTLE HARDWARE
R0038    PROVIDES THE UPPER.


 0039    REF   5  LAST  781  31,2244  3 5014 1  WHERETO  CA      EBANK5            INITIALIZE L*WCR*T AND H*GHCR*T FROM
 0040    REF  25  LAST  788  31,2245  54 003 0           TS      EBANK               PAD LOADED ERASABLES IN W-MATRIX
 0041    REF   2  LAST  121    E5,1506                     EBANK=  LOWCRIT
 0042                          31,2246  0 0006 1            EXTEND
 0043    REF   3  LAST  794    31,2247  3 1507 1            DCA     LOWCRIT
 0044    REF   1               31,2250  52 131 0            DXCH    L*WCR*T
 0045    REF   7  LAST  788    31,2251  3 5016 0            CA      EBANK7
 0046    REF  26  LAST  793    31,2252  54 003 0            TS      EBANK
 0047    REF   3  LAST  793    E7,1612                      EBANK=  PIF
 0048    REF 143  LAST  785    31,2253  4 4755 0            CS      ZERO            INITIALIZE PIFPSET
 0049    REF   2  LAST  149    31,2254  55'606 1            TS      PIFPSET
 0050    REF   1               31,2255  4 0131 0            CS      H*GHCR*T
 0051    REF   2  LAST  149    31,2256  6 1620 1            AD      FCOLD
 0052                          31,2257  0 0006 1            EXTEND
 0053    REF   1               31,2260  6 2272 1            BZMF    LOWFCOLD        BRANCH IF FCOLD < OR = HIGHCRIT
 0054    REF   2  LAST  794    31,2261  4 0130 1            CS      L*WCR*T
 0055    REF   3  LAST  793    31,2262  6 1465 1            AD      FCODD
 0056                          31,2263  0 0006 1            EXTEND
 0057    REF   1               31,2264  6 2267 0            BZMF    FCOMPSET        BRANCH IF FC < OR = LOWCRIT
 0058    REF   3  LAST  793    31,2265  3 1467 0            CA      FP              SEE NOTE 1
 0059    REF   1               31,2266  1 2277 0            TCF     FLATOUT1

 0060    REF   1               31,2267  4 2002 0  FCOMPSET  CS      FMAXODD         SEE NOTE 2
 0061    REF   4  LAST  794    31,2270  6 1467 0            AD      FP
 0062    REF   1               31,2271  1 2301 0            TCF     FLATOUT2

 0063    REF   2  LAST  794    31,2272  4 0131 0  LOWFCOLD  CS      H*GHCR*T
 0064    REF   4  LAST  794    31,2273  6 1465 1            AD      FCODD
 0065                          31,2274  0 0006 1            EXTEND
 0066    REF   1               31,2275  6 2302 1            BZMF    DOPIF           BRANCH IF FC < OR = HIGHCRIT

 0067    REF   1               31,2276  3 2003 0            CA      FMAXPOS         NO:    THROTTLE-UP
 0068    REF   5  LAST  794    31,2277  53'466 0  FLATOUT1  DXCH    FCODD
 0069    REF   1               31,2300  3 4737 0            CA      FEXTRA
 0070    REF   3  LAST  794    31,2301  55'606 1  FLATOUT2  TS      PIFPSET

A0071                                             NOTE 1    FC IS SET EQUAL TO FP SO PIF WILL BE ZERO.   THIS IS DESIRABLE
A0072                                                       AS THERE IS ACTUALLY NO THROTTLE CHANGE.

A0073                                             NOTE 2    HERE, SINCE WE ARE ABOUT TO RETURN TO THE THROTTLEABLE REGION
A0074                                                       (BELOW 55%) THE QUANTITY -(FMAXODD - FP) IS COMPUTED AND PUT
A0075                                                       INTO PIFPSET TO COMPENSATE FOR THE DIFFERENCE BETWEEN THE
A0076                                                       NUMBER OF BITS CORRESPONDING TO FULL THROTTLE (FMAXODD) AND THE
A0077                                                       NUMBER CORRESPONDING TO ACTUAL THRUST (FP).   THUS THE TOTAL
A0078                                                       THROTTLE COMMAND PIF = FC - FP -(FMAXODD - FP) = FC - FMAXODD.

 0081    REF   1               31,2302  0 3740 1  DOPIF     TC      FASTCHNG
 0082                          31,2303  0 0006 1            EXTEND
 0083    REF   6  LAST  794    31,2304  3 1466 1            DCA     FCODD
 0084    REF   3  LAST  794    31,2305  55'620 0            TS      FCOLD
 0085    REF   4  LAST  794    31,2306  53'613 0            DXCH    PIF
 0086                          31,2307  0 0006 1            EXTEND
 0067   REF   5  LAST  794    31,2310  4 1470 1             DCS     FP
 0088   REF   5  LAST  794    31,2311  21'613 0             DAS     PIF                PIF = FC - FP, NEVER EQUALS +0


 0089   REF   6  LAST  795    31,2312  3 1612 0  DOIT       CA      PIF
 0090   REF   4  LAST  794    31,2313  6 1606 0             AD      PIFPSET            ADD IN PIFPSET, WITHOUT CHANGING PIF
 0091   REF   3  LAST  200    31,2314  55'614 1             TS      PSEUDO55
 0092   REF   4  LAST  760    31,2315  54 055 0             TS      THRUST
 0093   REF  31  LAST  760    31,2316  3 4750 1             CAF     BIT4
 0094                         31,2317  0 0006 1             EXTEND
 0095   REF  10  LAST  760    31,2320  05 014 1             WOR     CHAN14
 0096   REF   9  LAST  793    31,2321  3 0025 0             CA      TIME1
 0097   REF   3  LAST  793    31,2322  55'617 1             TS      TTHROT

R0098        SINCE /AF/ IS NOT AN INSTANTANEOUS ACCELERATION, BUT RATHER AN "AVERAGE" OF THE ACCELERATION LEVELS DURING
R0100   THE PRECEEDING PIPA INTERVAL, AND SINCE FP IS COMPUTED DIRECTLY FROM /AF/, FP IN ORDER TO CORRESPOND TO THE
R0102   ACTUAL THRUST LEVEL AT THE END OF THE INTERVAL MUST BE WEIGHTED BY

R0103                                    PIF(PPROCESS + TL)      PIF /PIF/
R0104                         FWEIGHT = ------------------ + -------------
R0105                                          PGUID          2 PGUID FRATE

R0106   WHERE PPROCESS IS THE TIME BETWEEN PIPA READING AND THE START OF THROTTLING, PGUID IS THE GUIDANCE PERIOD, AND
R0108   FRATE IS THE THROTTLING RATE (32 UNITS PER CENTISECOND).  PGUID IS EITHER 1 OR 2 SECONDS. THE "TL" IN THE
R0110   FIRST TERM REPRESENTS THE ENGINE'S RESPONSE LAG.   HERE FWEIGHT IS COMPUTED FOR USE NEXT PASS.

 0112   REF   2  LAST  151    31,2323  3 1762 0             CA      THISTPIF +1        INITIALIZE FWEIGHT COMP AS IF FOR P66
 0113   REF  49  LAST  457    31,2324  54 130 1             TS      BUF

 0114   REF  12  LAST  683    31,2325  4 1011 1             CS      MODREG             ARE WE IN FACT IN P66?
 0115   REF   1               31,2326  6 2501 1             AD      DEC66
 0116                         31,2327  0 0006 1             EXTEND
 0117   REF   1               31,2330  1 2335 1             BZF     FWCOMP             YES

 0118   REF  13  LAST  791    31,2331  3 1235 1             CA      PIPTIME  +1        NO:    INITIALIZE FOR TWO SECOND PERIOD
 0119   REF  50  LAST  795    31,2332  54 130 1             TS      BUF
 0120   REF   2  LAST  165    31,2333  3 5003 1             CAF     4SECS
 0121   REF   2  LAST  795    31,2334  1 2336 1             TCF     FWCOMP   +1

 0122   REF   5  LAST  605    31,2335  3 5000 1  FWCOMP     CAF     2SECS
 0126   REF 194  LAST  763    31,2336  54 002 1     +1      TS      Q
 01261                        31,2337  0 0006 1             EXTEND
 01262  REF  40  LAST  789    31,2340  7 4746 1             MP      BIT6
 01263  REF  51  LAST  795    31,2341  22 131 1             LXCH    BUF  +1
 0127   REF  52  LAST  795    31,2342  4 0130 1             CS      BUF                TIME OF LAST PIPA READING.
 0128   REF  10  LAST  795    31,2343  6 0025 0             AD      TIME1
 0129   REF   1               31,2344  6 2004 1             AD      THROTLAG           COMPENSATE FOR ENGINE RESPONSE LAG
 0130   REF   4  LAST  460    31,2345  7 4357 0             MASK    LOW8               MAKE SURE SMALL AND POSITIVE
 0131                         31,2346  22 007 0             ZL
 0132                         31,2347  0 0006 1             EXTEND
 0133    REF 195   LAST   795     31,2350   10 C02 1                  DV       Q
 0134                             31,2351   0 0006 1                  EXTEND
 0135    REF   7   LAST   795     31,2352   7 1612 1                  MP       PIF
 0136                             31,2353   6 0000 1                  DOUBLE
 0137    REF   3   LAST   793     31,2354   53'611 1                  DXCH     FWEIGHT
 0138    REF   8   LAST   796     31,2355   11'612 1                  CCS      PIF
 0139    REF  86   LAST   785     31,2356   6 4753 1                  AD       ONE
 0140                             31,2357   1 2361 0                  TCF      +2
 0141    REF  87   LAST   796     31,2360   6 4753 1                  AD       ONE
 0142                             31,2361   0 0006 1                  EXTEND
 0143    REF   9   LAST   796     31,2362   7 1612 1                  MP       PIF
 0144                             31,2363   0 0006 1                  EXTEND
 0145    REF  53   LAST   795     31,2364   10 131 0                  DV       BUF +1
 0146                             31,2365   22 007 0                  ZL
 0147    REF   4   LAST   796     31,2366   21'611 1                  DAS      FWEIGHT


 0148    REF   3   LAST   793     31,2367   0 1607 1   THDUMP         TC       RTNHOLD


R0149         FLATOUT THROTTLES UP THE DESCENT ENGINE, AND IS CALLED AS A BASIC SUBROUTINE.

 0151    REF  28   LAST   741     31,2370   3 4737 0   FLATOUT        CAF      BIT13                  4096 PULSES
 0152    REF   5   LAST   795     31,2371   55'606 1   WHATOUT        TS       PIFPSET                USE PIFPSET SO FWEIGHT WILL BE ZERO
 0153    REF 144   LAST   794     31,2372   4 4755 0                  CS       ZERO
 0154    REF   4   LAST   794     31,2373   55'620 0                  TS       FCOLD
 0155    REF  10   LAST   796     31,2374   55'612 1                  TS       PIF
 0156                             31,2375   0 0006 1                  EXTEND
 0157    REF   4   LAST   796     31,2376   23'607 1                  QXCH     RTNHOLD
 0158    REF   1                  31,2377   1 2312 1                  TCF      DOIT


R0159         MASSMULT SCALES ACCELERATION, ARRIVING IN A AND L IN UNITS OF 2(-4) M/CS/CS, TO FORCE IN PULSE UNITS.

 0161                             31,2400   0 0006 1   MASSMULT EXTEND
 0162    REF  54   LAST   796     31,2401   22 130 0                  QXCH     BUF
 0163    REF 294   LAST   774     31,2402   52 155 1                  DXCH     MPAC
 0164    REF  15   LAST   435     31,2403   0 7103 1                  TC       DMP
 0165    REF   5   LAST   295     31,2404    01244 1                  ADRES    MASS
 0166    REF  16   LAST   796     31,2405   0 7103 1                  TC       DMP                    LEAVES PROPERLY SCALED FORCE IM MPAC   -
 0167    REF   1                  31,2406    02005 0                  ADRES    SCALEFAC
 0168    REF  10   LAST   774     31,2407   0 7257 0                  TC       TPAGREF
 0169    REF 295   LAST   796     31,2410   3 0154 1                  CA       MPAC
 0170                             31,2411   0 0006 1                  EXTEND
 0171                             31,2412   1 2415 1                  BZF      +3
 0172    REF  14   LAST   793     31,2413   3 4733 1                  CAF      POSMAX
 0173    REF  55   LAST   796     31,2414   0 0130 0                  TC       BUF
 0174    REF 296   LAST   796     31,2415   52 156 1                  DXCH     MPAC +1
 0175    REF  56   LAST   796     31,2416   0 0130 0                  TC       BUF
```

```
R0176             CONSTANTS:-
 0177   REF  29  LAST  796      4737            FEXTRA    =      BIT13                   FEXT        +5.13309020E+ 4
 0180                        31,2417   04143 0  /AF/CNST  DEC    .13107
R0181   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

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R0001

 0002   REF   2  LAST  785   E7,1621                      EBANK= E2DPS

 0003   REF   2 LAST   39 TO   40:      2     2*          COUNT* $$/F2DPS

R0004   ******************************************************************************************************************
R0006   LUNAR LANDING FLIGHT SEQUENCE TABLES
R0007   ******************************************************************************************************************

R0009   FLIGHT SEQUENCE TABLES ARE ARRANGED BY FUNCTION.  THEY ARE REFERENCED USING AS AN INDEX THE REGISTER WCHPHASE:

A0011                                                     WCHPHASE  =  -1  --->  IGNALG
A0012                                                     WCHPHASE  =   0  --->  BRAKQUAD
A0013                                                     WCHPHASE  =   1  --->  APPRQUAD
A0014                                                     WCHPHASE  =   2  --->  VERTICAL

R0015   *****************************************************************************************************************

R0017   ROUTINES FOR STARTING NEW GUIDANCE PHASES:

 0018   REF   1              31,2420   1 2641 1           TCF    TTFINCR         IGNALG
 0019   REF   2  LAST  798   31,2421   1 2641 1  NEWPHASE TCF    TTFINCR         BRAKQUAD
 0020   REF   1              31,2422   1 2630 1           TCF    STARTP64        APPRQUAD
 0021   REF   1              31,2423   1 2621 1           TCF    P65START        VERTICAL
R0022

R0023   PRE-GUIDANCE COMPUTATIONS:

 0024   REF   1              31,2424   1 3003 0           TCF    CALCRGVG        IGNALG
 0025   REF   1              31,2425   1 3013 1  PREGUIDE TCF    RGVGCALC        BRAKQUAD
 0026   REF   1              31,2426   1 2704 1           TCF    REDESIG         APPRQUAD
 0027   REF   2  LAST  798   31,2427   1 3013 1           TCF    RGVGCALC        VERTICAL
R0028

R0029   GUIDANCE EQUATIONS:

 0030   REF   1              31,2430   1 3061 1           TCF    TTF/8CL         IGNALG
 0031   REF   2  LAST  798   31,2431   1 3061 1  WHATGUID TCF    TTF/8CL         BRAKQUAD
 0032   REF   3  LAST  798   31,2432   1 3061 1           TCF    TTF/8CL         APPRQUAD
 0033   REF   1              31,2433   1 3531 1           TCF    VERTGUID        VERTICAL
R0034

R0035   POST GUIDANCE EQUATION COMPUTATIONS:

 0036   REF   1              31,2434   1 3245 0           TCF    CGCALC          IGNALG
 0037   REF   2  LAST  798   31,2435   1 3245 0  AFTRGUID TCF    CGCALC          BRAKQUAD
 0038   REF   3  LAST  798   31,2436   1 3245 0           TCF    CGCALC          APPRQUAD
 0039   REF   1              31,2437   1 3432 0           TCF    STEER?          VERTICAL
R0040
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                    3:15 DEC.  2,1970  FLY      .132  PAGE  799

L       LUNAR LANDING GUIDANCE EQUATIONS                                                  USER'S PAGE NO.  2      E7 S3

R0041   WINDOW VECTOR COMPUTATIONS:

 0042   REF    1                  31,2440  1 3331 1           TCF      EXGSUB           IGNALG
 0043   REF    1                  31,2441  1 3352 1  WHATEXIT TCF      EXBRAK           BRAKQUAD
 0044   REF    1                  31,2442  1 3360 0           TCF      EXNORM           APPRQUAD
R0045

R0046   DISPLAY ROUTINES:

 0047   REF    2  LAST   749      31,2443  1 3473 0  WHATDISP TCF      P63DISPS         BRAKQUAD
 0048   REF    1                  31,2444  1 3477 1           TCF      P64DISPS         APPRQUAD
 0049   REF    1                  31,2445  1 3527 0           TCF      VERTDISP         VERTICAL
R0050

R0051   ALARM ROUTINE FOR TTF COMPUTATION:

 0052   REF    1                  31,2446  1 3733 1           TCF      1406P00          IGNALG
 0053   REF    1                  31,2447  1 3735 1  WHATALM  TCF      1406ALM          BRAKQUAD
 0054   REF    2  LAST   799      31,2450  1 3735 1           TCF      1406ALM          APPRQUAD
R0055

R0056   INDICES FOR REFERENCING TARGET PARAMETERS:

 0057                             31,2451   00000 1           OCT      0                IGNALG
 0058                             31,2452   00000 1  TARGTDEX OCT      0                BRAKQUAD
 0059                             31,2453   00034 0           OCT      34               APPRQUAD
R0060

R0061   *****************************************************************************************************************
R0063   ENTRY POINTS:   ?GUIDSUB FOR THE IGNITION ALGORITHM, LUNLAND FOR SERVOUT
R0064   *****************************************************************************************************************

R0066   IGNITION ALGORITHM ENTRY:  DELIVERS N PASSES OF QUADRATIC QUIDANCE

 0067                             31,2454   77776 1  ?GUIDSUB EXIT
 0068   REF   44  LAST   756      31,2455  3 4752 0           CAF      TWO              N = 3
 0069   REF    1                  31,2456  55'647 1           TS       NGUIDSUB
 0070   REF    1                  31,2457  1 2603 1           TCF      GUILDRET +2

 0071   REF    2  LAST   799      31,2460  55'647 1  GUIDSUB  TS       NGUIDSUB         ON SUCEEDING PASSES SKIP TTFINCR
 0072   REF    2  LAST   798      31,2461  1 3003 0           TCF      CALCRGVG

R0073   NORMAL ENTRY:  CONTROL COMES HERE FROM SERVOUT

 0074   REF   56  LAST   791      31,2462  0 5353 1  LUNLAND  TC       PHASCHNG
 0075                             31,2463   00035 1           OCT      00035            GROUP 5: RETAIN ONLY PIPA TASK
 0076   REF   57  LAST   799      31,2464  0 5353 1           TC       PHASCHNG
 0077                             31,2465   05023 0           OCT      05023            GROUP 3: PROTECT GUIDANCE WITH PRIO 21
 0078                             31,2466   21000 1           OCT      21000              JUST HIGHER THAN SERVICER'S PRIORITY
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R0079        ***********************************************************************************************************
R0081        GUILDENSTERN:  AUTO-MODES MONITOR (R13)
R0082        ***********************************************************************************************************

 0084        REF   1                                                     COUNT* $$/R13

R0085            HERE IS THE PHILOSOPHY OF GUILDENSTERN:   ON EVERY APPEARANCE OR DISAPPEARANCE OF THE MANUAL THROTTLE
R0087        DISCRETE TO SELECT P67 OR P66 RESPECTIVELY;   ON EVERY APPEARANCE OF THE ATTITUDE-HOLD DISCRETE TO SELECT P66
R0089        UNLESS THE CURRENT PROGRAM IS P67 IN WHICH CASE THERE IS NO CHANGE.

 0090                                 31,2467  0 0006 1  GUILDEN  EXTEND                         IS UN-AUTO-THROTTLE DISCRETE PRESENT?
 0091        REF   5  LAST  748       31,2470  00 030 1    STERN  READ    CHAN30
 0092        REF  34  LAST  751       31,2471  7 4747 0           MASK    BIT5
 0093        REF 231  LAST  763       31,2472  10 000 0           CCS     A
 0094        REF   1                  31,2473  1 2551 0           TCF     STARTP67               YES
 0095        REF   3  LAST  738       31,2474  0 5321 1  P67NOW?  TC      CHECKMM                NO:    ARE WE IN P67 NOW?
 0096                                 31,2475   00103 0           DEC     67
 0097        REF   1                  31,2476  1 2557 0           TCF     STABL?                 NO
 0098        REF   2  LAST  794       31,2477  0 3740 1  STARTP66 TC      FASTCHNG               YES
 0099        REF   2  LAST  373       31,2500  0 5311 1           TC      NEWMODEX
 0100                                 31,2501   00102 1  DEC66    DEC     66
 0101                                 31,2502  0 0006 1           EXTEND
 0102        REF   6  LAST  315       31,2503  3 1474 1           DCA     HDOTDISP               SET DESIRED ALTITUDE RATE = CURRENT
 0103        REF   1                  31,2504  53'645 0           DXCH    VDGVERT                       ALTITUDE RATE.
 0104        REF 125  LAST  791       31,2505  0 6037 0  STRTP66A TC      INTPRET
 0105                                 31,2506   41535 1           SLOAD   PUSH
 0106        REF   1                  31,2507   01457 0                   PBIASZ
 0107                                 31,2510   41535 1           SLOAD   PUSH
 0108        REF   1                  31,2511   01455 1                   PBIASY
 0109                                 31,2512   55535 1           SLOAD   VDEF
 0110        REF   2  LAST  109       31,2513   01453 1                   PBIASX
 0111                                 31,2514   43161 0           VXSC    SET
 0112        REF   1                  31,2515   25537 1                   BIASFACT
 0113        REF   1                  31,2516   00463 0                   RODFLAG
 0114        REF   1                  31,2517   26631 1           STOVL   VBIAS
 0115        REF   2  LAST  105       31,2520   01255 1                   TEMX
 0116                                 31,2521   77676 0           VCOMP
 0117        REF   2  LAST  151       31,2522   27764 1           STOVL   OLDPIPAX
 0118        REF  13  LAST  786       31,2523   06522 1                   ZEROVECS
 0119        REF   2  LAST  151       31,2524   17767 1           STODL   DELVROD
 0120        REF   2  LAST  122       31,2525   02540 1                   RODSCALE
 0121        REF   2  LAST  151       31,2526   17757 1           STODL   RODSCAL1
 0122        REF  14  LAST  795       31,2527   01235 1                   PIPTIME
 0123        REF   2  LAST  151       31,2530   03760 0           STORE   LASTTPIP
 0124                                 31,2531   77776 1           EXIT
 0125        REF 145  LAST  796       31,2532  3 4755 1           CAF     ZERO
 0126        REF   5  LAST  796       31,2533  55'620 0           TS      FCOLD
 0127        REF   5  LAST  796       31,2534  55'610 0           TS      FWEIGHT
 0128        REF   6  LAST  800       31,2535  55'611 1           TS      FWEIGHT +1
 0129        REF   1                  31,2536  55'647 1  VRTSTART TS      WCHVERT
 0130    REF  45  LAST  799   31,2537  3 4752 0             CAF     TWO              WCHPHASE = 2 ---> VERTICAL: P65,P66,P67
 0131    REF   3  LAST  739   31,2540  55'621 1             TS      WCHPHOLD
 0132    REF   3  LAST  785   31,2541  55'351 0             TS      WCHPHASE
 0133    REF 223  LAST  791   31,2542  0 4616 1             TC      BANKCALL         TEMPORARY, I HOPE HOPE HOPE
 0134    REF   4  LAST  762   31,2543   40165 1             CADR    STOPRATE         TEMPORARY, I HOPE HOPE HOPE
 0135    REF  70  LAST  781   31,2544  0 5516 0             TC      DOWNFLAG         PERMIT X-AXIS OVERRIDE
 0136    REF   3  LAST  229   31,2545   00311 1             ADRES   XOVINFLG
 0137    REF  71  LAST  801   31,2546  0 5516 0             TC      DOWNFLAG
 0138    REF   2  LAST  785   31,2547   00143 1             ADRES   REDFLAG
 0139    REF   2  LAST  798   31,2550  1 3531 1             TCF     VERTGUID

 0140    REF   3  LAST  800   31,2551  0 5311 1  STARTP67 TC      NEWMODEX         NO HARM IN "STARTING" P67 OVER AND OVER
 0141                         31,2552   00103 0             DEC     67                 SO NO NEED FOR A FASTCHNG AND NO NEED
 0142    REF 146  LAST  800   31,2553  3 4755 1             CAF     ZERO               TO SEE IF ALREADY IN P67.
 0143    REF   1              31,2554  55'746 1             TS      RODCOUNT
 0144    REF   6  LAST  467   31,2555  3 4363 0             CAF     TEN
 0145    REF   1              31,2556  1 2536 1             TCF     VRTSTART

 0146    REF  30  LAST  797   31,2557  3 4737 0  STABL?     CAF     BIT13            IS UN-ATTITUDE-HOLD DISCRETE PRESENT?
 0147                         31,2560  0 0006 1             EXTEND
 0148    REF   3  LAST  476   31,2561  02 031 1             RAND    CHAN31
 0149    REF 232  LAST  800   31,2562  10 000 0             CCS     A
 0150    REF   2  LAST  799   31,2563  1 2601 0             TCF     GUILDRET         YES:  ALL'S WELL

 0151    REF  13  LAST  795   31,2564  4 1011 1  P66NOW?    CS      MODREG
 0152    REF   2  LAST  795   31,2565  6 2501 1             AD      DEC66
 0153                         31,2566  0 0006 1             EXTEND
 0154    REF   1              31,2567  1 2574 1             BZF     RESTART?

 0155    REF   2  LAST  801   31,2570  3 1746 0             CA      RODCOUNT         NO. HAS THE ROD SWITCH BEEN "CLICKED"?
 0156                         31,2571  0 0006 1             EXTEND
 0157    REF   3  LAST  801   31,2572  1 2601 0             BZF     GUILDRET         NO.  CONTINUE WITH AUTOMATIC LANDING.
 0158    REF   1              31,2573  1 2477 0             TCF     STARTP66         YES.  SWITCH INTO THE ROD MODE.

 0159    REF  26  LAST  519   31,2574  3 0075 0  RESTART? CA      FLAGWRD1         HAS THERE BEEN A RESTART?
 0160    REF   2  LAST  217   31,2575  7 4740 1             MASK    RODFLBIT
 0161                         31,2576  0 0006 1             EXTEND
 0162    REF   1              31,2577  1 2505 1             BZF     STRTP66A         YES.  REINITIALIZE BUT LEAVE VDGVERT AS
A0163                                                                                        IS.

 0164    REF   3  LAST  801   31,2600  1 3531 1             TCF     VERTGUID         NO:  CONTINUE WITH R.O.D.

R0165    ****************************************************************************************************************
R0167    INITIALIZATION FOR THIS PASS
R0168    ****************************************************************************************************************

 0170    REF    3 LAST  798 TO  800:     39     41*         COUNT*  $$/F2DPS

 0171    REF 147  LAST  801   31,2601  3 4755 1  GUILDRET CAF     ZERO
 0172    REF   3  LAST  801   31,2602  55'746 1             TS      RODCOUNT
 0173                         31,2603  0 0006 1  +2        EXTEND
 0174   REF   3  LAST  786    31,2604  3 1625 1            DCA      TPIP
 0175   REF   1               31,2605  53'574 1            DXCH     TPIPOLD

 0176   REF   3  LAST  800    31,2606  0 3740 1            TC       FASTCHNG

 0177                         31,2607  0 0006 1            EXTEND
 0178   REF   7  LAST  787    31,2610  3 1561 1            DCA      PIPTIME1
 0179   REF   4  LAST  802    31,2611  53'625 0            DXCH     TPIP

 0180                         31,2612  0 0006 1            EXTEND
 0181   REF   4  LAST  786    31,2613  3 1643 1            DCA      TTF/8
 0182   REF   2  LAST  149    31,2614  53'553 1            DXCH     TTF/8TMP

 0183   REF   4  LAST  785    31,2615  11'623 0            CCS      FLPASS0
 0184   REF   3  LAST  798    31,2616  1 2641 1            TCF      TTFINCR

 0185   REF   4  LAST  801    31,2617  51'351 1  BRSPOT1   INDEX    WCHPHASE
 0186   REF   1               31,2620  1 2421 0            TCF      NEWPHASE

R0187   ***************************************************************************************************************
R0189   ROUTINES TO START NEW PHASES
R0190   ***************************************************************************************************************

 0192   REF   4  LAST  801    31,2621  0 5311 1  P65START  TC       NEWMODEX
 0193                         31,2622   00101 1            DEC      65
 0194   REF  46  LAST  801    31,2623  4 4752 1            CS       TWO
 0195   REF   2  LAST  800    31,2624  55'647 1            TS       WCHVERT
 0196   REF  72  LAST  801    31,2625  0 5516 0            TC       DOWNFLAG          PERMIT X-AXIS OVERRIDE
 0197   REF   4  LAST  801    31,2626   00311 1            ADRES    XOVINFLG
 0198   REF   4  LAST  802    31,2627  1 2641 1            TCF      TTFINCR


 0199   REF   5  LAST  802    31,2630  0 5311 1  STARTP64  TC       NEWMODEX
 0200                         31,2631   00100 0            DEC      64
 0201   REF   1               31,2632  3 1425 0            CA       DELTTFAP          AUGMENT TTF/8
 0202   REF   3  LAST  802    31,2633  27'552 0            ADS      TTF/8TMP
 0203   REF  28  LAST  781    31,2634  3 4740 0            CA       BIT12             ENABLE RUPT10
 0204                         31,2635  0 0006 1            EXTEND
 0205   REF  15  LAST  557    31,2636  05 013 0            WOR      CHAN13
 0206   REF  73  LAST  802    31,2637  0 5516 0            TC       DOWNFLAG          INITIALIZE REDESIGNATION FLAG
 0207   REF   3  LAST  801    31,2640   00143 1            ADRES    REDFLAG

R0208      (CONTINUE TO TTFINCR)

R0209   ***************************************************************************************************************
R0211   INCREMENT TTF/8, UPDATE LAND FOR LUNAR ROTATION, DO OTHER USEFUL THINGS
R0212   ***************************************************************************************************************

R0214               TTFINCR COMPUTATIONS ARE AS FOLLOWS:-
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R0215                        TTF/8 UPDATED FOR TIME SINCE LAST PASS:

R0216                                   TTF/8 = TTF/8 + (TPIP - TPIPOLD)/8

R0217                        LANDING SITE VECTOR UPDATED FOR LUNAR ROTATION:

R0218                                   -                  -      -                      -
R0220                                   LAND = /LAND/ UNIT(LAND - LAND(TPIP - TPIPOLD) * WM)

R0222                        SLANT RANGE TO LANDING SITE, FOR DISPLAY:

R0223                                                    -      -
R0224                                   RANGEDSP = ABVAL(LAND - R)

 0225   REF 126  LAST  800   31,2641  0 6037 0  TTFINCR  TC     INTPRET
 0226                        31,2642   45345 1           DLOAD  DSU
 0227   REF   5  LAST  802   31,2643   03625 0                  TPIP
 0228   REF   2  LAST  802   31,2644   03574 1                  TPIPOLD
 0229                        31,2645   41461 1           SLP    PUSH            SHIFT SCALES DELTA TIME TO 2(17) CSECS
 0230                        31,2646   21214 0                  11D
 0231                        31,2647   47361 0           VXSC   VXV
 0232   REF   5  LAST  788   31,2650   03635 1                  LAND
 0233   REF   2  LAST  120   31,2651   02325 1                  WM
 0234                        31,2652   47045 0           BVSU   RTB
 0235   REF   6  LAST  803   31,2653   03635 1                  LAND
 0236   REF   2  LAST  339   31,2654   21726 1                  NORMUNIT
 0237                        31,2655   76561 1           VXSC   VSL1
 0238   REF   3  LAST  120   31,2656   02333 0                  /LAND/
 0239   REF   2  LAST  149   31,2657   17545 0           STODL  LANDTEMP
 0240                        31,2660   77776 1           EXIT

 0241   REF 297  LAST  796   31,2661  52 155 1           DXCH   MPAC
 0242   REF   4  LAST  802   31,2662  21'553 1           DAS    TTF/8TMP        NOW HAVE INCREMENTED TTF/8 IN TTF/8TMP

 0243   REF   4  LAST  802   31,2663  0 3740 1           TC     FASTCHNG

 0244                        31,2664  0 0006 1           EXTEND
 0245   REF   5  LAST  803   31,2665  3 1553 0           DCA    TTF/8TMP
 0246   REF   5  LAST  802   31,2666  53'643 0           DXCH   TTF/8

 0247                        31,2667  0 0006 1           EXTEND
 0248   REF   3  LAST  803   31,2670  3 1545 1           DCA    LANDTEMP
 0249   REF   7  LAST  803   31,2671  53'635 1           DXCH   LAND
 0250                        31,2672  0 0006 1           EXTEND
 0251   REF   4  LAST  803   31,2673  3 1547 0           DCA    LANDTEMP +2
 0252   REF   8  LAST  803   31,2674  53'637 0           DXCH   LAND     +2
 0253                        31,2675  0 0006 1           EXTEND
 0254   REF   5  LAST  803   31,2676  3 1551 1           DCA    LANDTEMP +4
 0255   REF   9  LAST  803   31,2677  53'641 1           DXCH   LAND     +4
 0256   REF   1                31,2700  0 3704 1            TC      TDISPSET
 0257   REF   5  LAST  803     31,2701  0 3740 1            TC      FASTCHNG          SINCE REDESIG MAY CHANGE LANDTEMP

 0258   REF   5  LAST  802     31,2702  51'351 1  BRSPOT2   INDEX   WCHPHASE
 0259   REF   1                31,2703  1 2425 1            TCF     PREGUIDE

R0260   ***********************************************************************************************************************
R0262   LANDING SITE PERTURBATION EQUATIONS
R0263   ***********************************************************************************************************************

 0265   REF   4  LAST  781     31,2704  3 0102 1  REDESIG   CA      FLAGWRD6          IS REDFLAG SET?
 0266   REF   1                31,2705  7 4746 1            MASK    REDFLBIT
 0267                          31,2706  0 0006 1            EXTEND
 0268   REF   3  LAST  798     31,2707  1 3013 1            BZF     RGVGCALC          NO:   SKIP REDESIGNATION LOGIC

 0269   REF   1                31,2710  3 1666 0            CA      TREDES            YES:  HAS TREDES REACHED ZERO?
 0270                          31,2711  0 0006 1            EXTEND
 0271   REF   4  LAST  804     31,2712  1 3013 1            BZF     RGVGCALC          YES:  SKIP REDESIGNATION LOGIC

 0272                          31,2713  0 0004 0            INHINT
 0273   REF   1                31,2714  3 1267 0            CA      ELINCR1
 0274   REF   2  LAST  [illegible]  31,2715  55'554 0       TS      ELINCR
 0275   REF   2  LAST  106     31,2716  3 1266 1            CA      AZINCR1
 0276   REF   2  LAST  149     31,2717  55'556 1            TS      AZINCR
 0277   REF   6  LAST  804     31,2720  0 3740 1            TC      FASTCHNG

 0278   REF 143  LAST  801     31,2721  3 4755 1            CA      ZERO
 0279   REF   2  LAST  804     31,2722  55'267 1            TS      ELINCR1
 0280   REF   3  LAST  804     31,2723  55'266 0            TS      AZINCR1
 0281   REF   3  LAST  804     31,2724  55'555 1            TS      ELINCR   +1
 0282   REF   3  LAST  804     31,2725  55'557 0            TS      AZINCR   +1

 0283   REF  19  LAST  601     31,2726  3 0120 1            CA      FIXLOC            SET PD TO 0
 0284   REF   6  LAST  603     31,2727  54'166 1            TS      PUSHLOC

 0285   REF 127  LAST  803     31,2730  0 6037 0            TC      INTPRET
 0286                          31,2731   52375 1            VLOAD   VSU
 0287   REF  10  LAST  803     31,2732   03635 1                    LAND
 0288   REF   7  LAST  783     31,2733   03521 1                    R                             -      -
 0289                          31,2734   41434 1            RTB     PUSH              PUSH DOWN UNIT (LAND - R)
 0290   REF   3  LAST  803     31,2735   21726 1                    NORMUNIT
 0291                          31,2736   76435 1            VXV     VSL1
 0292   REF   2  LAST  114     31,2737   02154 0                    YNBPIP                                 -            -     -
 0293                          31,2740   65361 0            VXSC    PDDL              PUSH DOWN - ELINCR(YNB * UNIT(LAND - R))
 0294   REF [illegible] LAST 804  31,2741   03555 1                 ELINCR
 0295   REF   4  LAST  804     31,2742   03557 0                    AZINCR
 0296                          31,2743   52361 1            VXSC    VSU
 0297   REF   3  LAST  804     31,2744   02154 0                    YNBPIP
 0298                          31,2745   41455 0            VAD     PUSH              RESULTING VECTOR IS 1/2 REAL SIZE
 0299                           31,2746   45345 1            DLOAD   DSU                  MAKE SURE REDESIGNATION IS NOT
 0300                           31,2747   00001 0                    0                      TOO CLOSE TO THE HORIZON
 0301   REF    1                31,2750   05660 1                    DEPRCRIT
 0302                           31,2751   71240 1            BMN     DLOAD
 0303   REF    1                31,2752   62755 1                    REDES1
 0304   REF    2  LAST  805     31,2753   05660 1                    DEPRCRIT
 0305                           31,2754   00001 0            STORE   0
 0306                           31,2755   45345 1  REDES1    DLOAD   DSU
 0307   REF   11  LAST  804     31,2756   03635 1                    LAND
 0308   REF    8  LAST  804     31,2757   03521 1                    R
 0309                           31,2760   74271 0            DDV     VXSC
 0310                           31,2761   00001 0                    0
 0311                           31,2762   53455 0            VAD     UNIT
 0312   REF    9  LAST  805     31,2763   03521 1                    R
 0313                           31,2764   76561 1            VXSC    VSL1
 0314   REF    4  LAST  803     31,2765   02333 0                    /LAND/
 0315   REF    6  LAST  803     31,2766   03545 0            STORE   LANDTEMP
 0316                           31,2767   77776 1            EXIT                         LOOKANGL WILL BE COMPUTED AT RGVGCALC

 0317   REF    7  LAST  804     31,2770  0 3740 1            TC      FASTCHNG

 0318                           31,2771  0 0006 1            EXTEND
 0319   REF    7  LAST  805     31,2772  3 1545 1            DCA     LANDTEMP
 0320   REF   12  LAST  805     31,2773  5 3635 1            DXCH    LAND
 0321                           31,2774  0 0006 1            EXTEND
 0322   REF    3  LAST  805     31,2775  3 1547 0            DCA     LANDTEMP +2
 0323   REF   13  LAST  805     31,2776  5 3637 0            DXCH    LAND     +2
 0324                           31,2777  0 0006 1            EXTEND
 0325   REF    9  LAST  805     31,3000  3 1551 1            DCA     LANDTEMP +4
 0326   REF   14  LAST  805     31,3001  5 3641 1            DXCH    LAND     +4

 0327   REF    5  LAST  804     31,3002  1 3013 1            TCF     RGVGCALC

R0328   ************************************************************************************************************
R0330   COMPUTE STATE IN GUIDANCE COORDINATES
R0331   ************************************************************************************************************

R0333                RGVGCALC COMPUTATIONS ARE AS FOLLOWS:-

R0334                          VELOCITY RELATIVE TO THE SURFACE:

R0335                                     -          -    -    -
R0336                                     ANGTERM  = V  + R  * WM

R0337                          STATE IN GUIDANCE COORDINATES:

R0338                                     -    *    -    -
R0339                                     RGU = CG (R  - LAND)

R0340                                     -    *    -    -    -
```

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R0341                                    VGU = CG (V - WM * R)

R0342                       HORIZONTAL VELOCITY FOR DISPLAY:

R0343                                    VHORIZ = 8 ABVAL (0, VG , VG )
R0344                                                           2    1

R0345                       DEPRESSION ANGLE FOR DISPLAY:

R0346                                                           -   -     -
R0347                                    LOOKANGL = ARCSIN(UNIT(R - LAND).XMBPIP)

 0348   REF 128  LAST  804    31,3003  0 6037 0  CALCRGVG TC      INTPRET         IN IGNALG, COMPUTE V FROM INTEGRATION
 0349                         31,3004   64375 1           VLOAD   MXV               OUTPUT AND TRIM CORRECTION TERM
 0350   REF  14  LAST  788    31,3005   00025 0                   VATT1             COMPUTED LAST PASS AND LEFT IN UNFC/2
 0351   REF  27  LAST  786    31,3006   01734 0                   REFSMMAT
 0352                         31,3007   53362 0           VSR1    VAD
 0353   REF   6  LAST  788    31,3010   03254 1                   UNFC/2
 0354   REF   4  LAST  788    31,3011   03527 1           STORE   V
 0355                         31,3012   77776 1           EXIT

 0356   REF 129  LAST  806    31,3013  0 6037 0  RGVGCALC TC      INTPRET         ENTER HERE TO RECOMPUTE RG AND VG
 0357                         31,3014   47375 0           VLOAD   VXV
 0358   REF  10  LAST  805    31,3015   03521 1                   R
 0359   REF   3  LAST  803    31,3016   02325 1                   WM
 0360                         31,3017   70455 1           VAD     VSR2            RESCALE TO UNITS OF 2(9) M/CS
 0361   REF   5  LAST  806    31,3020   03527 1                   V
 0362   REF   2  LAST  119    31,3021   02265 1           STORE   ANGTERM
 0363                         31,3022   77721 0           MXV
 0364   REF   5  LAST  786    31,3023   02603 0                   CG              NO SHIFT SINCE ANGTERM IS DOUBLE SIZED
 0365   REF   6  LAST  787    31,3024   03627 1           STORE   VGU
 0366                         31,3025   55525 0           PDDL    VDEF            FORM (0,VG ,VG ) IN UNITS OF 2(10) M/CS
 0367   REF  14  LAST  800    31,3026   06522 1                   ZEROVECS                  2   1
 0368                         31,3027   52446 0           ABVAL   SL3
 0369   REF   3  LAST  315    31,3030   26263 1           STOVL   VHORIZ          VHORIZ FOR DISPLAY DURING P65.
 0370   REF  11  LAST  806    31,3031   03521 1                   R                         -   -
 0371                         31,3032   41451 1           VSU     PUSH            PUSH DOWN R - LAND
 0372   REF  15  LAST  805    31,3033   03635 1                   LAND
 0373                         31,3034   76521 0           MXV     VSL1
 0374   REF   6  LAST  806    31,3035   02603 0                   CG
 0375   REF   5  LAST  787    31,3036   02637 1           STORE   RGU
 0376                         31,3037   77646 0           ABVAL
 0377   REF   3  LAST  315    31,3040   26625 1           STOVL   RANGEDSP
 0378                         31,3041   50234 1           RTB     DOT             NOW IN MPAC IS SINE(LOOKANGL)/4
 0379   REF   4  LAST  804    31,3042   21726 1                   NORMUNIT
 0380   REF   2  LAST  114    31,3043   02146 0                   XNBPIP
 0381                         31,3044   77776 1           EXIT

 0382   REF  20  LAST  804    31,3045  3 0120 1           CA      FIXLOC          RESET PUSH DOWN POINTER
 0383   REF   7  LAST  804    31,3046  54 166 1           TS      PUSHLOC
 0384   REF 298  LAST  803   31,3047  3 0154 1             CA      MPAC              COMPUTE LOOKANGL ITSELF
 0385                        31,3050  6 0000 1             DOUBLE
 0386   REF 224  LAST  801   31,3051  0 4616 1             TC      BANKCALL
 0387   REF   1              31,3052   61672 0             CADR    SPARCSIN -1
 0388   REF   1              31,3053  6 3753 0             AD      1/2DEG
 0389                        31,3054  0 0006 1             EXTEND
 0390   REF   1              31,3055  7 3752 0             MP      180DEGS
 0391   REF   1              31,3056  55'667 0             TS      LOOKANGL          LOOKANGL FOR DISPLAY DURING P64

 0392   REF   6  LAST  804   31,3057  51'351 1  BPSPLT3    INDEX   WCHPHASE
 0393   REF   1              31,3060  1 2431 1             TCF     WHATGUID

R0394   ************************************************************************************************************
R0396   TTF/8 COMPUTATION
R0397   ************************************************************************************************************

 0399   REF   1              31,3061  0 3677 1  TTF/8CL    TC      INTPRETX
 0400                        31,3062   77743 1             DLOAD*
 0401   REF   1              31,3063   02431 0                     JDG2TTF,1
 0402   REF   2  LAST  149   31,3064   23571 0             STODL*  TABLTTF   +6      A(3) = 8 JDG  TO TABLTTF
 0403   REF   1              31,3065   02427 1                     ADG2TTF,1                  2
 0404   REF   3  LAST  807   31,3066   17567 0             STODL   TABLTTF   +4      A(2) = 6 ADG  TO TABLTTF
 0405   REF   7  LAST  806   31,3067   03633 1                     VGU       +4                 2
 0406                        31,3070   42605 1             DMP     DAD*
 0407   REF   1              31,3071   05656 1                     3/4DP
 0408   REF   1              31,3072   02425 0                     VDG2TTF,1
 0409   REF   4  LAST  807   31,3073   23565 0             STODL*  TABLTTF   +2      A(1) = (6 VGU  + 18 VDG )/8 TO TABLTTF
 0410   REF   1              31,3074   02407 0                     RDG     +4,1                2          2
 0411                        31,3075   41225 1             DSU     DMP
 0412   REF   6  LAST  806   31,3076   02643 1                     RGU       +4
 0413   REF   1              31,3077   05654 0                     3/8DP
 0414   REF   5  LAST  807   31,3100   03563 1             STORE   TABLTTF           A(0) = -24(RGU  - RDG )/64 TO TABLTTF
 0415                        31,3101   77776 1             EXIT                                   2      2

 0416   REF  27  LAST  613   31,3102  3 4744 1             CA      BIT8
 0417   REF   6  LAST  807   31,3103  55'572 1             TS      TABLTTF   +10     FRACTIONAL PRECISION FOR TTF TO TABLE

 0418                        31,3104  0 0006 1             EXTEND
 0419   REF   6  LAST  803   31,3105  3 1643 1             DCA     TTF/8
 0420   REF 299  LAST  807   31,3106  52'155 1             DXCH    MPAC              LOADS TTF/8 (INITIAL GUESS) INTO MPAC
 0421   REF  47  LAST  802   31,3107  3 4752 0             CAF     TWO               DEGREE - ONE
 0422   REF 109  LAST  774   31,3110  54'001 1             TS      L
 0423   REF   1              31,3111  3 3746 1             CAF     TABLTTFL
 0424   REF   1              31,3112  0 3553 1             TC      ROOTPSRS          YIELDS TTF/8 IN MPAC
 0425   REF   7  LAST  807   31,3113  51'351 1             INDEX   WCHPHASE
 0426   REF   1              31,3114  1 2447 0             TCF     WHATALM

 0427                        31,3115  0 0006 1             EXTEND                    GOOD RETURN
 0428   REF 300  LAST  807   31,3116  3 0155 0             DCA     MPAC              FETCH TTF/8 KEEPING IT IN MPAC
 0429   REF   7  LAST  807   31,3117  53'643 0             DXCH    TTF/8             CORRECTED TTF/8
 0430   REF   2  LAST  804    31,3120   0 3704 1            TC      TDISPSET

A0431                                                 (CONTINUE TO QUADGUID)


R0432   *************************************************************************************************
R0434   MAIN GUIDANCE EQUATION
R0435   *************************************************************************************************

R0437                            AS PUBLISHED:-

R0438                                                 -       -        -       -
R0439                                        -     -     6(VDG + VG)   12(RDG - RG)
R0440                                       ACG = ADG + ----------- + ------------
R0441                                                        TTF        (TTF)(TTF)

R0442                            AS HERE PROGRAMMED:-

R0443                                                        -     -
R0444                                            3 (1/4(RDG - RG)    -      - )
R0445                                            - (------------- + VDG + VG)
R0446                                      -     4 (     TTF/8                )   -
R0447                                     ACG = ----------------------------- + ADG
R0448                                                         TTF/8

 0449   REF   8  LAST  807    31,3121   4 1642 1  QUADGUID CS      TTF/8
 0450   REF   1               31,3122   6 1426 0           AD      LEADTIME         LEADTIME IS A NEGATIVE NUMBER
 0451   REF  15  LAST  796    31,3123   6 4733 1           AD      POSMAX           SAFEGUARD THE COMPUTATIONS THAT FOLLOW
 0452   REF 110  LAST  807    31,3124  54 001  1           TS      L                  BY FORCING -TTF+LEADTIME > OR = ZERO
 0453   REF 111  LAST  808    31,3125   4 0001 1           CS      L
 0454   REF 112  LAST  808    31,3126   6 0001 0           AD      L
 0455                         31,3127  22 007  0           ZL
 0456                         31,3130   0 0006 1           EXTEND
 0457   REF   9  LAST  808    31,3131  11'642  1           DV      TTF/8
 0458   REF  57  LAST  796    31,3132  54 130  1           TS      BUF              - RATIO OF LAG-DIMINISHED TTF TO TTF
 0459                         31,3133   0 0006 1           EXTEND
 0460                         31,3134   7 0000 0           SQUARE
 0461   REF  58  LAST  808    31,3135  54 131  0           TS      BUF   +1
 0462   REF  59  LAST  808    31,3136   6 0130 0           AD      BUF
 0463   REF  60  LAST  808    31,3137  56 131  1           XCH     BUF   +1         RATIO SQUARED - RATIO
 0464   REF  61  LAST  808    31,3140   6 0131 1           AD      BUF   +1
 0465   REF 301  LAST  807    31,3141  54 154  0           TS      MPAC             COEFFICIENT FOR VGU TERM
 0466   REF  62  LAST  808    31,3142   6 0131 1           AD      BUF   +1
 0467   REF  21  LAST  806    31,3143  50 120  1           INDEX   FIXLOC
 0468                         31,3144  54 032  1           TS      26D              COEFFICIENT FOR RDG-RGU TERM
 0469   REF  63  LAST  808    31,3145   6 0131 1           AD      BUF   +1
 0470   REF  22  LAST  808    31,3146  50 120  1           INDEX   FIXLOC
 0471                         31,3147  54 034  1           TS      28D              COEFFICIENT FOR VDG TERM
 0472   REF  64  LAST  808    31,3150   6 0130 0           AD      BUF
 0473   REF  16  LAST  808    31,3151   6 4733 1           AD      POSMAX
 0474   REF  65  LAST  808   31,3152  6 0131 1                  AD      BUF   +1
 0475   REF  66  LAST  809   31,3153  6 0131 1                  AD      BUF   +1
 0476   REF  23  LAST  808   31,3154  50 120 1                  INDEX   FIXLOC
 0477                        31,3155  54 036 0                  TS      30D                 COEFFICIENT FOR ADG TERM

 0478   REF 149  LAST  804   31,3156  3 4755 1                  CAF     ZERO
 0479   REF   8  LAST  603   31,3157  54 163 1                  TS      MODE

 0480   REF   2  LAST  807   31,3160  0 3677 1                  TC      INTPRETX
 0481                        31,3161   65361 0                  VXSC    PDDL
 0482   REF   8  LAST  807   31,3162   03627 1                          VCU
 0483                        31,3163   00035 1                          28D
 0484                        31,3164   62757 0                  VXSC*   PDVL*
 0485   REF   1              31,3165   02411 1                          VDG,1
 0486   REF   2  LAST  807   31,3166   02403 1                          RDG,1
 0487                        31,3167   70251 0                  VSU     V/SC
 0488   REF   7  LAST  807   31,3170   02637 1                          RGU
 0489   REF  10  LAST  808   31,3171   03643 0                          TTF/8
 0490                        31,3172   74342 1                  VSR2    VXSC
 0491                        31,3173   00033 1                          26D
 0492                        31,3174   53255 0                  VAD     VAD
 0493                        31,3175   74341 1                  V/SC    VXSC
 0494   REF  11  LAST  809   31,3176   03643 0                          TTF/8
 0495   REF   2  LAST  807   31,3177   05656 1                          3/4DP
 0496                        31,3200   73725 0                  PDDL    VXSC*
 0497                        31,3201   00037 0                          30D
 0498   REF   1              31,3202   02417 1                          ADG,1
 0499                        31,3203   77655 1                  VAD
 0500                        31,3204   76505 0         AFCCALC1 VXM     VSL1                VERTGUID COMES HERE
 0501   REF   7  LAST  806   31,3205   02603 0                          CG
 0502                        31,3206   70315 1                  PDVL    V/SC
 0503   REF   5  LAST  786   31,3207   01237 0                          GDT/2
 0504   REF   1              31,3210   05652 0                          GSCALE
 0505                        31,3211   45445 0                  BVSU    STADR
 0506   REF   7  LAST  806   31,3212   74523 0                  STORE   UNFC/2              UNFC/2 NEED NOT BE UNITIZED
 0507                        31,3213   77646 0                  ABVAL
 0508   REF   3  LAST  793   31,3214   17464 1         AFCCALC2 STODL   /AFC/               MAGNITUDE OF AFC FOR THROTTLE
 0509   REF   8  LAST  809   31,3215   03254 1                          UNFC/2              VERTICAL COMPONENT
 0510                        31,3216   65316 0                  DSQ     PDDL
 0511   REF   9  LAST  809   31,3217   03256 0                          UNFC/2    +2        OUT-OF-PLANE
 0512                        31,3220   65316 0                  DSQ     PDDL
 0513   REF   1              31,3221   05650 1                          HIGHESTF
 0514                        31,3222   63471 0                  DDV     DSQ
 0515   REF   6  LAST  796   31,3223   01245 0                          MASS                                  2       2        2
 0516                        31,3224   45225 0                  DSU     DSU                 AMAXHORIZ = SQRT(ATOTAL   - A     - A   )
 0517                        31,3225   71244 0                  BPL     DLOAD                                          1       0
 0518   REF   1              31,3226   63230 0                          AFCCALC3
 0519   REF  15  LAST  806   31,3227   06522 1                          ZEROVECS
 0520                        31,3230   43366 0         AFCCALC3 SQRT    DAD
 0521   REF  10  LAST  809   31,3231   03260 0                          UNFC/2    +4
 0522                        31,3232   44244 0            BPL     BDSU
 0523   REF   1              31,3233   63236 0                    AFCCLEND
 0524   REF  11  LAST  809   31,3234   03260 0                    UNFC/2    +4
 0525   REF  12  LAST  810   31,3235   03260 0            STORE   UNFC/2    +4
 0526                        31,3236   77776 1  AFCCLEND  EXIT
 0527   REF   8  LAST  805   31,3237  0 3740 1            TC      FASTCHNG

 0528   REF   8  LAST  807   31,3240  3 1351 1            CA      WCHPHASE          PREPARE FOR PHASE SWITCHING LOGIC
 0529   REF   4  LAST  801   31,3241  55'621 1            TS      WCHPHOLD
 0530   REF   5  LAST  802   31,3242  25'623 1            INCR    FLPASS0           INCREMENT PASS COUNTER

 0531   REF   9  LAST  810   31,3243  51'351 1  BRSPOT4   INDEX   WCHPHASE
 0532   REF   1              31,3244  1 2435 0            TCF     AFTRGUID

R0533   ************************************************************************************************************
R0535   ERECT GUIDANCE-STABLE MEMBER TRANSFORMATION MATRIX
R0536   ************************************************************************************************************

 0538   REF   6  LAST  793   31,3245  3 5014 1  CGCALC    CAF     EBANK5
 0539   REF  27  LAST  794   31,3246  54 003 0            TS      EBANK
 0540   REF   2  LAST  121   15,1435                      EBANK=  TCGIBRAK
 0541                        31,3247  0 0006 1            EXTEND
 0542   REF  10  LAST  810   31,3250  5 1351 1            INDEX   WCHPHASE
 0543   REF   1              31,3251  5 2452 0            INDEX   TARGTDEX
 0544   REF   2  LAST  121   31,3252  3 1435 1            DCA     TCGFBRAK
 0545   REF  17  LAST  750   31,3253  24 006 1            INCR    BBANK
 0546   REF  13  LAST  810   31,3254  24 006 1            INCR    BBANK
 0547   REF  12  LAST  809   E7,1642                      EBANK=  TTF/8
 0548   REF  13  LAST  810   31,3255  6 1642 0            AD      TTF/8
 0549   REF 113  LAST  808   31,3256  56 001 0            XCH     L
 0550   REF  14  LAST  810   31,3257  6 1642 0            AD      TTF/8
 0551   REF 233  LAST  801   31,3260  10 000 0            CCS     A
 0552   REF 114  LAST  810   31,3261  10 001 1            CCS     L
 0553   REF   1              31,3262  1 3313 1            TCF     EXTLOGIC
 0554   REF   2  LAST  810   31,3263  1 3313 1            TCF     EXTLOGIC
 0555                        31,3264  13 265 1            NOOP

 0556   REF   3  LAST  809   31,3265  0 3677 1            TC      INTPRETX
 0557                        31,3266   53575 0            VLOAD   UNIT
 0558   REF  16  LAST  806   31,3267   03635 1                    LAND
 0559   REF   8  LAST  809   31,3270   16603 0            STODL   CG
 0560   REF  15  LAST  810   31,3271   03643 0                    TTF/8
 0561                        31,3272   74203 0            DMP*    VXSC
 0562   REF   2  LAST  121   31,3273   02433 1                    GAINBRAK,1        NUMERO MYSTERIOSO
 0563   REF   3  LAST  806   31,3274   02265 1                    ANGTERM
 0564                        31,3275   77655 1            VAD
 0565   REF  17  LAST  810   31,3276   03635 1                    LAND
 0566                        31,3277   47051 0            VSU     RTB
 0567   REF  12  LAST  806   31,3300   03521 1                    R
 0568   REF   5  LAST  806   31,3301   21726 1                    NORMUNIT
```

```
CGCALC    CA        WCHPHOLD
          TC        INTPRETX
          DLOAD*    EXIT
                    TCGFBRAK,1
          CA        TTF/8
          TS        L
          DAS       MPAC
          CCS       MPAC      +1
          CCS       MPAC
          TCF       EX  ?
          TCF       EX
          NOOP
```

```
 0569                          31,3302   47035 1            VXV     RTB
 0570   REF   14  LAST  810    31,3303   03635 1                    LAND
 0571   REF    6  LAST  810    31,3304   21726 1                    NORMUNIT
 0572   REF    9  LAST  810    31,3305   26611 0            STOVL   CG    +6          SECOND ROW
 0573   REF   10  LAST  811    31,3306   02603 0                    CG
 0574                          31,3307   76435 1            VXV     VSL1
 0575   REF   11  LAST  811    31,3310   02611 0                    CG    +6
 0576   REF   12  LAST  811    31,3311   02617 0            STOFE   CG    +14
 0577                          31,3312   77776 1            EXIT

A0578                                                (CONTINUE TO EXTLOGIC)

R0579   *****************************************************************************************************************
R0581   PREPARE TO EXIT
R0582   *****************************************************************************************************************

R0584   DECIDE (1) HOW TO EXIT, AND (2) WHETHER TO SWITCH PHASES

 0585   REF   11  LAST  810    31,3313   51'351 1  EXTLOGIC INDEX   WCHPHASE          WCHPHASE = 1    APPRQUAD
 0586   REF    2  LAST  139    31,3314   3 1423 0           CA      TENDBRAK          WCHPHASE = 0    BRAKQUAD
 0587   REF   16  LAST  810    31,3315   6 1642 0           AD      TTF/8

 0588                          31,3316   0 0006 1  EXSPOT1  EXTEND
 0589   REF   12  LAST  811    31,3317   5 1351 1           INDEX   WCHPHASE
 0590   REF    1               31,3320   6 2441 1           BZMF    WHATEXIT

 0591   REF    9  LAST  810    31,3321   0 3740 1           TC      FASTCHNG

 0592   REF    5  LAST  810    31,3322   3 1621 0           CA      WCHPHOLD
 0593   REF   88  LAST  796    31,3323   6 4753 1           AD      ONE
 0594   REF   13  LAST  811    31,3324   55'351 0           TS      WCHPHASE
 0595   REF  150  LAST  809    31,3325   3 4755 1           CA      ZERO
 0596   REF    6  LAST  810    31,3326   55'623 0           TS      FLPASS0           RESET FLPASS0

 0597   REF    6  LAST  811    31,3327   51'621 0           INDEX   WCHPHOLD
 0598   REF    2  LAST  811    31,3330   1 2441 0           TCF     WHATEXIT

R0599   *****************************************************************************************************************
R0601   ROUTINES FOR EXITING FROM LANDING GUIDANCE
R0602   *****************************************************************************************************************

R0604   1.        EXGSUB IS THE RETURN WHEN GUIDSUB IS CALLED BY THE IGNITION ALGORITHM.

R0606   2.        EXBRAK IN THE EXIT USED DURING THE BRAKING PHASE.   IN THIS CASE UNIT(F) IS THE WINDOW POINTING VECTOR.

R0608   3.        EXNORM IS THE EXIT USED AT OTHER TIMES DURING THE BURN.

R0609             (EXOVFLOW IS A SUBROUTINE OF EXBRAK AND EXNORM CALLED WHEN OVERFLOW OCCURRED ANYWHERE IN GUIDANCE.)

 0611   REF  130  LAST  806    31,3331   0 6037 0  EXGSUB   TC      INTPRET           COMPUTE TRIM VELOCITY CORRECTION TERM
```

```
0612                      31,3332    47175 1              VLOAD   RTB
0613   REF  13  LAST 810  31,3333    03254 1                      UNFC/2
0614   REF   7  LAST 811  31,3334    21726 1                      NORMUNIT
0615                      31,3335    74361 0              VXSC    VXSC
0616   REF   5  LAST 788  31,3336    03423 1                      ZOOMTIME
0617   REF   1            31,3337    22001 0                      TRIMACCL
0618   REF  14  LAST 812  31,3340    03254 1              STORE   UNFC/2
0619                      31,3341    77776 1              EXIT

0620   REF   3  LAST 799  31,3342   11'647 1              CCS     NGUIDSUB
0621   REF   1            31,3343   1 2460 0              TCF     GUIDSUB
0622   REF   3  LAST 787  31,3344   11'646 0              CCS     NIGNLOOP
0623                      31,3345   1 3350 0              TCF     +3
0624   REF  31  LAST 772  31,3346   0 5567 0              TC      ALARM
0625                      31,3347    01412 1              OCT     01412

0626   REF  46  LAST 789  31,3350   0 4635 0    +3        TC      POSTJUMP
0627   REF   1            31,3351    55102 1              CADR    DDUMCALC

0628   REF 131  LAST 811  31,3352   0 6037 0  EXBRAK      TC      INTPRET
0629                      31,3353    77775 1              VLOAD
0630   REF   8  LAST 779  31,3354    03537 0                      UNIT/R/
0631   REF   2  LAST 136  31,3355    03262 1              STORE   UNWC/2
0632                      31,3356    77776 1              EXIT
0633   REF   2  LAST 798  31,3357   1 3432 0              TCF     STEER?

0634   REF 132  LAST 812  31,3360   0 6037 0  EXNORM      TC      INTPRET
0635                      31,3361    52375 1              VLOAD   VSU
0636   REF  19  LAST 811  31,3362    03635 1                      LAND
0637   REF  13  LAST 810  31,3363    03521 1                      R
0638                      31,3364    77634 0              RTB
0639   REF   8  LAST 812  31,3365    21726 1                      NORMUNIT
0640   REF   3  LAST 812  31,3366    03262 1              STORE   UNWC/2            UNIT(LAND - R) IS TENTATIVE CHOICE
0641                      31,3367    50235 0              VXV     DOT
0642   REF   3  LAST 806  31,3370    02146 0                      XNBPIP
0643   REF  13  LAST 811  31,3371    02611 0                      CG +6
0644                      31,3372    77776 1              EXIT                      WITH PROJ IN MPAC 1/8 REAL SIZE

0645   REF 302  LAST 808  31,3373   4 0154 0              CS      MPAC              GET COEFFICIENT FOR CG +14
0646   REF   1            31,3374   6 3754 1              AD      PROJMAX
0647   REF  17  LAST 808  31,3375   6 4733 1              AD      POSMAX
0648   REF  67  LAST 809  31,3376   54 130 1              TS      BUF
0649   REF  68  LAST 812  31,3377   4 0130 1              CS      BUF
0650   REF  69  LAST 812  31,3400   26 130 1              ADS     BUF               RESULT IS 0 IF PROJMAX - PROJ NEGATIVE

0651   REF   1            31,3401   4 3755 1              CS      PROJMIN           GET COEFFICIENT FOR UNIT(LAND - R)
0652   REF 303  LAST 812  31,3402   6 0154 1              AD      MPAC
0653   REF  18  LAST 812  31,3403   6 4733 1              AD      POSMAX
0654   REF  70  LAST 812  31,3404   54 131 0              TS      BUF +1
0655   REF  71  LAST 812  31,3405   4 0131 0              CS      BUF +1
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 0656   REF  72  LAST  812   31,3406  26 131 0            ADS     BUF +1        RESULT IS 0 IF PROJ - PROJMIN NEGATIVE

 0657   REF  14  LAST  785   31,3407  3 4751 0            CAF     FOUR
 0658   REF  16  LAST  725   31,3410  7 6242 1  UNWCLOOP  MASK    SIX
 0659   REF 196  LAST  796   31,3411  54 002 1            TS      Q
 0660   REF   7  LAST  810   31,3412  3 5014 1            CA      EBANK5
 0661   REF  28  LAST  810   31,3413  54 003 0            TS      EBANK
 0662   REF  14  LAST  812   E5,1602                      EBANK=  CG
 0663   REF  73  LAST  813   31,3414  3 0130 0            CA      BUF
 0664                        31,3415  0 0006 1            EXTEND
 0665   REF 197  LAST  813   31,3416  5 0002 0            INDEX   Q
 0666   REF  15  LAST  813   31,3417  7 1616 0            MP      CG   +14
 0667   REF  19  LAST  810   31,3420  24 006 1            INCR    BBANK
 0668   REF   4  LAST  812   E6,1661                      EBANK=  UNWC/2
 0669   REF 198  LAST  813   31,3421  50 002 0            INDEX   Q
 0670   REF   5  LAST  813   31,3422  53'662 0            DXCH    UNWC/2
 0671                        31,3423  0 0006 1            EXTEND
 0672   REF  74  LAST  813   31,3424  7 0131 0            MP      BUF +1
 0673   REF 199  LAST  813   31,3425  50 002 0            INDEX   Q
 0674   REF   6  LAST  813   31,3426  21'662 0            DAS     UNWC/2
 0675   REF 200  LAST  813   31,3427  10 002 1            CCS     Q
 0676   REF   1              31,3430  1 3410 0            TCF     UNWCLOOP

 0677   REF  20  LAST  813   31,3431  24 006 1            INCR    BBANK
 0678   REF  11  LAST  796   E7,1612                      EBANK=  PIF

 0679   REF  20  LAST  762   31,3432  3 0076 0  STEER?    CA      FLAGWRD2      IF STEERSW DOWN NO OUTPUTS
 0680   REF   1              31,3433  7 4741 0            MASK    STEERBIT
 0681                        31,3434  0 0006 1            EXTEND
 0682   REF   1              31,3435  1 3443 0            BZF     RATESTOP

 0683   REF   1              31,3436  3 0121 0  EXVERT    CA      OVFIND        IF OVERFLOW ANYWHERE IN GUIDANCE
 0684                        31,3437  0 0006 1            EXTEND                  DON'T CALL THROTTLE OR FINDCDUW
 0685                        31,3440  1 3453 1            BZF     +13

 0686   REF  32  LAST  812   31,3441  0 5567 0  EXOVFLOW  TC      ALARM         SOUND THE ALARM NON-ABORTIVELY.
 0687                        31,3442   01410 0            OCT     01410

 0688   REF  31  LAST  801   31,3443  3 4737 0  RATESTOP  CAF     BIT13         ARE WE IN ATTITUDE-HOLD?
 0689                        31,3444  0 0006 1            EXTEND
 0690   REF   4  LAST  801   31,3445  02 031 1            RAND    CHAN31
 0691                        31,3446  0 0006 1            EXTEND
 0692   REF   1              31,3447  1 3460 1            BZF     DISPEXIT      YES

 0693   REF 225  LAST  807   31,3450  0 4616 1            TC      BANKCALL      NO:    DO A STOPRATE
 0694   REF   5  LAST  801   31,3451   40165 1            CADR    STOPRATE

 0695   REF   2  LAST  813   31,3452  1 3460 1            TCF     DISPEXIT

 0696   REF   1              31,3453  0 2216 0  GDUMP1    TC      THROTTLE
 0697   REF 133  LAST  812   31,3454  0 6037 0           TC      INTPRET
 0698                        31,3455   77624 1           CALL
 0699   REF   3  LAST  772   31,3456   61111 1                   FINDCDUW -2
 0700                        31,3457   77776 1           EXIT


A0701                                              (CONTINUE TO DISPEXIT)


R0702   **************************************************************************************************
R0704   GUIDANCE LOOP DISPLAYS
R0705   **************************************************************************************************

 0707                        31,3460  0 0006 1  DISPEXIT EXTEND                     KILL GROUP 3:   DISPLAYS WILL BE
 0708   REF  14  LAST  744   31,3461  3 4755 1           DCA     NEGO                 RESTORED BY NEXT GUIDANCE CYCLE
 0709   REF   3  LAST  737   31,3462  52 757 0           DXCH    -PHASE3

 0710   REF  11  LAST  739   31,3463  4 0104 0      +3   CS      FLAGWRD8           IF FLUNDISP IS SET, NO DISPLAY THIS PASS
 0711   REF   2  LAST  739   31,3464  7 4742 0           MASK    FLUNDBIT
 0712                        31,3465  0 0006 1           EXTEND
 0713   REF   1              31,3466  1 3476 0           BZF     ENDLLJOB           TO PICK UP THE TAG

 0714   REF   7  LAST  811   31,3467  51 621 0           INDEX   WCHPHOLD
 0715   REF   1              31,3470  1 2443 1           TCF     WHATDISP

 0716   REF  58  LAST  799   31,3471  0 5353 1  -2       TC      PHASCHNG           KILL GROUP 5
 0717                        31,3472   00035 1           OCT     00035

 0718   REF   1              31,3473  3 3756 0  P63DISPS CAF     V06N63
 0719   REF 226  LAST  813   31,3474  0 4616 1  DISPCOMN TC      BANKCALL
 0720   REF   1              31,3475   20470 0           CADR    REGODSPR

 0721   REF 128  LAST  788   31,3476  1 5155 1  ENDLLJOB TCF     ENDOFJOB

 0722   REF   2  LAST  804   31,3477  3 1666 0  P64DISPS CA      TREDES             HAS TREDES REACHED ZERO?
 0723                        31,3500  0 0006 1           EXTEND
 0724   REF   1              31,3501  1 3523 1           BZF     RED-OVER           YES:  CLEAR REDESIGNATION FLAG

 0725   REF   5  LAST  804   31,3502  4 0102 0           CS      FLAGWRD6           NO:   IS REDFLAG SET?
 0726   REF   2  LAST  804   31,3503  7 4746 1           MASK    REDFLBIT
 0727                        31,3504  0 0006 1           EXTEND
 0728   REF   1              31,3505  1 3525 1           BZF     REDES-OK           YES:  DO STATIC DISPLAY

 0729   REF   1              31,3506  3 3757 1           CAF     V06N64             OTHERWISE USE FLASHING DISPLAY
 0730   REF 227  LAST  814   31,3507  0 4616 1           TC      BANKCALL
 0731   REF   2  LAST  755   31,3510   20462 0           CADR    REFLASHR
 0732   REF  33  LAST  792   31,3511  1 6001 1           TCF     GOTOPOOH           TERMINATE
 0733   REF   1              31,3512  1 3515 1           TCF     P64CEED            PROCEED     PERMIT REDESIGNATIONS
 0734   REF   2  LAST  799   31,3513  1 3477 1           TCF     P64DISPS           RECYCLE
 0735    REF   2  LAST  814    31,3514  1 3476 0             TCF     ENDLLJOB          TO PICK UP THE TAG

 0736    REF 151  LAST  811    31,3515  3 4755 1  P64CEED   CAF     ZERO
 0737    REF   3  LAST  804    31,3516  55'267 1             TS      ELINCR1
 0738    REF   4  LAST  804    31,3517  55'266 0             TS      AZINCR1

 0739    REF  48  LAST  782    31,3520  0 5504 0             TC      UPFLAG            ENABLE REDESIGNATION LOGIC
 0740    REF   4  LAST  802    31,3521   00143 1             ADRES   REDFLAG

 0741    REF 129  LAST  814    31,3522  1 5155 1             TCF     ENDOFJOB

 0742    REF  74  LAST  802    31,3523  0 5516 0  RED-OVER  TC      DOWNFLAG
 0743    REF   5  LAST  815    31,3524   00143 1             ADRES   REDFLAG
 0744    REF   2  LAST  814    31,3525  3 3757 1  REDES-OK  CAF     V06N64
 0745    REF   1               31,3526  1 3474 1             TCF     DISPCOMN


 0746    REF   1               31,3527  3 3760 0  VERTDISP  CAF     V06N60
 0747    REF   2  LAST  815    31,3530  1 3474 1             TCF     DISPCOMN

R0748    ******************************************************************************************
R0750    GUIDANCE FOR P65
R0751    ******************************************************************************************

 0753    REF   3  LAST  802    31,3531  11'647 1  VERTGUID  CCS     WCHVERT
 0754    REF   1               31,3532  1 3545 1             TCF     P67VERT           POSITIVE NON-ZERO ---> P67
 0755    REF   1               31,3533  1 3543 1             TCF     P66VERT           +0

R0756                  THE P65 GUIDANCE EQUATION IS AS FOLLOWS:-

R0757                                     -        -
R0758                                     V2FG  -  VGU
R0759                              ACG =  ----------
R0760                                       TAUVERT

 0761    REF 134  LAST  814    31,3534  0 6037 0  P65VERT   TC      INTPRET
 0762                          31,3535   52375 1             VLOAD   VSU
 0763    REF   2  LAST  121    31,3536   02511 0                     V2FG
 0764    REF   9  LAST  809    31,3537   03627 1                     VGU
 0765                          31,3540   52141 1             V/SC    GOTO
 0766    REF   2  LAST  121    31,3541   02517 0                     TAUVERT
 0767    REF   1               31,3542   63204 1                     AFCCALC1
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R0769      ****************************************************************************************************************
R0770      GUIDANCE FOR P66
R0771      ****************************************************************************************************************

 0773      REF  47  LAST  812    31,3543  0 4635 0  P66VERT   TC      POSTJUMP
 0774      REF   1               31,3544   65270 1            CADR    P66VERTA

 0775      REF  59  LAST  814    31,3545  0 5353 1  P67VERT   TC      PHASCHNG          TERMINATE GROUP 3
 0776                            31,3546   00003 1            OCT     00003

 0777      REF 135  LAST  815    31,3547  0 6037 0            TC      INTPRET
 0778                            31,3550   52175 0            VLOAD   GOTO
 0779      REF   6  LAST  806    31,3551   03527 1                    V
 0780      REF   1               31,3552   65517 1                    VHORCOMP

 0781      REF   1               32,2000                      SETLOC  P66LOC
 0782                            32,3263                      BANK
 0783      REF   2 LAST   40 TO   41:        1      1*         COUNT*  $$/F2DPS

 0784      REF   4  LAST  706    32,3263  3 7710 0  RODTASK   CAF     PRIO22
 0785      REF  35  LAST  761    32,3264  0 5105 0            TC      FINDVAC
 0786      REF  32  LAST  785    E7,1515                      EBANK=  DVCNTR
 0787      REF   1               32,3265   03275 1            2CADR   RODCOMP
 0787      REF   1               32,3266   64067 1
 0788      REF  55  LAST  782    32,3267  1 5261 0            TCF     TASKOVER

 0789      REF  60  LAST  816    32,3270  0 5353 1  P66VERTA  TC      PHASCHNG          TERMINATE GROUP 3.
 0790                            32,3271   00003 1            OCT     00003

 0791      REF  16  LAST  763    32,3272  3 4777 1            CAF     1SEC
 0792      REF  21  LAST  781    32,3273  0 5173 1            TC      TWIDDLE
 0793      REF   1               32,3274   03263 0            ADRES   RODTASK

 0794                            32,3275  0 0004 0  RODCOMP   INHINT
 0795      REF 152  LAST  815    32,3276  3 4755 1            CAF     ZERO
 0796      REF   4  LAST  801    32,3277  57'746 0            XCH     RODCOUNT
 0797                            32,3300  0 0006 1            EXTEND
 0798      REF   3  LAST  800    32,3301  7 1756 0            MP      RODSCAL1
 0799      REF   2  LAST  800    32,3302  21'645 0            DAS     VDGVERT           UPDATE DESIRED ALTITUDE RATE.

 0800                            32,3303  0 0006 1            EXTEND                    SET OLDPIPAX,Y,Z = PIPAX,Y,Z
 0801      REF   8  LAST  384    32,3304  3 0040 0            DCA     PIPAX
 0802      REF   3  LAST  800    32,3305  53'764 1            DXCH    OLDPIPAX
 0803      REF  22  LAST  520    32,3306  52 071 0            DXCH    RUPTREG1          SET RUPTREG1,2,3 = OLDPIPAX,Y,Z
 0804      REF   3  LAST  384    32,3307  3 0041 1            CA      PIPAZ
 0805      REF   2  LAST  151    32,3310  57'765 1            XCH     OLDPIPAZ
 0806      REF   2  LAST  372    32,3311  56 072 1            XCH     RUPTREG3

 0807                            32,3312  0 0006 1            EXTEND                    SNAPSHOT TIME OF PIPA READING.
 0808      REF  24  LAST  762    32,3313  3 0025 0            DCA     TIME2
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0809  REF   3  LAST  795   32,3314  53'762 1            DXCH    THISTPIP

0810  REF   4  LAST  816   32,3315   3 1763 1            CA      OLDPIPAX
0811  REF   1              32,3316   6 1160 1            AD      PIPATMPX
0812  REF 304  LAST  812   32,3317  54 154 0             TS      MPAC              MPAC(X) = PIPAX + PIPATMPX
0813  REF   2  LAST  151   32,3320   3 1764 0            CA      OLDPIPAY
0814  REF   1              32,3321   6 1161 0            AD      PIPATMPY
0815  REF 305  LAST  817   32,3322  54 157 0             TS      MPAC +3           MPAC(Y) = PIPAY + PIPATMPY
0816  REF   3  LAST  816   32,3323   3 1765 1            CA      OLDPIPAZ
0817  REF   1              32,3324   6 1162 0            AD      PIPATMPZ
0818  REF 306  LAST  817   32,3325  54 161 0             TS      MPAC +5           MPAC(Z) = PIPAZ + PIPATMPZ

0819  REF   5  LAST  817   32,3326   4 1763 0            CS      OLDPIPAX
0820  REF   3  LAST  800   32,3327   6 1254 0            AD      TEMX
0821  REF  23  LAST  816   32,3330   6 0070 0            AD      RUPTREG1
0822  REF   3  LAST  800   32,3331  55'766 0             TS      DELVROD
0823  REF   3  LAST  817   32,3332   4 1764 1            CS      OLDPIPAY
0824  REF   2  LAST  105   32,3333   6 1255 1            AD      TEMY
0825  REF   8  LAST  258   32,3334   6 0071 1            AD      RUPTREG2
0826  REF   4  LAST  817   32,3335  55'770 1             TS      DELVROD +2
0827  REF   4  LAST  817   32,3336   4 1765 0            CS      OLDPIPAZ
0828  REF   2  LAST  105   32,3337   6 1256 1            AD      TEMZ
0829  REF   3  LAST  816   32,3340   6 0072 1            AD      RUPTREG3
0830  REF   5  LAST  817   32,3341  55'772 0             TS      DELVROD +4

0831  REF 153  LAST  816   32,3342   3 4755 1            CAF     ZERO
0832  REF 307  LAST  817   32,3343  54 155 1             TS      MPAC +1           ZERO LO-ORDER MPAC COMPONENTS
0833  REF 308  LAST  817   32,3344  54 160 1             TS      MPAC +4
0834  REF 309  LAST  817   32,3345  54 162 0             TS      MPAC +6
0835  REF   4  LAST  817   32,3346  55'254 1             TS      TEMX              ZERO TEMX, TEMY, AND TEMZ SO WE WILL
0836  REF   3  LAST  817   32,3347  55'255 0             TS      TEMY                   KNOW WHEN READACCS CHANGES THEM.
0837  REF   3  LAST  817   32,3350  55'256 0             TS      TEMZ
0838  REF  89  LAST  811   32,3351   4 4753 0            CS      ONE
0839  REF   9  LAST  809   32,3352  54 163 1             TS      MODE
0840  REF 136  LAST  816   32,3353   0 6037 0            TC      INTPRET
0841                       32,3354   65361 0  ITRPNT1   VXSC    PDDL              SCALE MPAC TO M/CS *2(-7) AND PUSH  (6)
0842  REF   1              32,3355   26022 0                    KPIP1
0843  REF   4  LAST  817   32,3356   03762 1                    THISTPIP
0844                       32,3357   77625 0            DSU
0845  REF  15  LAST  800   32,3360   01235 1                    PIPTIME
0846                       32,3361   00037 0            STORE   30D               30-31D CONTAINS TIME IN CS SINCE PIPTIME
0847                       32,3362   63271 0            DDV     PDVL                                                (8)
0848  REF   1              32,3363   27153 0                    4SEC(28)
0849  REF   6  LAST  809   32,3364   01237 0                    GDT/2
0850                       32,3365   74251 1            VSU     VXSC                                                (6)
0851  REF   2  LAST  800   32,3366   02631 1                    VBIAS
0852                       32,3367   53352 0            VSL2    VAD
0853  REF   7  LAST  816   32,3370   03527 1                    V
0854                       32,3371   45455 1            VAD     STADR                                               (0)
0855                       32,3372   53746 1            STOVL   24D               STORE UPDATED VELOCITY IN 24-29D
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 0856   REF  14  LAST  812    32,3373   03521 1                  R
 0857                         32,3374   77656 1          UNIT
 0858                         32,3375   00017 1          STORE  14D
 0859                         32,3376   72441 0          DOT    SL1
 0860                         32,3377   00031 0                 24D
 0861   REF   7  LAST  800    32,3400   17474 0          STODL  HDOTDISP        UPDATE HDOTDISP FOR NOUN 63.
 0862                         32,3401   00037 0                 30D
 0863                         32,3402   41261 1          SL     DMP
 0864                         32,3403   20214 1                 11D
 0865   REF   8  LAST  818    32,3404   03474 0                 HDOTDISP
 0866                         32,3405   45215 0          DAD    DSU
 0867                         32,3406   00045 0                 36D
 0868   REF   5  LAST  805    32,3407   02333 0                 /LAND/
 0869   REF   2  LAST  315    32,3410   17775 1          STODL  HCALC1          UPDATE HCALC1 FOR NOUN 63.
 0870   REF   9  LAST  818    32,3411   03474 0                 HDOTDISP
 0871                         32,3412   56221 0          BDSU   DDV
 0872   REF   3  LAST  816    32,3413   03645 0                 VDGVERT
 0873   REF   2  LAST  122    32,3414   02541 0                 TAUROD
 0874                         32,3415   51515 1          PDVL   ABVAL                                        (2)
 0875   REF   7  LAST  817    32,3416   01237 0                 GDT/2
 0876                         32,3417   60471 0          DDV    SR2
 0877   REF   2  LAST  809    32,3420   05652 0                 GSCALE
 0878                         32,3421   00025 0          STORE  20D
 0879                         32,3422   77615 0          DAD                                                  (0)
 0880                         32,3423   45115 0          PDVL   CALL                                         (2)
 0881   REF  10  LAST  792    32,3424   06520 0                 UNITX
 0882   REF   2  LAST  705    32,3425   47661 0                 CDU*NBSM
 0883                         32,3426   77641 1          DOT
 0884                         32,3427   00017 1                 14D
 0885                         32,3430   00027 1          STORE  22D
 0886                         32,3431   45465 1          BDDV   STADR                                        (0)
 0887   REF   4  LAST  809    32,3432   50313 0          STOVL  /AFC/
 0888   REF   6  LAST  817    32,3433   03767 1                 DELVROD
 0889                         32,3434   53331 0          VXSC   VAD
 0890   REF   2  LAST  817    32,3435   26022 0                 KPIP1
 0891   REF   3  LAST  817    32,3436   02631 1                 VBTAS
 0892                         32,3437   65246 1          ABVAL  PDDL                                         (2)
 0893   REF   5  LAST  817    32,3440   03762 1                 THISTPIP
 0894                         32,3441   65225 1          DSU    PDDL                                         (4)
 0895   REF   3  LAST  800    32,3442   03760 0                 LASTTPIP
 0896   REF   6  LAST  818    32,3443   03762 1                 THISTPIP
 0897   REF   4  LAST  818    32,3444   17760 0          STODL  LASTTPIP                                     (2)
 0898                         32,3445   55271 0          DDV    BDDV                                         (0)
 0899   REF   1               32,3446   25535 0                 SHFTFACT
 0900                         32,3447   41325 0          PDDL   DMP                                          (2)
 0901   REF   7  LAST  800    32,3450   03611 1                 FWEIGHT
 0902   REF   1               32,3451   25534 1                 BIT1H
 0903                         32,3452   56271 0          DDV    DDV
 0904   REF   7  LAST  809    32,3453   01245 0                 MASS
 0905   REF   2  LAST  796    32,3454   22006 1                 SCALEFAC
 0906                             32,3455   65215 1             DAD      PDDL                                      (4)
 0907                             32,3456   00001 0                      0D
 0908                             32,3457   00025 0                      20D
 0909                             32,3460   45271 1             DDV      DSU                                       (2)
 0910                             32,3461   00027 1                      22D
 0911                             32,3462   43205 1             DMP      DAD
 0912  REF   2  LAST  122         32,3463   02543 1                      LAG/TAU
 0913  REF   5  LAST  818         32,3464   03464 1                      /AFC/
 0914                             32,3465   56325 0             PDDL     DDV                                       (4)
 0915  REF   2  LAST  122         32,3466   02547 0                      MAXFORCE
 0916  REF   8  LAST  818         32,3467   01245 0                      MASS
 0917                             32,3470   56325 0             PDDL     DDV                                       (6)
 0918  REF   2  LAST  122         32,3471   02545 1                      MINFORCE
 0919  REF   9  LAST  819         32,3472   01245 0                      MASS
 0920                             32,3473   44206 0             PUSH     BDSU                                      (8)
 0921                             32,3474   00003 1                      2D
 0922                             32,3475   71240 1             BMN      DLOAD                                     (6)
 0923  REF   1                    32,3476   65504 0                      AFCSPOT
 0924                             32,3477   41545 0             DLOAD    PUSH                                      (6)
 0925                             32,3500   51021 0             BDSU     BPL
 0926                             32,3501   00003 1                      2D
 0927  REF   2  LAST  819         32,3502   65504 0                      AFCSPOT
 0928                             32,3503   77745 1             DLOAD                                              (4)
 0929                             32,3504   77745 1  AFCSPOT    DLOAD                                 (2),(4),OP   (6)
 0930                             32,3505   77601 0             SETPD                                              (2)
 0931                             32,3506   00003 1                      2D
 0932  REF   6  LAST  819         32,3507   17464 1             STODL    /AFC/                                     (0)
 0933                             32,3510   77776 1  ITRPNT2    EXIT
 0934  REF 310  LAST  817         32,3511   52 155 1            DXCH     MPAC        MPAC = MEASURED ACCELERATION.
 0935  REF 228  LAST  814         32,3512   0 4616 1            TC       BANKCALL
 0936  REF   2  LAST  813         32,3513   62221 1             CADR     THROTTLE +3
 0937  REF 137  LAST  817         32,3514   0 6037 0            TC       INTPRET
 0938                             32,3515   77775 1             VLOAD                PICK UP UPDATED VELOCITY VECTOR.
 0939                             32,3516   00031 0                      24D
 0940                             32,3517   53352 0  VHORCOMP   VSL2     VAD
 0941  REF   2  LAST  151         32,3520   03734 1                      DELVS
 0942                             32,3521   63342 1             VSR2     PDVL                                      (6)
 0943  REF  15  LAST  818         32,3522   03521 1                      R
 0944                             32,3523   74256 0             UNIT     VXSC
 0945  REF  10  LAST  818         32,3524   03474 0                      HDOTDISP
 0946                             32,3525   51372 0             VSL1     BVSU                                      (0)
 0947                             32,3526   77646 0             ABVAL
 0948  REF   4  LAST  806         32,3527   02263 1             STORE    VHORIZ
 0949                             32,3530   77776 1             EXIT
 0950  REF 229  LAST  819         32,3531   0 4616 1            TC       BANKCALL    PUT UP V06N60 DISPLAY BUT AVOID PHASCHNG
 0951  REF   3  LAST  813         32,3532   63463 0             CADR     DISPEXIT +3

 0952                             32,3533   00001 0  BIT1H      OCT      00001
 0953                             32,3534   00000 1  SHFTFACT   2DEC     1 B-17
 0953                             32,3535   04000 0
 0954                       32,3536  00000 1  BIASFACT 2DEC    655.36 B-28
 0954                       32,3537  01217 1
R0955   ****************************************************************************************************************
R0957   REDESIGNATOR TRAP
R0958   ****************************************************************************************************************

 0960                       11,2275                    BANK    11
 0961   REF    1            11,2000                    SETLOC  F2DPS*11
 0962                       11,2275                    BANK

 0963   REF    1                                       COUNT*  $$/F2DPS

 0964   REF    4  LAST  555 11,2275  56 016 0 PITFALL  XCH     BANKRUPT
 0965                       11,2276  0 0006 1          EXTEND
 0966   REF    4  LAST  555 11,2277  22 012 1          QXCH    QRUPT

 0967   REF    4  LAST  800 11,2300  0 5321 1          TC      CHECKMM           IF NOT IN P64, NO REASON TO CONTINUE
 0968                       11,2301   00100 0          DEC     64
 0969   REF   18  LAST  557 11,2302  1 5270 0          TCF     RESUME

 0970                       11,2303  0 0006 1          EXTEND
 0971   REF    5  LAST  813 11,2304  00 031 0          READ    CHAN31
 0972                       11,2305  4 0000 0          COM
 0973   REF    1            11,2306  7 2373 0          MASK    ALL4BITS
 0974   REF    3  LAST  154 11,2307  55'265 0          TS      ELVIRA
 0975   REF   48  LAST  807 11,2310  3 4752 0          CAF     TWO
 0976   REF    2  LAST  106 11,2311  55'264 1          TS      ZERLINA
 0977   REF   16  LAST  725 11,2312  3 4756 1          CAF     FIVE
 0978   REF   22  LAST  816 11,2313  0 5173 1          TC      TWIDDLE
 0979   REF    1            11,2314   02321 0          ADRES   REDESMON
 0980   REF   19  LAST  820 11,2315  1 5270 0          TCF     RESUME


R0981   REDESIGNATION MONITOR  (INITIATED BY PITFALL)


 0982   REF    3  LAST  820 11,2316  55'264 1 PREMON1  TS      ZERLINA
 0983   REF    9  LAST  555 11,2317  3 4757 0 PREMON2  CAF     SEVEN
 0984   REF    7  LAST  781 11,2320  0 5224 0          TC      VARDELAY
 0985                       11,2321  0 0006 1 REDESMON EXTEND
 0986                       11,2322  00 031 0          READ    31
 0987                       11,2323  4 0000 0          COM
 0988   REF    2  LAST  820 11,2324  7 2373 0          MASK    ALL4BITS
 0989   REF    4  LAST  820 11,2325  57'265 1          XCH     ELVIRA
 0990   REF  115  LAST  810 11,2326  54 001 1          TS      L
 0991   REF    5  LAST  820 11,2327  11'265 0          CCS     ELVIRA            DO ANY BITS APPEAR THIS PASS?
 0992   REF    1            11,2330  1 2317 1          TCF     PREMON2             Y: CONTINUE MONITOR

 0993   REF  114  LAST  820 11,2331  10 001 1          CCS     L                   N: ANY LAST PASS?
 0994   REF    1            11,2332  1 2341 1          TCF     COUNT'EM               Y: COUNT 'EM, RESET RUPT, TERMINATE
 0995   REF   4  LAST  820   11,2333  11'264 1            CCS     ZERLINA            N: HAS ZERLINA REACHED ZERO YET?
 0996   REF   1              11,2334   1 2316 0            TCF     PREMON1               N: DIMINISH ZERLINA, CONTINUE
 0997   REF  29  LAST  802   11,2335   3 4740 0  RESETRPT  CAF     BIT12                 Y: RESET RUPT, TERMINATE
 0998                        11,2336   0 0006 1            EXTEND
 0999   REF  16  LAST  802   11,2337  05 013 0             WOR     CHAN13
 1000   REF  56  LAST  816   11,2340   1 5261 0            TCF     TASKOVER

 1001   REF  32  LAST  813   11,2341   3 4737 0  COUNT'EM  CAF     BIT13           ARE WE IN ATTITUDE-HOLD?
 1002                        11,2342   0 0006 1            EXTEND
 1003   REF   6  LAST  820   11,2343  02 031 1             RAND    CHAN31
 1004                        11,2344   0 0006 1            EXTEND
 1005   REF   1              11,2345   1 2335 1            BZF     RESETRPT        YES:  SKIP REDESIGNATION LOGIC.

 1006   REF 117  LAST  820   11,2346   3 0001 0            CA      L               NO
 1007   REF   1              11,2347   7 4746 1            MASK    -AZBIT
 1008   REF 234  LAST  810   11,2350  10 000 0             CCS     A
 1009   REF   1              11,2351   4 2374 1    -AZ     CS      AZEACH
 1010   REF   5  LAST  815   11,2352  27'266 0             ADS     AZINCR1
 1011   REF 118  LAST  821   11,2353   3 0001 0            CA      L
 1012   REF   1              11,2354   7 4747 0            MASK    +AZBIT
 1013   REF 235  LAST  821   11,2355  10 000 0             CCS     A
 1014   REF   2  LAST  821   11,2356   3 2374 0    +AZ     CA      AZEACH
 1015   REF   6  LAST  821   11,2357  27'266 0             ADS     AZINCR1
 1016   REF 119  LAST  821   11,2360   3 0001 0            CA      L
 1017   REF   1              11,2361   7 4753 0            MASK    -ELBIT
 1018   REF 236  LAST  821   11,2362  10 000 0             CCS     A
 1019   REF   1              11,2363   4 2375 0    -EL     CS      ELEACH
 1020   REF   4  LAST  815   11,2364  27'267 1             ADS     ELINCR1
 1021   REF 120  LAST  821   11,2365   3 0001 0            CA      L
 1022   REF   1              11,2366   7 4752 1            MASK    +ELBIT
 1023   REF 237  LAST  821   11,2367  10 000 0             CCS     A
 1024   REF   2  LAST  821   11,2370   3 2375 1    +EL     CA      ELEACH
 1025   REF   5  LAST  821   11,2371  27'267 1             ADS     ELINCR1
 1026   REF   2  LAST  821   11,2372   1 2335 1            TCF     RESETRPT

R1027   THESE EQUIVALENCIES ARE BASED ON GSOP CHAPTER 4, REVISION 16 OF P64LM


 1028   REF  38  LAST  715      4752            +ELBIT     =       BIT2            -PITCH


 1029   REF  38  LAST  760      4753            -ELBIT     =       BIT1            +PITCH


 1030   REF  35  LAST  800      4747            +AZBIT     =       BIT5


 1031   REF  41  LAST  795      4746            -AZBIT     =       BIT6
```

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1032                         11,2373  00063 1   ALL4BITS OCT    00063

1033                         11,2374  01074 0   AZEACH   DEC    .03491          2 DEGREES

1034                         11,2375  00217 0   ELEACH   DEC    .00873          1/2 DEGREE

R1035   ***************************************************************************************************************
R1037   R.O.D. TRAP
R1038   ************************************************************************

1039                         20,2115                     BANK   20
1040    REF   1              20,2000                     SETLOC RODTRAP
1041                         20,2115                     BANK
1042    REF   1                                          COUNT* $$/F2DPS        ****************************************

1044    REF  26  LAST  561   20,2115  7 4745 1  DFSCBITS MASK   BIT7            COME HERE FROM MARKRUPT CODING WITH BIT
1045    REF 238  LAST  821   20,2116  10 000 0           CCS    A                 7 OR 6 OF CHANNEL 16 IN A: BIT 7 MEANS
1046    REF  49  LAST  820   20,2117  4 4752 1           CS     TWO               - RATE INCREMENT, BIT 6 + INCREMENT
1047    REF  90  LAST  817   20,2120  6 4753 1           AD     ONE
1048    REF   5  LAST  816   20,2121  27'746 1           ADS    RODCOUNT
1049    REF  20  LAST  820   20,2122  1 5270 0           TCF    RESUME          TRAP IS RESET WHEN SWITCH IS RELEASED


1050                         31,3553                     BANK   31
1051    REF   3  LAST  791   31,2000                     SETLOC F2DPS*31
1052                         31,3553                     BANK

1053    REF   4 LAST  801 TO  816:   490   531*          COUNT* $$/F2DPS

R1054   ***************************************************************************************************************
R1056   DOUBLE PRECISION ROOT FINDER SUBROUTINE (BY ALLAN KLUMPP)
R1057   ***************************************************************************************************************

R1059                                                           N        N-1
R1060            ROOTPSRS FINDS ONE ROOT OF THE POWER SERIES A X  + A   X    + ... + A X + A
R1062                                                        N     N-1                1     0

R1064   USING NEWTON'S METHOD STARTING WITH AN INITIAL GUESS FOR THE ROOT. THE ENTERING DATA MUST BE AS FOLLOWS:

A1066                                           A        SP     LOC-3           ADRES FOR REFERENCING PWR COF TABL
A1067                                           L        SP     N-1             N IS THE DEGREE OF THE POWER SERIES
A1068                                           MPAC     DP     X               INITIAL GUESS FOR ROOT

A1069                                           LOC-2N   DP     A(0)
A1070                                                    ...
A1071                                           LOC      DP     A(N)
A1072                                           LOC+2    SP     PRECROOT        PREC RQD OF ROOT (AS FRACT OF 1ST GUESS)
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L         LUNAR LANDING GUIDANCE EQUATIONS                                                 USER'S PAGE NO.  26       E7 S3

R1073     THE DP RESULT IS LEFT IN MPAC UPON EXIT, AND A SP COUNT OF THE ITERATIONS TO CONVERGENCE IS LEFT IN MPAC+2.
R1075     RETURN IS NORMALLY TO LOC(TC ROOTPSRS)+3.   IF ROOTPSRS FAILS TO CONVERGE IN 8 PASSES, RETURN IS TO LOC+1 AND
R1077     OUTPUTS ARE NOT TO BE TRUSTED.

R1079               PRECAUTION: ROOTPSRS MAKES NO CHECKS FOR OVERFLOW OR FOR IMPROPER USAGE. IMPROPER USAGE COULD
R1080     PRECLUDE CONVERGENCE OR REQUIRE EXCESSIVE ITERATIONS. AS A SPECIFIC EXAMPLE, ROOTPSRS FORMS A DERIVATIVE
R1082     COEFFICIENT TABLE BY MULTIPLYING EACH A(I) BY I, WHERE I RANGES FROM 1 TO N. IF AN ELEMENT OF THE DERIVATIVE
R1084     COEFFICIENT TABLE = 1 OR > 1 IN MAGNITUDE, ONLY THE EXCESS IS RETAINED. ROOTPSRS MAY CONVERGE ON THE CORRECT
R1086     ROOT NONETHELESS, BUT IT MAY TAKE AN EXCESSIVE NUMBER OF ITERATIONS. THEREFORE THE USER SHOULD RECOGNIZE:

R1088     1. USER'S RESPONSIBILITY TO ASSURE THAT I X A(I) < 1 IN MAGNITUDE FOR ALL I.

R1090     2. USER'S RESPONSIBILITY TO ASSURE OVERFLOW WILL NOT OCCUR IN EVALUATING EITHER THE RESIDUAL OR THE DERIVATIVE
R1092        POWER SERIES.   THIS OVERFLOW WOULD BE PRODUCED BY SUBROUTINE POWRSERS, CALLED BY ROOTPSRS, AND MIGHT NOT
R1094        PRECLUDE EVENTUAL CONVERGENCE.

R1095     3. AT PRESENT, ERASABLE LOCATIONS ARE RESERVED ONLY FOR N UP TO 5.   AN N IN EXCESS OF 5 WILL PRODUCE CHAOS.
R1097        ALL ERASABLES USED BY ROOTPSRS ARE UNSWITCHED LOCATED IN THE REGION FROM MPAC-33 OCT TO MPAC+7.

R1099     4. THE ITERATION COUNT RETURNED IN MPAC+2 MAY BE USED TO DETECT ABNORMAL PERFORMANCE.

A1101                                                                                          STORE ENTERING DATA, INITLIZE ERASABLES

 1102                            31,3553  0 0006 1  ROOTPSRS EXTEND
 1103     REF   1                31,3554  22 132 1           QXCH    RETROOT            RETURN ADRES
 1104     REF   1                31,3555  54 117 1           TS      PWRPTR             PWR TABL POINTER
 1105     REF 311  LAST  819     31,3556  52 160 1           DXCH    MPAC       +3      PWR TABL ADRES, N-1
 1106     REF   1                31,3557  3 3676 0           CA      DERTABLL
 1107     REF   1                31,3560  54 141 1           TS      DERPTR             DER TABL POINTER
 1108     REF 312  LAST  823     31,3561  54 161 0           TS      MPAC       +5      DER TABL ADRES
 1109     REF 313  LAST  823     31,3562  10 160 1           CCS     MPAC       +4      NO POWER SERIES OF DEGREE 1 OR LESS
 1110     REF 314  LAST  823     31,3563  54 162 0           TS      MPAC       +6      N-2
 1111     REF 154  LAST  817     31,3564  3 4755 1           CA      ZERO               MODE USED AS ITERATION COUNTER. MODE
 1112     REF  10  LAST  817     31,3565  54 163 1           TS      MODE               MUST BE POS SO ABS WON'T COMP MPAC+3 ETC

A1113                                                                                          COMPUTE CRITERION TO STOP ITERATING

 1114                            31,3566  0 0006 1           EXTEND
 1115     REF 315  LAST  823     31,3567  3 0155 0           DCA     MPAC               FETCH ROOT GUESS, KEEPING IT IN MPAC
 1116     REF   1                31,3570  52 127 1           DXCH    ROOTPS             AND IN ROOTPS
 1117     REF 316  LAST  823     31,3571  50 157 1           INDEX   MPAC       +3      PWR TABL ADRES
 1118                            31,3572  3 0005 1           CA      5                  PRECROOT TO A
 1119     REF   7  LAST  462     31,3573  0 7307 1           TC      SHORTMP            YIELDS DP PRODUCT IN MPAC
 1120     REF   2  LAST  601     31,3574  0 4713 0           TC      USPRCADR
 1121     REF   1                31,3575   01226 0           CADR    ABS                YIELDS ABVAL OF CRITERION ON DX IN MPAC
 1122     REF 317  LAST  823     31,3576  52 155 1           DXCH    MPAC
 1123     REF   1                31,3577  52 125 0           DXCH    DXCRIT             CRITERION

A1124                                                                                          SET UP DER COF TABL
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 1125                                31,3600   0 0006 1           EXTEND
 1126     REF    2   LAST   823     31,3601   5 0117 0           INDEX   PWRPTR
 1127                                31,3602   3 0004 0           DCA     3
 1128     REF  318   LAST   823     31,3603   52 155 1           DXCH    MPAC                A(N) TO MPAC

 1129     REF  319   LAST   824     31,3604   3 0160 0           CA      MPAC        +4      N-1 TO A

 1130     REF    1                   31,3605   54 140 0  DERCLOOP TS      PWRCNT              LOOP COUNTER
 1131     REF   91   LAST   822     31,3606   6 4753 1           AD      ONE
 1132     REF    1                   31,3607   0 7316 1           TC      DMPNSUB             YIELDS DERCOF = I X A(I) IN MPAC
 1133                                31,3610   0 0006 1           EXTEND
 1134     REF    3   LAST   824     31,3611   5 0117 0           INDEX   PWRPTR
 1135                                31,3612   3 0002 0           DCA     1
 1136     REF  320   LAST   824     31,3613   52 155 1           DXCH    MPAC                A(I-1) TO MPAC, FETCHING DERCOF
 1137     REF    2   LAST   823     31,3614   50 141 0           INDEX   DERPTR
 1138                                31,3615   52 004 1           DXCH    3                   DERCOF TO DER TABL
 1139     REF   50   LAST   822     31,3616   4 4752 1           CS      TWO
 1140     REF    4   LAST   824     31,3617   26 117 1     .     ADS     PWRPTR              DECREMENT PWR POINTER
 1141     REF   51   LAST   824     31,3620   4 4752 1           CS      TWO
 1142     REF    3   LAST   824     31,3621   26 141 1           ADS     DERPTR              DECREMENT DER POINTER
 1143     REF    2   LAST   824     31,3622   10 140 0           CCS     PWRCNT
 1144     REF    1                   31,3623   1 3605 0           TCF     DERCLOOP

A1145                                                                                         CONVERGE ON ROOT

 1146                                31,3624   0 0006 1  ROOTLOOP EXTEND
 1147     REF    2   LAST   823     31,3625   3 0127 0           DCA     ROOTPS              FETCH CURRENT ROOT
 1148     REF  321   LAST   824     31,3626   52 155 1           DXCH    MPAC                LEAVE IN MPAC
 1149                                31,3627   0 0006 1           EXTEND
 1150     REF  322   LAST   824     31,3630   3 0162 1           DCA     MPAC        +5      LOAD A, L WITH DER TABL ADRES, N-2
 1151     REF    1                   31,3631   0 7215 0           TC      POWRSERS            YIELDS DERIVATIVE IN MPAC

 1152                                31,3632   0 0006 1           EXTEND
 1153     REF    3   LAST   824     31,3633   3 0127 0           DCA     ROOTPS
 1154     REF  323   LAST   824     31,3634   52 155 1           DXCH    MPAC                CURRENT ROOT TO MPAC, FETCHING DERIVTIVE
 1155     REF   75   LAST   813     31,3635   52 131 0           DXCH    BUF                 LEAVE DERIVATIVE IN BUF AS DIVISOR
 1156                                31,3636   0 0006 1           EXTEND
 1157     REF  324   LAST   824     31,3637   3 0160 0           DCA     MPAC        +3      LOAD A, L WITH PWR TABL ADRES, N-1
 1158     REF    2   LAST   824     31,3640   0 7215 0           TC      POWRSERS            YIELDS RESIDUAL IN MPAC

 1159     REF    3   LAST   823     31,3641   0 4713 0           TC      USPRCADR
 1160     REF    1                   31,3642    00353 1           CADR    DDV/BDDV            YIELDS -DX IN MPAC

 1161                                31,3643   0 0006 1           EXTEND
 1162     REF  325   LAST   824     31,3644   4 0155 1           DCS     MPAC                FETCH DX, LEAVING -DX IN MPAC
 1163     REF    4   LAST   824     31,3645   20 127 1           DAS     ROOTPS              CORRECTED ROOT NOW IN ROOTPS

 1164     REF    4   LAST   824     31,3646   0 4713 0           TC      USPRCADR
 1165     REF    2   LAST   823     31,3647    01226 0           CADR    ABS                 YIELDS ABS(DX) IN MPAC
 1166                                31,3650   0 0006 1           EXTEND
 1167    REF   2  LAST  823    31,3651  4 0125 0             DCS     DXCRIT
 1168    REF 326  LAST  824    31,3652  20 155 1             DAS     MPAC               ABS(DX)-ABS(DXCRIT) IN MPAC

 1169    REF  11  LAST  823    31,3653  3 0163 0             CA      MODE
 1170    REF  32  LAST  795    31,3654  7 4750 0             MASK    BIT4               KLUMPP SAYS GIVE UP AFTER EIGHT PASSES
 1171    REF 239  LAST  822    31,3655  10 000 0             CCS     A
 1172    REF   2  LAST  823    31,3656  0 0132 1   BADROOT   TC      RETROOT

 1173    REF  12  LAST  825    31,3657  24 163 0             INCR    MODE               INCREMENT ITERATION COUNTER
 1174    REF 327  LAST  825    31,3660  10 154 0             CCS     MPAC               TEST HI ORDER DX
 1175    REF   1               31,3661  1 3624 0             TCF     ROOTLOOP
 1176    REF   1               31,3662  1 3664 1             TCF     TESTLODX
 1177    REF   1               31,3663  1 3670 1             TCF     ROOTSTOR
 1178    REF 328  LAST  825    31,3664  10 155 1   TESTLODX  CCS     MPAC      +1       TEST LO ORDER DX
 1179    REF   2  LAST  825    31,3665  1 3624 0             TCF     ROOTLOOP
 1180    REF   2  LAST  825    31,3666  1 3670 1             TCF     ROOTSTOR
 1181    REF   3  LAST  825    31,3667  1 3670 1             TCF     ROOTSTOR
 1182    REF   5  LAST  824    31,3670  52 127 1   ROOTSTOR  DXCH    ROOTPS
 1183    REF 329  LAST  825    31,3671  52 155 1             DXCH    MPAC
 1184    REF  13  LAST  825    31,3672  3 0163 0             CA      MODE
 1185    REF 330  LAST  825    31,3673  54 156 1             TS      MPAC      +2       STORE SP ITERATION COUNT IN MPAC+2
 1186    REF   3  LAST  825    31,3674  50 132 1             INDEX   RETROOT
 1187                           31,3675  1 0002 1             TCF     2

 1188    REF   1               31,3676   00147 0   DERTABLL  ADRES   DERCOFN   -3


R1189    ***********************************************************************************************************
R1191    TRASHY LITTLE SUBROUTINES
R1192    ***********************************************************************************************************

 1194    REF  14  LAST  811    31,3677  51'351 1   INTPRETX  INDEX   WCHPHASE           SET X1 ON THE WAY TO THE INTERPRETER
 1195    REF   2  LAST  810    31,3700  4 2452 1             CS      TARGTDEX
 1196    REF  24  LAST  809    31,3701  50 120 1             INDEX   FIXLOC
 1197    REF  23  LAST  778    31,3702  54 046 1             TS      X1
 1198    REF 138  LAST  819    31,3703  1 6037 1             TCF     INTPRET


 1199    REF  17  LAST  811    31,3704  3 1642 0   TDISPSET  CA      TTF/8
 1200                           31,3705  0 0006 1             EXTEND
 1201    REF   1               31,3706  7 4750 0             MP      TSCALINV
 1202    REF   4  LAST  315    31,3707  53'476 1             DXCH    TTFDISP

 1203    REF   8  LAST  813    31,3710  3 5014 1             CA      EBANK5             TREDES BECOMES ZERO TWO PASSES
 1204    REF  29  LAST  813    31,3711  54 003 0             TS      EBANK                BEFORE TCGFAPPR IS REACHED
 1205    REF   2  LAST  121    E5,1470                       EBANK=  TCGFAPPR
 1206    REF   3  LAST  825    31,3712  3 1470 0             CA      TCGFAPPR
 1207    REF  21  LAST  813    31,3713  24 006 1             INCR    BBANK
 1208    REF  22  LAST  825    31,3714  24 006 1             INCR    BBANK
 1209    REF  18  LAST  825    E7,1642                       EBANK=  TTF/8
 1210    REF  13  LAST  825   31,3715  6 1642 0             AD       TTF/8
 1211                         31,3716  0 0006 1             EXTEND
 1212    REF   1              31,3717  7 3751 0             MP       TREDESCL
 1213    REF   1              31,3720  6 3747 0             AD       -DEC103
 1214    REF   3  LAST  597   31,3721  6 4735 1             AD       NEGMAX
 1215    REF 121  LAST  821   31,3722  54 0001 1            TS       L
 1216    REF 122  LAST  826   31,3723  4 0001 1             CS       L
 1217    REF 123  LAST  826   31,3724  6 0001 0             AD       L
 1218    REF   1              31,3725  6 3750 0             AD       +DEC39
 1219    REF  19  LAST  812   31,3726  6 4733 1             AD       POSMAX
 1220    REF   3  LAST  814   31,3727  55'666 1             TS       TREDES
 1221    REF   4  LAST  826   31,3730  4 1666 1             CS       TREDES
 1222    REF   5  LAST  826   31,3731  27'666 1             ADS      TREDES
 1223    REF 201  LAST  813   31,3732  0 0002 0             TC       Q

 1224    REF   4  LAST  455   31,3733  0 5652 0  1406POO    TC       POODOO
 1225                         31,3734   01406 1             OCT      01406
 1226    REF  33  LAST  813   31,3735  0 5567 0  1406ALM    TC       ALARM
 1227                         31,3736   01406 1             OCT      01406
 1228    REF   2  LAST  813   31,3737  1 3443 0             TCF      RATESTOP

R1229    ****************************************************************************************************************
R1231    SPECIALIZED "PHASCHNG" SUBROUTINE
R1232    ****************************************************************************************************************

 1234    REF   1              E3,1440                       EBANK=   PHSNAME2
 1235    REF   2  LAST  223   31,3740  3 5007 0  FASTCHNG   CA       EBANK3            SPECIALIZED 'PHASCHNG' ROUTINE
 1236    REF  30  LAST  825   31,3741  56 0003 1            XCH      EBANK
 1237    REF 124  LAST  826   31,3742  52 002 1             DXCH     L
 1238    REF   1              31,3743  55'442 0             TS       PHSNAME3
 1239    REF  31  LAST  826   31,3744  22 003 1             LXCH     EBANK
 1240    REF   3  LAST  798   E7,1621                       EBANK=   E2DPS
 1241    REF 240  LAST  825   31,3745  0 0000 1             TC       A


R1242    ****************************************************************************************************************
R1244    PARAMETER TABLE INDIRECT ADDRESSES
R1245    ****************************************************************************************************************

 1247    REF   2  LAST  121   E5,1402            RDG        =        RBRFG
 1248    REF   2  LAST  121   E5,1410            VDG        =        VBRFG
 1249    REF   2  LAST  121   E5,1416            ADG        =        ABRFG
 1250    REF   2  LAST  121   E5,1424            VDG2TTF    =        VBRFG*
 1251    REF   2  LAST  121   E5,1426            ADG2TTF    =        ABRFG*
 1252    REF   2  LAST  121   E5,1430            JDG2TTF    =        JBRFG*

R1253    ****************************************************************************************************************
R1255    LUNAR LANDING CONSTANTS
R1256    ***************************************************************************************************************
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 1258   REF    7  LAST  807    31,3746   01565 0  TABLTTFL ADRES   TABLTTF  +3     ADDRESS FOR REFERENCING TTF TABLE

 1259   REF   30  LAST  821       4740            TTFSCALE =       BIT12

 1260   REF   33  LAST  825       4750            TSCALINV =       BIT4

 1261                          31,3747   77630 1  -DEC103  DEC     -103

 1262                          31,3750   00143 1  +DEC99   DEC     +99

 1263                          31,3751   75340 1  TREDESCL DEC     -.08

 1264                          31,3752   00264 1  180DEGS  DEC     +180

 1265                          31,3753   00056 1  1/2DEG   DEC     +.00278

 1266                          31,3754   01542 0  PROJMAX  DEC     .42262 B-3      SIN(25')/8 TO COMPARE WITH PROJ

 1267                          31,3755   01022 0  PROJMIN  DEC     .25882 B-3      SIN(15')/8 TO COMPARE WITH PROJ

 1268                          31,3756   01477 1  V06N63   VN      0663            P63
 1269                          31,3757   01500 0  V06N64   VN      0664            P64
 1270                          31,3760   01474 1  V06N60   VN      0660            P65, P66, P67
 1271                          22,3647                     BANK    22
 1272   REF    1               22,2000                     SETLOC  LANDCNST
 1273                          22,3647                     BANK
 1274   REF    1                                           COUNT*  $$/F2DPS

 1275                          22,3647   00021 1  HIGHESTF 2DEC    4.34546769 B-12
 1275                          22,3650   14161 1
 1276                          22,3651   01440 0  GSCALE   2DEC    100 B-11
 1276                          22,3652   00000 1
 1277                          22,3653   14000 1  3/8DP    2DEC    .375
 1277                          22,3654   00000 1
 1278                          22,3655   30000 1  3/4DP    2DEC    .750
 1278                          22,3656   00000 1
 1279                          22,3657   77534 0  DEPRCRIT 2DEC    -.02 B-1
 1279                          22,3660   45074 0
```

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R1280    ****************************************************************************************************************
R1282    ****************************************************************************************************************
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L          P70-P71                                                                          USER'S PAGE NO.   1        EO S3

 0001                        21,2006                         BANK    21
 0002    REF    1            21,2000                         SETLOC  R11
 0003                        21,2006                         BANK

 0004    REF   33  LAST  816  E7,1515                        EBANK=  DVCNTR
 0005    REF    1                                            COUNT*  $$/R11

 0006    REF   17  LAST  762  21,2006  4 0103 1  R10,R11    CS      FLAGWRD7         IS SERVICER STILL RUNNING?
 0007    REF    4  LAST  704  21,2007  7 4747 0              MASK    AVEGFBIT
 0008    REF  241  LAST  826  21,2010  10 0000 0             CCS     A
 0009    REF   57  LAST  821  21,2011  1 5261 0              TCF     TASKOVER         LET AVGEND TAKE CARE OF GROUP 2.
 0010    REF    3  LAST  604  21,2012  11'056 1              CCS     PIPCTR
 0011                         21,2013  1 2015 0              TCF     +2
 0012    REF    1             21,2014  1 2130 0              TCF     LRHTASK          LAST PASS. CALL LRHTASK.
 0013    REF    1             21,2015  55'714 0     +2       TS      PIPCTR1

 0014    REF    2  LAST  151  E7,1714           PIPCTR1      =       LADQSAVE
 0015    REF    3  LAST  506     1056           PIPCTR       =       PHSPRDT2
 0016    REF    3  LAST  436  21,2016  3 6010 0              CAF     OCT31
 0017    REF   23  LAST  820  21,2017  0 5173 1              TC      TWIDDLE
 0018    REF    2  LAST  240  21,2020   02006 0              ADRES   R10,R11
 0019    REF   28  LAST  612  21,2021  4 1303 1  R10,R11A   CS      IMODES33         IF LAMP TEST, DO NOT CHANGE LR LITES.
 0020    REF   39  LAST  821  21,2022  7 4753 0              MASK    BIT1
 0021                         21,2023  0 0006 1              EXTEND
 0022    REF    1             21,2024  1 2042 1              BZF     10,11

 0023    REF   12  LAST  613  21,2025  7 0107 0  FLASHH?    MASK    FLGWRD11         C(A) = 1 = HFLASH BIT
 0024                         21,2026  0 0006 1              EXTEND
 0025    REF    1             21,2027  1 2033 1              BZF     FLASHV?          H FLASH OFF, SO LEAVE ALONE

 0026    REF    2  LAST  612  21,2030  3 4747 1              CA      HLITE
 0027    REF  125  LAST  826  21,2031  54 0001 1             TS      L
 0028    REF    1             21,2032  0 4606 0              TC      FLIP             FLIP H LITE

 0029    REF    1             21,2033  3 4752 0  FLASHV?    CA      VFLSHBIT         VFLASHBIT MUST BE BIT 2.
 0030    REF   13  LAST  829  21,2034  7 0107 0              MASK    FLGWRD11
 0031                         21,2035  0 0006 1              EXTEND
 0032    REF    2  LAST  829  21,2036  1 2042 1              BZF     10,11            V FLASH OFF

 0033    REF    2  LAST  613  21,2037  3 4751 0              CA      VLITE
 0034    REF  126  LAST  829  21,2040  54 0001 1             TS      L
 0035    REF    2  LAST  829  21,2041  0 4606 0              TC      FLIP             FLIP V LITE


 0036    REF    3  LAST  739  21,2042  3 0105 0  10,11      CA      FLAGWRD9         IS THE LETABORT FLAG SET ?
 0037    REF    2  LAST  739  21,2043  7 4743 1              MASK    LETABBIT
 0038                         21,2044  0 0006 1              EXTEND
 0039    REF    1             21,2045  1 2154 1              BZF     LANDISP          NO.  PROCEED TO P10.

 0040    REF   14  LAST  801  21,2046  4 1011 1  P71NOW?    CS      MODREG           YES.  ARE WE IN P71 NOW?
 0041    REF    1                21,2047   6 2107 0                AD      1DEC71
 0042                            21,2050   0 0006 1                EXTEND
 0043    REF    2  LAST  829     21,2051   1 2154 1                BZF     LANDISP           YES.  PROCEED TO P10.

 0044                            21,2052   0 0006 1                EXTEND                    NO.  IS AN ABORT STAGE COMMANDED?
 0045    REF    6  LAST  800     21,2053   00 030 1                READ    CHAN30
 0046                            21,2054   4 0000 0                CCM
 0047    REF  127  LAST  829     21,2055   54 001 1                TS      L
 0048    REF   34  LAST  827     21,2056   7 4750 0                MASK    BIT4
 0049    REF  242  LAST  829     21,2057   10 000 0                CCS     A
 0050    REF    2  LAST  242     21,2060   1 2076 0                TCF     P71A              YES.

 0051    REF   15  LAST  829     21,2061   4 1011 1   P70NOW?      CS      MODREG            NO.  ARE WE IN P70 NOW?
 0052    REF    1                21,2062   6 2106 1                AD      1DEC70
 0053                            21,2063   0 0006 1                EXTEND
 0054    REF    3  LAST  830     21,2064   1 2154 1                BZF     LANDISP           YES.  PROCEED TO P10.

 0055    REF  128  LAST  830     21,2065   3 0001 0                CA      L                 NO.  IS AN ABORT COMMANDED?
 0056    REF   40  LAST  829     21,2066   7 4753 0                MASK    BIT1
 0057    REF  243  LAST  830     21,2067   10 000 0                CCS     A
 0058    REF    2  LAST  241     21,2070   1 2073 0                TCF     P70A              YES.
 0059    REF    4  LAST  830     21,2071   1 2154 1                TCF     LANDISP           NO.  PROCEED TO P10.

 0060    REF    1                                                  COUNT*  $$/P70

 0061    REF    1                21,2072   0 2110 0   P70          TC      LEGAL?
 0062    REF  155  LAST  823     21,2073   4 4755 0   P70A         CS      ZERO
 0063                            21,2074   1 2077 1                TCF     +3
 0064    REF    2  LAST  830     21,2075   0 2110 0   P71          TC      LEGAL?
 0065    REF   52  LAST  824     21,2076   3 4752 0   P71A         CAF     TWO
 0066    REF  202  LAST  826     21,2077   54 002 1      +3        TS      Q
 0067                            21,2100   0 0004 0                INHINT
 0068                            21,2101   0 0006 1                EXTEND
 0069    REF    1                21,2102   3 2105 1                DCA     CNTABTAD
 0070                            21,2103   52 006 0                DTCB

 0071    REF   34  LAST  829     E7,1515                           EBANK=  DVCNTR
 0072    REF    1                21,2104    03402 1   CNTABTAD     2CADR   CONTABRT
 0072    REF    1                21,2105    12067 0
 0073                            21,2106    00106 0   1DEC70       DEC     70
 0074                            21,2107    00107 1   1DEC71       DEC     71

 0075                            05,3402                           BANK    05
 0076    REF    1                05,2000                           SETLOC  ABORTS1
 0077                            05,3402                           BANK
 0078    REF    1                                                  COUNT*  $$/P70

 0079    REF    1                05,3402   3 3405 0   CONTABRT     CAF     ABRTJADR
 0080    REF    1                05,3403   54 017 0                TS      BRUPT
 0081                            05,3404   5 0017 1                RESUME
 0082   REF    1              05,3405   1 3406 1  ABRTJADR TCF      ABRTJASK

 0083   REF    1              05,3406   3 3477 0  ABRTJASK CAF      OCTAL27
 0084   REF 203   LAST  830   05,3407   6 0002 0           AD       Q
 0085   REF 123   LAST  830   05,3410   54 001 1           TS       L
 0086                         05,3411   4 0000 0           COM
 0087   REF   6   LAST  747   05,3412   52 761 0           DXCH     -PHASE4
 0088   REF 204   LAST  831   05,3413   50 002 0           INDEX    Q
 0089   REF   1               05,3414   3 3476 1           CAF      MODE70
 0090   REF  16   LAST  830   05,3415   55'011 1           TS       MODREG

 0091   REF  24   LAST  757   05,3416   55'163 0           TS       DISPDEX           INSURE DISPDEX IS POSITIVE.

 0092   REF 205   LAST  831   05,3417   10 002 1           CCS      Q                 SET APSFLAG IF P71.
 0093   REF  16   LAST  757   05,3420   4 0106 1           CS       FLGWRD10          SET APSFLAG PRIOR TO THE ENEMA.
 0094   REF  11   LAST  757   05,3421   7 4737 1           MASK     APSFLBIT
 0095   REF  17   LAST  831   05,3422   26 106 1           ADS      FLGWRD10
 0096   REF   1               05,3423   4 3501 1           CS       DAPBITS           DAPBITS = OCT 640 = BITS 6, 8, 9
 0097   REF  27   LAST  760   05,3424   7 0111 1           MASK     DAPBOOLS          (TURN OFF: ULLAGE, DRIFT, AND XOVINHIB )
 0098   REF  28   LAST  831   05,3425   54 111 1           TS       DAPBOOLS

 0099   REF  24   LAST  760   05,3426   4 0101 0           CS       FLAGWRD5          SET ENGONFLG.
 0100   REF   5   LAST  760   05,3427   7 4745 1           MASK     ENGONBIT
 0101   REF  25   LAST  831   05,3430   26 101 0           ADS      FLAGWRD5

 0102   REF   8   LAST  760   05,3431   4 4355 1           CS       PRIO30            INSURE THAT THE ENGINE IS ON, IF ARMED.
 0103                         05,3432   0 0006 1           EXTEND
 0104   REF  26   LAST  760   05,3433   02 011 0           RAND     DSALMOUT
 0105   REF  33   LAST  821   05,3434   6 4737 0           AD       BIT13
 0106                         05,3435   0 0006 1           EXTEND
 0107   REF  27   LAST  831   05,3436   01 011 0           WRITE    DSALMOUT

 0108   REF   4   LAST  555   05,3437   3 4735 1           CAF      LRBYBIT           TERMINATE R12.
 0109   REF  14   LAST  829   05,3440   54 107 0           TS       FLGWRD11

 0110   REF  25   LAST  592   05,3441   4 0074 0           CS       FLAGWRD0          SET R10FLAG TO SUPPRESS OUTPUTS TO THE
 0111   REF   1               05,3442   7 4752 1           MASK     R10FLBIT          CROSS-POINTER DISPLAY.
 0112   REF  26   LAST  831   05,3443   26 074 0           ADS      FLAGWRD0          THE FOLLOWING ENEMA WILL REMOVE THE
A0113                                                                                  DISPLAY INERTIAL DATA OUTBIT.

 0114   REF  10   LAST  543   05,3444   0 6011 1           TC       CLRADMOD          INSURE RADMODES PROPERLY SET FOR R29.

 0115                         05,3445   0 0006 1           EXTEND                     LOAD TEVENT FOR THE DOWNLINK.
 0116   REF  25   LAST  816   05,3446   3 0025 0           DCA      TIME2
 0117   REF   6   LAST  760   05,3447   53'345 0           DXCH     TEVENT

 0118                         05,3450   0 0006 1           EXTEND
 0119   REF   1               05,3451   3 3475 1           DCA      SVEXITAD
 0120   REF   3   LAST  740   05,3452   53'253 0           DXCH     AVGEXIT
 0121                                05,3453   0 0006 1            EXTEND
 0122     REF  15   LAST  814        05,3454   3 4755 1            DCA      NEGO
 0123     REF   4   LAST  736        05,3455   52 753 1            DXCH     -PHASE1

 0124                                05,3456   0 0006 1            EXTEND
 0125     REF  16   LAST  832        05,3457   3 4755 1            DCA      NEGO
 0126     REF   4   LAST  814        05,3460   52 757 0            DXCH     -PHASE3

 0127                                05,3461   0 0006 1            EXTEND
 0128     REF  17   LAST  832        05,3462   3 4755 1            DCA      NEGO
 0129     REF   3   LAST  744        05,3463   52 765 1            DXCH     -PHASE6

 0130     REF  25   LAST  736        05,3464   3 6245 1            CAF      THREE             SET UP 4.3SPOT FOR GOABORT
 0131     REF 130   LAST  831        05,3465   54 001 1            TS       L
 0132                                05,3466   4 0000 0            COM
 0133     REF   7   LAST  831        05,3467   52 761 0            DXCH     -PHASE4

 0134     REF   1                    05,3470   3 7730 1            CAF      OCT37774          SET T5RUPT TO CALL DAPIDLER IN
 0135     REF   2   LAST  219        05,3471   54 030 0            TS       TIME5             40 MILLISECONDS.

 0136     REF  48   LAST  816        05,3472   0 4635 0            TC       POSTJUMP
 0137     REF   1                    05,3473    12765 0            CADR     ENEMA

 0138     REF  35   LAST  830        E7,1515                       EBANK=   DVCNTR
 0139     REF   6   LAST  762        05,3474    03770 1  SVEXITAD  2CADR    SERVEXIT
 0139                                05,3475    64067 1
 0140                                05,3476    00106 0  MODE70    DEC      70
 0141                                05,3477    00027 1  OCTAL27   OCT      27
 0142                                05,3500    00107 1  MODE71    DEC      71

 0143                                05,3501    00640 0  DAPBITS   OCT      00640

 0144                                32,3540                       BANK     32
 0145     REF   1                    32,2000                       SETLOC   ABORTS
 0146                                32,3540                       BANK

 0147     REF   1                                                  COUNT*   $$/P70

 0148     REF 139   LAST  825        32,3540   0 6037 0  GOABORT   TC       INTPRET
 0149                                32,3541    77624 1            CALL
 0150     REF   2   LAST  734        32,3542    61104 0                     INITCOUW
 0151                                32,3543    77776 1            EXIT
 0152     REF  15   LAST  813        32,3544   3 4751 0            CAF      FOUR
 0153     REF  36   LAST  832        32,3545   55'515 0            TS       DVCNTR

 0154     REF   1                    32,3546   3 3764 1            CAF      WHICHADR
 0155     REF  27   LAST  785        32,3547   55'455 0            TS       WHICH

 0156     REF  75   LAST  815        32,3550   0 5516 0            TC       DOWNFLAG
 0157     REF   1                    32,3551    00214 0            ADRES    FLRCS
 0158   REF  76  LAST  832   32,3552  0 5516 0            TC      DOWNFLAG
 0159   REF   4  LAST  747   32,3553   00175 1            ADRES   FLUNDISP

 0160   REF  77  LAST  833   32,3554  0 5516 0            TC      DOWNFLAG
 0161   REF   5  LAST  762   32,3555   00161 1            ADRES   IDLEFLAG

 0162   REF  49  LAST  815   32,3556  0 5504 0            TC      UPFLAG           INSURE 4-JET TRANSLATION CAPABILITY.
 0163   REF   1              32,3557   00307 0            ADRES   ACC4-2FL

 0164   REF   5  LAST  820   32,3560  0 5321 1            TC      CHECKMM
 0165                         32,3561   00106 0  70DEC     DEC     70
 0166   REF   1              32,3562  1 3707 0            TCF     P71RET

 0167   REF 140  LAST  832   32,3563  0 6037 0  P70INIT   TC      INTPRET
 0168                         32,3564   77624 1            CALL
 0169   REF   1              32,3565   65737 1                    TGOCOMP
 0170                         32,3566   54345 1            DLOAD   SL
 0171   REF   1              32,3567   34003 0                    MDOTDPS
 0172                         32,3570   20205 1                    4D
 0173                         32,3571   77665 1            BDDV
 0174   REF  10  LAST  819   32,3572   01245 0                    MASS
 0175   REF   2  LAST  119   32,3573   16271 1            STODL   TBUP
 0176   REF  11  LAST  833   32,3574   01245 0                    MASS
 0177                         32,3575   70471 1            DDV     SR1
 0178   REF   1              32,3576   16015 1                    K(1/DV)
 0179   REF   2  LAST  152   32,3577   03635 1            STORE   1/DV1
 0180   REF   2  LAST  152   32,3600   03637 0            STORE   1/DV2
 0181   REF   2  LAST  152   32,3601   03641 1            STORE   1/DV3
 0182                         32,3602   77665 1            BDDV
 0183   REF   1              32,3603   25763 1                    K(AT)
 0184   REF   3  LAST  200   32,3604   16263 1            STODL   AT
 0185   REF   1              32,3605   34005 0                    DTDECAY
 0186                         32,3606   54276 0            DCOMP   SL
 0187                         32,3607   20214 1                    11D
 0188   REF   2  LAST  119   32,3610   02267 0            STORE   TTO
 0189                         32,3611   57535 0            SLOAD   DCOMP
 0190   REF   2  LAST  754   32,3612   26002 1                    DPSVEX
 0191                         32,3613   77702 1            SR2
 0192   REF   2  LAST  119   32,3614   02265 1            STORE   VE               INITIALIZE DPS EXHAUST VELOCITY
 0193                         32,3615   45014 0            SET     CALL
 0194   REF   1              32,3616   04467 0                    FLAP
 0195   REF   1              32,3617   60300 1                    COMMINIT
 0196                         32,3620   52160 1            AXC,1   GOTO             RETURN HERE IN P70, SE X1 FOR DPS COEFF.
 0197                         32,3621   00000 1                    0D
 0198   REF   1              32,3622   65625 0                    BOTHPOLY
 0199                         32,3623   77760 0  INJTARG   AXC,1                    RETURN HERE IN P71, SET X1 FOR APS COEFF
 0200                         32,3624   00010 0                    8D
 0201                         32,3625   41343 0  BOTHPOLY DLOAD* DMP               TGO D
 0202   REF   2  LAST  122   32,3626   02551 1                    ABTCOF,1
 0203   REF  15  LAST  775   32,3627   03517 1                    TGO
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0204                        32,3630   41213 1           DAD*   DMP
0205   REF   3  LAST  833   32,3631   02553 0                  ABTCOF +2,1     TGO(C+TGO D)
0206   REF  16  LAST  833   32,3632   03517 1                  TGO
0207                        32,3633   41213 1           DAD*   DMP
0208   REF   4  LAST  834   32,3634   02555 0                  ABTCOF +4,1     TGO(B+TGO(C+TGO D))
0209   REF  17  LAST  834   32,3635   03517 1                  TGO
0210                        32,3636   77613 0           DAD*
0211   REF   5  LAST  834   32,3637   02557 1                  ABTCOF +6,1     A+TGO(B+TGO(C+TGO D))
0212   REF   3  LAST  316   32,3640   02277 1           STORE  ZDOTD           STORE TENTATIVELY IN ZDOTD
0213                        32,3641   51025 1           DSU    BPL             CHECK AGAINST MINIMUM
0214   REF   2  LAST  122   32,3642   02571 0                  VMIN
0215   REF   1              32,3643   65647 1                  UPRATE          IF BIG ENOUGH, LEAVE ZDOTD AS IS .
0216                        32,3644   77745 1           DLOAD
0217   REF   3  LAST  834   32,3645   02571 0                  VMIN
0218   REF   4  LAST  834   32,3646   02277 1           STORE  ZDOTD           IF TOO SMALL, REPLACE WITH MINIMUM.
0219                        32,3647   77745 1  UPRATE   DLOAD
0220   REF   2  LAST  122   32,3650   02575 1                  ABTRDOT
0221   REF   3  LAST  316   32,3651   36273 1           STCALL RDOTD           INITIALIZE RDOTD.
0222   REF   1              32,3652   57312 0                  YCOMP           COMPUTE Y
0223                        32,3653   45246 0           ABS    DSU
0224   REF   2  LAST  122   32,3654   02573 1                  YLIM            /Y/-DYMAX
0225                        32,3655   75240 0           BMN    SIGN            IF <0, XR<.5DEG, LEAVE YCO AT 0
0226   REF   1              32,3656   65661 0                  YOK             IF >0, FIX SIGN OF DEFICIT, THIS IS YCO.
0227   REF   2  LAST  120   32,3657   02335 0                  Y
0228   REF   2  LAST  152   32,3660   03633 1           STORE  YCO
0229                        32,3661   45345 1  YOK      DLOAD  DSU
0230   REF   3  LAST  834   32,3662   03633 1                  YCO
0231   REF   3  LAST  834   32,3663   02335 0                  Y               COMPUTE XRANGE IN CASE ASTRONAUT WANTS
02312                       32,3664   77661 0           SR
02314                       32,3665   20606 0                  5D
0232   REF   3  LAST  316   32,3666   03643 0           STORE  XRANGE          TO LOOK.
0233                        32,3667   77414 0  UPTHROT  SET    EXIT
0234   REF   1              32,3670   04461 0                  FLVR

0235   REF  50  LAST  833   32,3671  0 5504 0           TC     UPFLAG          SET ROTFLAG
0236   REF   1              32,3672   00220 1           ADRES  ROTFLAG

0237   REF   1              32,3673  0 3746 1           TC     THROTUP

0238   REF  61  LAST  816   32,3674  0 5353 1           TC     PHASCHNG
0239                        32,3675   04024 0           OCT    04024

0240   REF 230  LAST  819   32,3676  0 4616 1      -3   TC     BANKCALL        VERIFY THAT THE PANEL SWITCHES
0241   REF   2  LAST  733   32,3677   73747 1           CADR   P40AUTO         ARE PROPERLY SET.

0242   REF   2  LAST  834   32,3700  0 3746 1           TC     THROTUP

0243                        32,3701  0 0006 1  UPTHROT1 EXTEND                 SET SERVICER TO CALL ASCENT GUIDANCE.
0244   REF   1              32,3702  3 3766 0           DCA    ATMAGAD
0245   REF   4  LAST  831   32,3703  53 253 0           DXCH   AVGEXIT
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 0246    REF  62  LAST  834   32,3704  0 5353 1  GRP4OFF  TC      PHASCHNG          TERMINATE USE OF GROUP 4.
 0247                         32,3705   00004 0           OCT     00004

 0248    REF 130  LAST  815   32,3706  1 5155 1           TCF     ENDOFJOB

 0249    REF  78  LAST  833   32,3707  0 5516 0  P71RET   TC      DOWNFLAG
 0250    REF   2  LAST  791   32,3710   00215 1           ADRES   LETABORT

 0251    REF   2  LAST  758   32,3711  3 6000 1           CAF     THRESH2           SET DVMON THRESHOLD TO THE ASCENT VALUE.
 0252    REF   5  LAST  785   32,3712  55'251 1           TS      DVTHRUSH

 0253    REF 141  LAST  833   32,3713  0 6037 0           TC      INTPRET
 0254                         32,3714   45014 0           BON     CALL
 0255    REF   2  LAST  833   32,3715   04707 0                   FLAP
 0256    REF   1              32,3716   65724 0                   OLDTIME
 0257    REF   2  LAST  833   32,3717   65737 1                   TGOCOMP           IF FLAP=0, TGO=T-TIG
 0258                         32,3720   52131 0           SSP     GOTO
 0259    REF   7  LAST  771   32,3721   00053 1                   QPRET
 0260    REF   1              32,3722   65623 0           CADR    INJTARG
 0261    REF   1              32,3723   60254 1                   P12INIT           WILL EXIT P12INIT TO INJTARG
 0262                         32,3724   72545 0  OLDTIME  DLOAD   SL1               IF FLAP=1,TGO=2 TGO
 0263    REF  10  LAST  834   32,3725   03517 1                   TGO
 0264    REF   1              32,3726   37502 1           STCALL  TGO1
 0265    REF   2  LAST  835   32,3727   60254 1                   P12INIT
 0266                         32,3730   77776 1           EXIT
 0267    REF  63  LAST  835   32,3731  0 5353 1           TC      PHASCHNG
 0268                         32,3732   04024 0           OCT     04024

 0269                         32,3733  0 0006 1           EXTEND
 0270    REF   2  LAST  835   32,3734  3 1502 1           DCA     TGO1
 0271    REF  19  LAST  835   32,3735  53'517 1           DXCH    TGO
 0272    REF   1              32,3736  1 3676 1           TCF     UPTHROT1 -3

 0273    REF   9  LAST  757   E7,1501            TGO1     =       VGBODY
R0274    **************************************************************************

 0275                         21,2110                     BANK    21
 0276    REF   2  LAST  329   21,2000                     SETLOC  R11
 0277                         21,2110                     BANK

 0278    REF   2 LAST  830 TO  830:     14     14*        COUNT*  $$/P70

 0279    REF  10  LAST  231   21,2110  4 0775 0  LEGAL?   CS      MMNUMBER          IS THE DESIRED PGM ALREADY IN PROGRESS?
 0280    REF  17  LAST  831   21,2111  6 1011 0           AD      MODREG
 0281                         21,2112  0 0006 1           EXTEND
 0282    REF   1              21,2113  1 2124 0           BZF     ABORTAL4

 0283    REF   4  LAST  829   21,2114  4 0105 1           CS      FLAGWRDS          ARE THE ABORTS ENABLED?
 0284    REF   3  LAST  829   21,2115  7 4743 1           MASK    LETABBIT
 0285    REF 244  LAST  830   21,2116  10 000 0           CCS     A
 0286   REF   2  LAST  835   21,2117   1 2124 0            TCF      ABORTALM

 0287   REF  18  LAST  829   21,2120   3 0103 0            CA       FLAGWRD7         IS SERVICER ON THE AIR?
 0288   REF   5  LAST  829   21,2121   7 4747 0            MASK     AVEGFBIT
 0289   REF 245  LAST  835   21,2122  10 000 0             CCS      A
 0290   REF 206  LAST  831   21,2123   0 0002 0            TC       Q                YES.  ALL IS WELL.
 0291   REF   8  LAST  497   21,2124   0 4364 1  ABORTALM  TC       FALTON
 0292   REF  10  LAST  458   21,2125   0 4457 0            TC       RELDSP
 0293   REF  49  LAST  832   21,2126   0 4635 0            TC       POSTJUMP
 0294   REF   5  LAST  450   21,2127    21050 1            CADR     PINBRNCH

 0295                        32,3737                       BANK     32
 0296   REF   2  LAST  832   32,2000                       SETLOC   ABORTS
 0297                        32,3737                       BANK

 0298   REF   2 LAST  832 TO  835:    127     127*         COUNT*   $$/P70

R0299   ******************************************************************************

 0300                        32,3737    45234 0  TGOCOMP   RTB      DSU
 0301   REF  22  LAST  729   32,3740    21573 0                     LOADTIME
 0302   REF  40  LAST  788   32,3741    03442 0                     TIG
 0303                        32,3742    77661 0            SL
 0304                        32,3743    20214 1                     11D
 0305   REF  20  LAST  835   32,3744    03517 1            STORE    TGO
 0306                        32,3745    77616 0            RVQ

R0307   ******************************************************************************

 0308   REF  34  LAST  831   32,3746   3 4737 0  THROTUP   CAF      BIT13
 0309   REF   5  LAST  795   32,3747  54 055 0             TS       THRUST
 0310   REF  35  LAST  830   32,3750   3 4750 1            CAF      BIT4
 0311                        32,3751   0 0006 1            EXTEND
 0312   REF  11  LAST  795   32,3752  05 014 1             WOR      CHAN14
 0313   REF 207  LAST  836   32,3753   0 0002 0            TC       Q

R0314   ******************************************************************************

 0315                        32,3754    00000 1  10SECS    2DEC     1000
 0315                        32,3755    01750 1
 0316                        32,3756    00021 1  HINJECT   2DEC     18288 B-24       60,000 FEET EXPRESSED IN METERS.
 0316                        32,3757    33400 0
 0317                        32,3760    11021 1  (TGO)A    2DEC     37000 B-17
 0317                        32,3761    00000 1
 0318                        32,3762    00507 0  K(AT)     2DEC     .02              SCALING CONSTANT
 0318                        32,3763    25605 0
 0319   REF   1              32,3764    02112 1  WHICHADR  REMADR   ABRTABLE

R0320   ******************************************************************************
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 0321    REF  37  LAST  832    E7,1515                          EBANK=  DVCNTR
 0322    REF   2  LAST  749    32,3765    03642 1  ATMAGAD   2CADR    ATMAG
 0322                          32,3766    70067 1
 0323    REF   5  LAST  235    32,3767    00003 1  ORBMANAD  ADRES    ORBMANUV
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0001                          24,3670                         BANK     24
0002     REF   1              30,2000                         SETLOC   P12
0003                          30,2061                         BANK

0004     REF  38  LAST  837   E7,1515                         EBANK=   DVCNTR
0005     REF   1                                              COUNT*   $$/P12

0006     REF  64  LAST  835   30,2061   0 5353 1   P12LM      TC       PHASCHNG
00062                         30,2062    04024 0              OCT      04024

00064    REF 231  LAST  834   30,2063   0 4616 1              TC       BANKCALL
0007     REF  10  LAST  785   30,2064    11254 1              CADR     R02BOTH              CHECK THE STATUS OF THE IMU.

0008     REF  51  LAST  834   30,2065   0 5504 0              TC       UPFLAG
0009     REF   5  LAST  785   30,2066    00141 0              ADRES    MUNFLAG

0010     REF  52  LAST  838   30,2067   0 5504 0              TC       UPFLAG               INSURE 4-JET TRANSLATION CAPABILITY.
0011     REF   2  LAST  833   30,2070    00307 0              ADRES    ACC4-2FL

00112    REF  53  LAST  838   30,2071   0 5504 0              TC       UPFLAG               PREVENT R10 FROM ISSUING CROSS-POINTER
00114    REF   1              30,2072    00015 0              ADRES    R10FLAG              OUTPUTS.

00115    REF  11  LAST  831   30,2073   0 6011 1              TC       CLRADMOD             INITIALIZE RADMODES FOR R29.

0012     REF  79  LAST  835   30,2074   0 5516 0              TC       DOWNFLAG             CLEAR RENDEZVOUS FLAG FOR P22
0013     REF   5  LAST  785   30,2075    00010 0              ADRES    RNDVZFLG

001301   REF   3  LAST  835   30,2076   3 6000 1              CAF      THRESH2              INITIALIZE DVMON
001302   REF   6  LAST  835   30,2077   55'251 1              TS       DVTHRUSH
001303   REF  16  LAST  832   30,2100   3 4751 0              CAF      FOUR
001304   REF  39  LAST  838   30,2101   55'515 0              TS       DVCNTR

00131    REF 156  LAST  830   30,2102   3 4755 1              CA       ZERO
00132    REF  10  LAST  760   30,2103   55'462 1              TS       TRKMKCNT             SHOW THAT R29 DOWNLINK DATA ISN'T READY.
0014     REF   1              30,2104   3 3035 1              CAF      V06N33A
0015     REF 232  LAST  838   30,2105   0 4616 1              TC       BANKCALL             FLASH TIG
0016     REF  23  LAST  791   30,2106    20476 0              CADR     GOFLASH
0017     REF  34  LAST  814   30,2107   1 6001 1              TCF      GOTOPOOH
0018                          30,2110   1 2112 0              TCF      +2                   PROCEED
0019                          30,2111   1 2104 1              TCF      -5                   ENTER

00192    REF  65  LAST  838   30,2112   0 5353 1              TC       PHASCHNG
00194                         30,2113    04024 0              OCT      04024

0020     REF 142  LAST  835   30,2114   0 6037 0              TC       INTPRET
0021                          30,2115    77624 1              CALL                          INITIALIZE WM AND /LAND/
0022     REF   2  LAST  786   30,2116    46432 0                       GUIDINIT
0023                          30,2117    45014 0              SET      CALL
00235    REF   1              30,2120    04464 0                       FLPI
0024     REF   3  LAST  835   30,2121    60254 1                       P12INIT
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 0025                          30,2122   77745 1  P12LMB   DLOAD
 0026   REF   1                30,2123   25761 0                    (TGO)A         SET TGO TO AN INITIAL NOMINAL VALUE.
 0027   REF  21  LAST  836     30,2124   17517 1           STODL    TGO
 0028   REF  41  LAST  836     30,2125   03442 0                    TIG
 0029   REF  51  LAST  788     30,2126   34041 0           STCALL   TDEC1
 0030   REF  11  LAST  786     30,2127   27057 0                    LEMPREC        ROTATE THE STATE VECTORS TO THE
 0031                          30,2130   64375 1           VLOAD    MXV            IGNITION TIME.
 0032   REF  23  LAST  766     30,2131   00007 0                    VATT
 0033   REF  28  LAST  806     30,2132   01734 0                    REFSMMAT
 0034                          30,2133   77772 0           VSL1
 0035   REF   2  LAST  147     30,2134   27601 0           STOVL    V1S            COMPUTE V1S = VEL(TIG)*2(-7)M/CS.
 0036   REF  28  LAST  766     30,2135   00001 0                    RATT
 0037                          30,2136   52521 0           MXV      VSL6
 0038   REF  29  LAST  839     30,2137   01734 0                    REFSMMAT
 0039   REF  16  LAST  819     30,2140   37521 0           STCALL   R              COMPUTE R = POS(TIG)*2(-24)M.
 0040   REF   3  LAST  786     30,2141   67130 1                    MUNGRAV        COMPUTE GDT1/2(TIG)*2(-7)M/CS.
 0041                          30,2142   53575 0           VLOAD    UNIT
 0042   REF  17  LAST  839     30,2143   03521 1                    R
 0043   REF   9  LAST  812     30,2144   37537 1           STCALL   UNIT/R/        COMPUTE UNIT/R/ FOR YCOMP.
 0044   REF   2  LAST  834     30,2145   57312 0                    YCOMP
 0045                          30,2146   57461 0           SR       DCOMP
 0046                          30,2147   20606 0                    5D
 0047   REF   4  LAST  834     30,2150   17643 0           STODL    XRANGE         INITIALIZE XRANGE FOR NOUN 76.
 0048   REF   1                30,2151   06456 0                    VINJNOM
 0049   REF   5  LAST  834     30,2152   16277 1           STODL    ZDOTD
 00492  REF   1                30,2153   06460 0                    RDOTDNOM
 00494  REF   4  LAST  834     30,2154   02273 0           STORE    RDOTD
 0050                          30,2155   77776 1           EXIT

 0051   REF  66  LAST  838     30,2156  0 5353 1           TC       PHASCHNG
 0052                          30,2157   04024 0           OCT      04024

 0053   REF   1                30,2160  3 3034 0  NEWLOAD  CAF      V06N76         FLASH CROSS-RANGE AND APOLUNE VALUES.
 0054   REF 233  LAST  838     30,2161  0 4616 1           TC       BANKCALL
 0055   REF  24  LAST  838     30,2162   20476 0           CADR     GOFLASH
 0056   REF  35  LAST  838     30,2163  1 6001 1           TCF      GOTOPOOH
 0057                          30,2164  1 2165 0           TCF      +2             PROCEED
 0058   REF   1                30,2165  1 2160 0           TCF      NEWLOAD        ENTER NEW DATA.

 0059   REF   1                30,2166  3 2320 1           CAF      P12ADRES
 0060   REF  28  LAST  832     30,2167   55455 0           TS       WHICH

 00602  REF  67  LAST  839     30,2170  0 5353 1           TC       PHASCHNG
 00604                         30,2171   04024 0           OCT      04024

 0061   REF 143  LAST  838     30,2172  0 6037 0           TC       INTPRET
 0062                          30,2173   54345 1           DLOAD    SL
 0063   REF   5  LAST  839     30,2174   03643 0                    XRANGE
 0064                          30,2175   20206 1                    5D
 0065                          30,2176   77615 0           DAD
 0066     REF   4  LAST  834    30,2177    02335 0                       Y
 0067     REF   4  LAST  834    30,2200    27633 1              STOVL    YCU
 0081     REF  10  LAST  839    30,2201    03537 0                       UNIT/R/
 0082                           30,2202    53361 0              VXSC     VAD
 0083     REF   1               30,2203    06454 1                       49FPS
 0084     REF   3  LAST  839    30,2204    03601 0                       V1S
 0085     REF   8  LAST  317    30,2205    03527 1              STORE    V                   V(TIPOVER) = V(IGN) + 57FPS (UNIT/R/)
 00852                          30,2206    72441 0              DOT      SL1
 00853    REF  11  LAST  840    30,2207    03537 0                       UNIT/R/
 00854    REF   1               30,2210    27474 0              STOVL    RDOT                RDOT * 2(-7)
 00855    REF  12  LAST  840    30,2211    03537 0                       UNIT/R/
 00856                          30,2212    53435 0              VXV      UNIT
 00857    REF   1               30,2213    03720 1                       QAXIS
 00858    REF   1               30,2214    03726 1              STORE    ZAXIS1
 0087                           30,2215    77614 1              SETGO
 0088     REF   2  LAST  834    30,2216    04421 1                       FLVR
 0089     REF   1               30,2217    60321 1                       ASCENT
 0090                           30,2220    77745 1   P12RET     DLOAD
 0091     REF   2  LAST  120    30,2221    02361 1                       ATP                 ATP(2)*2(18)
 0092                           30,2222    65316 0              DSQ      PDDL
 0093     REF   2  LAST  120    30,2223    02355 0                       ATY                 ATY(2)*2(18)
 0094                           30,2224    43316 1              DSQ      DAD
 0095                           30,2225    75454 0              BZE      SQRT
 0096     REF   1               30,2226    60232 1                       YAWDUN
 0097                           30,2227    55352 0              SL1      BDDV
 0098     REF   3  LAST  840    30,2230    02355 0                       ATY
 0099                           30,2231    77736 0              ARCSIN
 0100     REF   3  LAST  316    30,2232    26363 0   YAWDUN     STOVL    YAW
 0101     REF  15  LAST  812    30,2233    03254 1                       UNFC/2
 0102                           30,2234    50256 0              UNIT     DOT
 0103     REF  13  LAST  840    30,2235    03537 0                       UNIT/R/
 0104                           30,2236    65552 0              SL1      ARCCOS
 0105                           30,2237    77676 0              DCOMP
 0106     REF   2  LAST  316    30,2240    02365 0              STORE    PITCH
 0107                           30,2241    77776 1              EXIT
 0108     REF  68  LAST  839    30,2242    0 5353 1             TC       PHASCHNG
 0109                           30,2243    04024 0              OCT      04024

 0110     REF  80  LAST  838    30,2244    0 5516 0             TC       DOWNFLAG
 0111     REF   2  LAST  838    30,2245    00213 1              ADRES    FLPI

 0112                           30,2246    0 0004 0             INHINT
 0113     REF  37  LAST  788    30,2247    0 4674 0             TC       IBNKCALL
 0114     REF   3  LAST  788    30,2250    40142 1              CADR     PFLITEDB
 0115                           30,2251    0 0003 1             RELINT

 0116     REF  50  LAST  836    30,2252    0 4635 0             TC       POSTJUMP
 0117     REF   3  LAST  789    30,2253    74126 1              CADR     BURNBABY

 0118                           30,2254    77745 1   P12INIT    DLOAD                        INITIALIZE ENGINE DATA. USED FOR P12 AND
 0119    REF    1                30,2255    16013 1                        (1/DV)A      P71.
 0120    REF    3  LAST   833    30,2256    03641 1              STORE     1/DV3
 0121    REF    3  LAST   833    30,2257    03637 0              STORE     1/DV2
 0122    REF    3  LAST   833    30,2260    17635 1              STODL     1/DV1
 0123    REF    1                30,2261    16017 0                        (AT)A
 0124    REF    4  LAST   833    30,2262    16263 1              STODL     AT
 0125    REF    1                30,2263    16021 0                        (TBUP)A
 0126    REF    3  LAST   833    30,2264    16271 1              STODL     TBUP
 0127    REF    1                30,2265    34013 1                        ATDECAY
 0128                            30,2266    54276 0              DCOMP     SL
 0129                            30,2267    20214 1                        11D
 0130    REF    3  LAST   833    30,2270    02267 0              STORE     TTO
 0131                            30,2271    57535 0              SLOAD     DCOMP
 0132    REF    2  LAST   758    30,2272    26001 1                        APSVEX
 0133                            30,2273    77702 1              SR2
 0134    REF    3  LAST   833    30,2274    02265 1              STORE     VE
 0135                            30,2275    43414 1              BOFF      RVQ
 0136    REF    3  LAST   835    30,2276    04747 1                        FLAP
 0137    REF    2  LAST   833    30,2277    60300 1                        COMMINIT
 0138                            30,2300    43345 1   COMMINIT   DLOAD     DAD          INITIALIZE TARGET DATA. USED BY P12, P70
 0139    REF    1                30,2301    25757 0                        HINJECT      AND P71 IF IT DOES NOT FOLLOW P70.
 0140    REF    6  LAST   818    30,2302    02333 0                        /LAND/
 0141    REF    2  LAST   152    30,2303    17631 0              STODL     RCO
 0142    REF    8  LAST   786    30,2304    06522 1                        HI6ZEROS
 0143    REF    2  LAST   152    30,2305    03654 0              STORE     TXO
 0144    REF    5  LAST   840    30,2306    03633 1              STORE     YCO
 0145    REF    5  LAST   839    30,2307    02273 0              STORE     RDOTD
 0146    REF    2  LAST   119    30,2310    26275 0              STOVL     YDOTD
 0147    REF    1                30,2311    01563 0                        VRECTCSM
 0148                            30,2312    64235 1              VXV       MXV
 0149    REF    5  LAST   240    30,2313    01555 0                        RRECTCSM
 0150    REF   30  LAST   839    30,2314    01734 0                        REFSMMAT
 0151                            30,2315    77656 1              UNIT
 0152    REF    2  LAST   840    30,2316    03720 1              STORE     QAXIS
 0153                            30,2317    77616 0              RVQ
 01652   REF    1                30,2320    02022 0   P12ADRES   REMADR    P12TABLE

 01654   REF    1                23,2000                         SETLOC    P12A
 01656                           23,2432                         BANK
 01658   REF    1                                                COUNT*    $$/P12

 0166                            23,2432    40220 0   GUIDINIT   STQ       SETPD
 0167    REF    6  LAST   748    23,2433    01164 0                        TEMPR60
 0168                            23,2434    00001 0                        0D
 0169                            23,2435    41575 0              VLOAD     PUSH
 0170    REF    8  LAST   786    23,2436    06514 1                        UNITZ
 0171                            23,2437    41434 1               TB       PUSH
 0172    REF   23  LAST   836    23,2440    21573 0                        LOADTIME
 0173                            23,2441    77624 1              CALL
 0175    REF    2  LAST   786    23,2442    55716 1                        RP-TO-R
 0176                            23,2443   74321 1            MXV     VXSC
 0177  REF   31  LAST  841       23,2444   01734 0                    REFSMMAT
 0178  REF    1                  23,2445   16027 0                    MOONRATE
 0179  REF    4  LAST  806       23,2446   26325 1            STOVL   WM
 0180  REF    8  LAST  791       23,2447   02023 1                    RLS
 0181                            23,2450   52446 0            ABVAL   SL3
 0182  REF    7  LAST  841       23,2451   36333 1            STCALL  /LAND/
 0183  REF    7  LAST  841       23,2452   01164 0                    TEMPR60

 0185                            23,2453   00046 0  49FPS     2DEC    .149352 B-6     EXPECTED RDOT AT TIPOVER
 0185                            23,2454   07374 0
 0186                            23,2455   04145 0  VINJNOM   2DEC    16.7924 B-7     5509.5 FPS(APO=30NM WITH RDOT=19.5FPS)
 0186                            23,2456   15527 0
 0187                            23,2457   00007 0  RDOTDNOM  2DEC    .059436 B-7     19.5 FPS
 0187                            23,2460   23346 1
 0001                              34,3642                            BANK     34
 0002    REF    1                  34,2000                            SETLOC ASCFILT
 0003                              34,3642                            BANK

 0004    REF   40  LAST   838      E7,1515                            EBANK= DVCNTR

 0005    REF    1                                                     COUNT* $$/ASENT

 0006    REF   69  LAST   840      34,3642  0 5353 1  ATMAG           TC       PHASCHNG
 0007                              34,3643   00035 1                  OCT      00035
 0008    REF  144  LAST   839      34,3644  0 6037 0                  TC       INTPRET
 0009                              34,3645   77614 1                  BON
 0010    REF    2  LAST   832      34,3646   04705 1                           FLRCS
 0011    REF    2  LAST   840      34,3647   60321 1                           ASCENT
 0012                              34,3650   45345 1                  DLOAD    DSU
 0013    REF    2  LAST   147      34,3651   03514 1                           ABDVCONV
 0014    REF    1                  34,3652   26205 1                           MINABDV
 0015                              34,3653   43040 1                  BMN      CLEAR
 0016    REF    1                  34,3654   60750 0                           ASCTERM4
 0017    REF   15  LAST   791      34,3655   04267 0                           SURFFLAG
 0018                              34,3656   67214 1                  CLEAR    SLOAD
 0019    REF   10  LAST   609      34,3657   02676 1                           RENDWFLG
 0020    REF    1                  34,3660   31716 0                           BIT3H
 0021                              34,3661   77471 0                  DDV      EXIT
 0022    REF    3  LAST   843      34,3662   03514 1                           ABDVCONV
 0023    REF  331  LAST   825      34,3663  52 155 1                  DXCH     MPAC
 0024    REF    4  LAST   841      34,3664  53'641 1                  DXCH     1/DV3
 0025    REF    4  LAST   841      34,3665  53'637 0                  DXCH     1/DV2
 0026    REF    4  LAST   841      34,3666  53'635 1                  DXCH     1/DV1
 0027    REF    1                  34,3667  53'571 1                  DXCH     1/DV0
 0028    REF  145  LAST   843      34,3670  0 6037 0                  TC       INTPRET
 0029                              34,3671   43345 1                  DLOAD    DAD
 0030    REF    2  LAST   843      34,3672   03571 1                           1/DV0
 0031    REF    5  LAST   843      34,3673   03635 1                           1/DV1
 0032                              34,3674   43215 0                  DAD      DAD
 0033    REF    5  LAST   843      34,3675   03637 0                           1/DV2
 0034    REF    5  LAST   843      34,3676   03641 1                           1/DV3
 0035                              34,3677   41205 0                  DMP      DMP
 0036    REF    4  LAST   841      34,3700   02265 1                           VE
 0037    REF    1                  34,3701   21032 0                           2SEC(9)
 0038                              34,3702   65252 1                  SL3      PDDL
 0039    REF    4  LAST   841      34,3703   02271 1                           TBUP
 0040                              34,3704   43342 0                  SR1      DAD
 0041                              34,3705   77625 0                  DSU
 0042    REF    1                  34,3706   21027 1                           6SEC(18)
 0043    REF    5  LAST   843      34,3707   16271 1                  STODL    TBUP
 0044    REF    5  LAST   843      34,3710   02265 1                           VE
 0045                              34,3711   56342 1                  SR1      DDV
 0046    REF    6  LAST   843      34,3712   02271 1                           TBUP
 0047    REF    5  LAST   841      34,3713   36263 0                  STCALL AT
 0048   REF   3  LAST  843   34,3714   60321 1                      ASCENT
 0049                        34,3715   00004 0  BIT3H     OCT      4
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P0050


 0051                            30,2321                              BANK    30
 0052    REF   2  LAST   39      30,2000                              SETLOC  ASENT
 0053                            30,2321                              BANK
 0054    REF   2 LAST   39 TO    39:        2      2*                 COUNT*  $$/ASENT


 0055                            30,2321     51575 1   ASCENT         VLOAD   ABVAL
 0056    REF  16  LAST  839      30,2322     03521 1                          R
 0057    REF   2  LAST  119      30,2323     26301 1                  STOVL   /R/MAG
 0058    REF   2  LAST  840      30,2324     03726 1                          ZAXIS1
 0059                            30,2325     72441 0                  DOT     SL1
 0060    REF   9  LAST  840      30,2326     03527 1                          V                 Z.V = ZDOT*2(-8).
 0061    REF   2  LAST  120      30,2327     26313 1                  STOVL   ZDOT              ZDOT*2(-7)
 0062    REF   3  LAST  845      30,2330     03726 1                          ZAXIS1
 0063                            30,2331     76435 1                  VXV     VSL1
 0064    REF  14  LAST  840      30,2332     03537 0                          UNIT/R/           Z X UR = LAXIS*2(-2)
 0065    REF   2  LAST  120      30,2333     02303 0                  STORE   LAXIS             LAXIS*2(-1)
 0066                            30,2334     72441 0                  DOT     SL1
 0067    REF  10  LAST  845      30,2335     03527 1                          V                 L.V = YDOT*2(-3).
 0068    REF   3  LAST  316      30,2336     36311 1                  STCALL  YDOT              YDOT * 2(-7)
 0069    REF   3  LAST  839      30,2337     57312 0                          YCOMP
 0070                            30,2340     77775 1                  VLOAD
 0071    REF   2  LAST  147      30,2341     03563 1                          GDT1/2            LOAD GDT1/2*2(-7)M/CS.
 0072                            30,2342     50341 1                  V/SC    DOT
 0073    REF   1                 30,2343     27147 0                          2SEC(18)
 0074    REF  15  LAST  845      30,2344     03537 0                          UNIT/R/           G.UR*2(9) = GR*2(9).
 0075                            30,2345     47315 0                  PDVL    VXV               STORE IN PDL(0)                      (2)
 0076    REF  16  LAST  845      30,2346     03537 0                          UNIT/R/           LOAD UNIT/R/*2(-1).
 0077    REF  11  LAST  845      30,2347     03527 1                          V                 UR*2(-1) X V*2(-7) = H/R*2(-8).
 0078                            30,2350     56236 0                  VSQ     DDV               H(2)/R(2)*2(-16).
 0079    REF   3  LAST  845      30,2351     02301 1                          /R/MAG            H(2)/R(3)*2(9).
 0080                            30,2352     43352 1                  SL1     DAD
 0081                            30,2353     77626 0                  STADR
 0082    REF   2  LAST  120      30,2354     61462 0                  STODL   GEFF              GEFF*2(10)M/CS/CS.
 0083    REF   6  LAST  839      30,2355     02277 1                          ZDOTD
 0084                            30,2356     77625 0                  DSU
 0085    REF   3  LAST  845      30,2357     02313 1                          ZDOT
 0086    REF   2  LAST  120      30,2360     02343 1                  STORE   DZDOT             DZDOT = (ZDOTD - ZDOT)*2(7)M/CS.
 0087                            30,2361     65361 0                  VXSC    PDDL
 0088    REF   4  LAST  845      30,2362     03726 1                          ZAXIS1
 0089    REF   3  LAST  841      30,2363     02275 0                          YDOTD
 0090                            30,2364     77625 0                  DSU
 0091    REF   4  LAST  845      30,2365     02311 0                          YDOT
 0092    REF   2  LAST  120      30,2366     02341 0                  STORE   DYDOT             DYDOT = (YDOTD - YDOT)*2(7)M/CS.
 0093                            30,2367     65361 0                  VXSC    PDDL
 0094    REF   3  LAST  845      30,2370     02303 0                          LAXIS
 0095    REF   6  LAST  841      30,2371     02273 0                          RDOTD
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0096                           30,2372    77625 0               DSU
0097   REF    2  LAST   840    30,2373    03474 0                        RDOT
0098   REF    2  LAST   120    30,2374    02337 1               STORE    DRDOT          DRDOT = (RDOTD - RDOT)*2(7)M/CS.
0099                           30,2375    53361 0               VXSC     VAD
0100   REF   17  LAST   845    30,2376    03537 0                        UNIT/R/
0101                           30,2377    76455 1               VAD      VSL1
0102                           30,2400    77626 0               STADR
0103   REF    3  LAST   200    30,2401    74131 1               STORE    VGVECT         VG = (DRDOT)R + (DYDOT)L + (DZDOT)Z.
0104                           30,2402    41345 0               DLOAD    DMP            LOAD TGO
0105   REF   22  LAST   839    30,2403    03517 1                        TGO            TGO GEFF
0106   REF    3  LAST   845    30,2404    02315 1                        GEFF
0107                           30,2405    76561 1               VXSC     VSL1
0108   REF   18  LAST   846    30,2406    03537 0                        UNIT/R/        TGO GEFF UR
0109                           30,2407    77645 0               BVSU
0110   REF    4  LAST   846    30,2410    03646 0                        VGVECT         COMPENSATED FOR GEFF
0111   REF    5  LAST   846    30,2411    03646 0               STORE    VGVECT         STORE FOR DOWNLINK
0112                           30,2412    76521 0               MXV      VSL1           GET VGBODY FOR N85 DISPLAY
0113   REF    4  LAST   812    30,2413    02146 0                        XNBPIP
0114   REF   10  LAST   835    30,2414    27502 0               STOVL    VGBODY
0115   REF    6  LAST   846    30,2415    03646 0                        VGVECT
0116                           30,2416    43046 1               ABVAL    BOFF           MAGNITUDE OF VGVECT
0117   REF    3  LAST   843    30,2417    04745 0                        FLRCS          IF FLRCS=0,DO NORMAL GUIDANCE
0118   REF    1                30,2420    60425 1                        MAINENG
0119                           30,2421    77671 1               DDV                     USE TGO=VG/AT  WITH RCS
0120   REF    1                30,2422    20001 1                        AT/RCS
0121   REF   23  LAST   846    30,2423    37517 0               STCALL   TGO            THIS WILL BE USED ON NEXT CYCLE
0122   REF    1                30,2424    60746 1                        ASCTERM2
0123                           30,2425    41471 0    MAINENG    DDV      PUSH           VG/VE IN PDL(0)                    (2)
0124   REF    6  LAST   843    30,2426    02265 1                        VE
0125                           30,2427    44205 0               DMP      BDSU           1-KT VG/VE
0126   REF    1                30,2430    26201 0                        KT1
0127   REF    1                30,2431    17771 0                        NEARONE
0128                           30,2432    41205 0               DMP      DMP            TBUP VG(1-KT VG/VE)/VE             (0)
0129   REF    7  LAST   843    30,2433    02271 1                        TBUP            = TGO
0130                           30,2434    77625 0               DSU                     COMPENSATE FOR TAILOFF
0131   REF    4  LAST   841    30,2435    02267 0                        TTO
0132   REF   24  LAST   846    30,2436    03517 1               STORE    TGO
0133                           30,2437    57461 0               SR       DCOMP
0134                           30,2440    20614 0                        11D
0135   REF   23  LAST   746    30,2441    17454 1               STODL    TTOGO          TGO*2(-28)CS
0136   REF   25  LAST   846    30,2442    03517 1                        TGO
0137                           30,2443    45214 1               BON      DSU
0138   REF    6  LAST   833    30,2444    03710 1                        IDLEFLAG
0139   REF    1                30,2445    60451 1                        T2TEST
0140   REF    2  LAST   773    30,2446    21021 1                        4SEC(17)       ( TGO - 4 )*2(-17)CS.
0141                           30,2447    77640 0               BMN
0142   REF    1                30,2450    30355 1                        ENGOFF
0143                           30,2451    77745 1    T2TEST     DLOAD
0144   REF   26  LAST   846    30,2452    03517 1                        TGO
0145                           30,2453    50025 0               DSU      BMN            IF TGO - T2 NEG., GO TO CMPONENT
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 0146   REF  1              30,2454   21023 0                   T2A
 0147   REF  1              30,2455   60612 1                   CMPONENT
 0148                       30,2456   45345 1           DLOAD   DSU
 0149   REF  8   LAST  846  30,2457   02271 1                   TBUP
 0150   REF 27   LAST  846  30,2460   03517 1                   TGO
 0151                       30,2461   45071 0           DDV     CALL                1-TGO/TBUP
 0152   REF  9   LAST  847  30,2462   02271 1                   TBUP
 0153   REF  1              30,2463   61036 0                   LOGSUB
 0154                       30,2464   41461 1           SL      PUSH                -L IN PDL(0)                                 (2)
 0155                       30,2465   20206 1                   5
 0156                       30,2466   44265 0           BDDV    BDSU                -TGO/L*2(-17)
 0157   REF 28   LAST  847  30,2467   03517 1                   TGO
 0158   REF 10   LAST  847  30,2470   02271 1                   TBUP                TBUP + TGO/L = D12*2(-17)
 0159                       30,2471   43006 0           PUSH    BON                 STORE IN PDL(2)                              (4)
 0160   REF  1              30,2472   04703 1                   FLPC                IF FLPC = 1, GO TO CONST
 0161   REF  1              30,2473   60502 0                   NORATES
 0162                       30,2474   45345 1           DLOAD   DSU
 0163   REF 29   LAST  847  30,2475   03517 1                   TGO
 0164   REF  1              30,2476   21025 0                   T3
 0165                       30,2477   43044 0           BPL     SET                 FLPC=1
 0166   REF  1              30,2500   60510 0                   RATES
 0167   REF  2   LAST  847  30,2501   04463 1                   FLPC
 0168                       30,2502   77745 1 NORATES   DLOAD
 0169   REF  9   LAST  841  30,2503   06522 1                   HI6ZEROS
 0170   REF  2   LAST  120  30,2504   02351 1           STORE   PRATE               B = 0
 0171   REF  2   LAST  120  30,2505   02353 0           STORE   YRATE               D = 0
 0172                       30,2506   77650 1           GOTO
 0173   REF  1              30,2507   60572 1                   CONST               GO TO CONST
 0174                       30,2510   45345 1 RATES     DLOAD   DSU
 0175   REF 30   LAST  847  30,2511   03517 1                   TGO
 0176                       30,2512   00003 1                   02D                 TGO - D12 = D21*2(-17)
 0177                       30,2513   72406 0           PUSH    SL1                 IN PDL(4)                                    (6)
 0178                       30,2514   52421 1           BDSU    SL3                 (1/2TGO - D21)*2(-13) = E * 2(-13)
 0179   REF 31   LAST  847  30,2515   03517 1                   TGO                                                              (8)
 0180                       30,2516   41325 0           PDDL    DMP                 IN PDL(6)
 0181   REF 32   LAST  847  30,2517   03517 1                   TGO
 0182   REF  3   LAST  846  30,2520   03474 0                   RDOT                RDOT TGO * 2(-24)
 0183                       30,2521   45215 0           DAD     DSU                 F + RDOT TGO
 0184   REF  4   LAST  845  30,2522   02301 1                   /R/MAG              R + RDOT TGO - RCO
 0185   REF  3   LAST  841  30,2523   03631 0                   RCO                 MPAC = - DR*2(-24).
 0186                       30,2524   41325 0           PDDL    DMP                 -DR IN PDL(8)                                (10)
 0187   REF  3   LAST  847  30,2525   02337 1                   DRDOT
 0188                       30,2526   00005 1                   04D                 D21 DRDOT*2(-24)
 0189                       30,2527   62415 0           DAD     SL2                 (D21 DRDOT-DR)*2(-22)                        (8)
 0190                       30,2530   56271 0           DDV     DDV
 0191                       30,2531   00007 0                   06D                 (D21 DRDOT-DR)/E*2(-9)
 0192   REF 33   LAST  847  30,2532   03517 1                   TGO
 0193   REF  3   LAST  847  30,2533   02351 1           STORE   PRATE               B * 2(8)
 0194                       30,2534   71240 1           BMN     DLOAD               B>0 NOT PERMITTED
 0195   REF  1              30,2535   60541 1                   CHKBMAG
 0196   REF  10  LAST  847   30,2536   06522 1                     HI6ZEROS
 0197   REF   4  LAST  847   30,2537   36351 0            STCALL   PRATE
 0198   REF   1              30,2540   60553 1                     PROK
 0199                        30,2541   56202 1  CHKBMAG   SR4      DDV         B*2(4)
 0200   REF  11  LAST  847   30,2542   02271 1                     TBUP        (B / TAU) * 2(21)
 0201                        30,2543   51025 1            DSU      BPL
 0202   REF   1              30,2544   26203 1                     PRLIMIT     ( B/ TAU) * 2(21) MAX.
 0203   REF   2  LAST  848   30,2545   60553 1                     PROK
 0204                        30,2546   41345 0            DLOAD    DMP
 0205   REF   2  LAST  848   30,2547   26203 1                     PRLIMIT
 0206   REF  12  LAST  848   30,2550   02271 1                     TBUP        B MAX. * 2(4)
 0207                        30,2551   77612 1            SL4                  BMAX*2(8)
 0208   REF   5  LAST  848   30,2552   02351 1            STORE    PRATE
 0209                        30,2553   77745 1  PROK      DLOAD
 0210   REF  34  LAST  847   30,2554   03517 1                     TGO
 0211                        30,2555   43205 1            DMP      DAD         YDOT TGO
 0212   REF   5  LAST  845   30,2556   02311 0                     YDOT
 0213   REF   5  LAST  840   30,2557   02335 0                     Y           Y + YDOT TGO
 0214                        30,2560   65225 1            DSU      PDDL        Y + YDOT TGO - YCO
 0215   REF   6  LAST  841   30,2561   03633 1                     YCO         MPAC = - DY*2(-24.) IN PDL(8)        (10)
 0216   REF   3  LAST  845   30,2562   02341 0                     DYDOT
 0217                        30,2563   43205 1            DMP      DAD         D21 DYDOT - DY                       (8)
 0218                        30,2564   00005 1                     04D
 0219                        30,2565   56312 1            SL2      DDV         (D21 DYDOT - DY)/E*2(-9)
 0220                        30,2566   40271 1            DDV      SETPD       (D21 DYDOT - DY)/E TGO*2(8)
 0221   REF  35  LAST  848   30,2567   03517 1                     TGO           = D*2(8)
 0222                        30,2570   00005 1                     04
 0223   REF   3  LAST  847   30,2571   02353 0            STORE    YRATE
 0224                        30,2572   41345 0  CONST     DLOAD    DMP         LOAD B*2(8)
 0225   REF   6  LAST  848   30,2573   02351 1                     PRATE       B D12*2(-9)
 0226                        30,2574   00003 1                     02D
 0227                        30,2575   56325 0            PDDL     DDV         D12 B IN PDL(4)                      (6)
 0228   REF   4  LAST  847   30,2576   02337 1                     DRDOT       LOAD DRDOT*2(-7)
 0229                        30,2577   00001 0                     00D         -DRDOT/L*2(-7)
 0230                        30,2600   45302 1            SR2      DSU         (-DRDOT/L-D12 B)=A*2(-9)              (4)
 0231                        30,2601   77626 0            STADR
 0232   REF   2  LAST  120   30,2602   61432 0            STODL    PCONS
 0233   REF   4  LAST  848   30,2603   02353 0                     YRATE       D*2(9)
 0234                        30,2604   65205 0            DMP      PDDL        D12 D,EXCH WITH -L IN PDL(0)         (2,2)
 0235                        30,2605   60465 0            BDDV     SR2         -DYDOT/L*2(-9)
 0236   REF   4  LAST  848   30,2606   02341 0                     DYDOT
 0237                        30,2607   77625 0            DSU                  (-DYDOT/L-D12 D)=C*2(-9)
 0238                        30,2610   00001 0                     00D
 0239   REF   2  LAST  120   30,2611   02347 0            STORE    YCONS
 0240                        30,2612   71201 1  CMPONENT  SETPD    DLOAD
 0241                        30,2613   00001 0                     00D
 0242   REF   1              30,2614   27147 0                     100CS
 0243                        30,2615   77605 1            DMP
 0244   REF   7  LAST  848   30,2616   02351 1                     PRATE       B(T-T0)*2(-9)
 0245                        30,2617   56215 1            DAD      DDV         (A+B(T-T0))*2(-9)
 0246   REF   3  LAST  848   30,2620   02345 1                    PCONS       (A+B(T-T0))/TBUP*2(8)
 0247   REF  13  LAST  848   30,2621   02271 1                    TBUP
 0248                        30,2622   45352 1           SL1      DSU
 0249   REF   4  LAST  846   30,2623   02315 1                    GEFF        ATR*2(9)
 0250   REF   2  LAST  120   30,2624   16357 1           STODL    ATR
 0251   REF   2  LAST  848   30,2625   27147 0                    100CS
 0252                        30,2626   43205 1           DMP      DAD
 0253   REF   5  LAST  848   30,2627   02353 0                    YRATE
 0254   REF   3  LAST  848   30,2630   02347 0                    YCONS       (C+D(T-T0))*2(-9)
 0255                        30,2631   72471 0           DDV      SL1
 0256   REF  14  LAST  849   30,2632   02271 1                    TBUP
 0257   REF   4  LAST  840   30,2633   02355 0           STORE    ATY         ATY*2(9)
 0258                        30,2634   65361 0           VXSC     PDDL        ATY UY*2(8)                          (6)
 0259   REF   4  LAST  845   30,2635   02303 0                    LAXIS
 0260   REF   3  LAST  849   30,2636   02357 1                    ATR
 0261                        30,2637   53361 0           VXSC     VAD                                              (0)
 0262   REF  19  LAST  846   30,2640   03537 0                    UNIT/R/
 0263                        30,2641   41572 1           VSL1     PUSH        AH*2(9) IN PDL(0)                    (6)
 0264                        30,2642   65246 1           ABVAL    PDDL        AH(2) IN PDL(34)
 0265   REF [illegible] LAST  843   30,2643   02263 1                    AT          AHMAG IN PDL(6)                      (8)
 0266                        30,2644   45316 1           DSQ      DSU         (AT(2)-AH(2))*2(18)
 0267                        30,2645   00043 0                    34D         =ATP2*2(18)
 0268                        30,2646   41525 0           PDDL     PUSH                                             (12)
 0269   REF   7  LAST  849   30,2647   02263 1                    AT
 0270                        30,2650   45316 1           DSQ      DSU         (AT(2)KR(2)-AH(2))*2(18)             (10)
 0271                        30,2651   00043 0                    34D         =ATP3*2(18)
 0272                        30,2652   71240 1           BMN      DLOAD       IF ATP3 NEG,GO TO NO-ATP
 0273   REF   1              30,2653   60657 0                    NO-ATP      LOAD ATP2,IF ATP3 POS
 0274                        30,2654   00011 1                    8D
 0275                        30,2655   52166 1           SQRT     GOTO        ATP*2(9)
 0276   REF   1              30,2656   60665 1                    AIMER
 0277                        30,2657   55345 0  NO-ATP   DLOAD    BDDV        KR AT/AH = KH                        (8)
 0278                        30,2660   06007 0                     6D
 0279                        30,2661   77761 1           VXSC                 KH AH*2(9)
 0280                        30,2662   00001 0                    00D
 0281                        30,2663   14001 0           STODL    00D         STORE NEW AH IN PDL(0)
 0282   REF  11  LAST  848   30,2664   06522 1                    HI6ZEROS
 0283                        30,2665   77765 0  AIMER    SIGN
 0284   REF   3  LAST  845   30,2666   02343 1                    DZDOT
 0285   REF   3  LAST  840   30,2667   02361 1           STORE    ATP
 0286                        30,2670   77761 1           VXSC
 0287   REF   5  LAST  845   30,2671   03726 1                    ZAXIS1      ATP ZAXIS *2(8).
 0288                        30,2672   53372 1           VSL1     VAD         AT*2(9)
 0289                        30,2673   00001 0                    00D
 0290   REF  16  LAST  840   30,2674   03254 1           STORE    UNFC/2      WILL BE OVERWRITTEN IF IN VERT. RISE.
 0291                        30,2675   43001 1           SETPD    BON
 0292                        30,2676   00001 0                    00D
 0293   REF   3  LAST  840   30,2677   04704 0                    FLPI
 0294   REF   1              30,2700   60220 1                    P12RET
 0295                        30,2701   77614 1           BON
 0296    REF   3  LAST  840    30,2702   04701 0                      FLVP
 0297    REF   1               30,2703   60755 0                      CHECKALT
 0298                          30,2704   57575 1  MAINLINE VLOAD      VCOMP
 0299    REF  20  LAST  849    30,2705   03537 0                      UNIT/R/
 0300    REF   7  LAST  813    30,2706   17262 1           STODL      UNWC/2
 0301    REF   3  LAST  841    30,2707   03654 0                      TXO
 0302                          30,2710   51025 1           DSU        BPL
 0303    REF  16  LAST  817    30,2711   01235 1                      PIPTIME
 0304    REF   1               30,2712   60721 0                      ASCTERM
 0305                          30,2713   77614 1           BON
 0306    REF   2  LAST  834    30,2714   04711 1                      ROTFLAG
 0307    REF   1               30,2715   57273 0                      ANG1CHEK
 0308                          30,2716   43014 0  CLRXFLAG CLEAR      CLEAR
 0309    REF   1               30,2717   01664 1                      NOR29FLG             START R29 IN ASCENT PHASE.
 0310    REF   5  LAST  802    30,2720   06666 1                      XOVINFLG             ALLOW X-AXIS OVERRIDE
 0311                          30,2721   77776 1  ASCTERM  EXIT
 0312    REF   5  LAST  835    30,2722  3 0105 0           CA         FLAGWRD9
 0313    REF   1               30,2723  7 4742 0           MASK       FLRCSBIT
 0314    REF 246  LAST  836    30,2724  10 000 0           CCS        A
 0315    REF   1               30,2725  1 2747 0           TCF        ASCTERM3
 0316    REF 146  LAST  843    30,2726  0 6037 0           TC         INTPRET
 0317                          30,2727   77624 1           CALL
 0318    REF   4  LAST  814    30,2730   61111 1                      FINDCDUW -2
 0319                          30,2731   77776 1  ASCTERM1 EXIT
 0320    REF   6  LAST  850    30,2732  3 0105 0     +1    CA         FLAGWRD9             INSURE THAT THE NOUN 63 DISPLAY IS
 0321    REF   2  LAST  850    30,2733  7 4742 0           MASK       FLRCSBIT             BYPASSED IF WE ARE IN THE RCS TRIMMING
 0322    REF 247  LAST  850    30,2734  10 000 0           CCS        A                    MODE OF OPERATION
 0323    REF   2  LAST  850    30,2735  1 2747 0           TCF        ASCTERM3
 0324    REF  12  LAST  814    30,2736  3 0104 1           CA         FLAGWRD8             BYPASS DISPLAYS IF ENGINE FAILURE IS
 0325    REF   3  LAST  814    30,2737  7 4742 0           MASK       FLUNDBIT             INDICATED.
 0326    REF 248  LAST  850    30,2740  10 000 0           CCS        A
 0327    REF   3  LAST  850    30,2741  1 2747 0           TCF        ASCTERM3
 0328    REF   1               30,2742  3 3033 1           CAF        V06N63*
 0329    REF 234  LAST  839    30,2743  0 4616 1           TC         BANKCALL
 0330    REF   2  LAST  474    30,2744   20451 0           CADR       GODSPR
 0331    REF   4  LAST  850    30,2745  1 2747 0           TCF        ASCTERM3
 0332                          30,2746   77776 1  ASCTERM2 EXIT
 0333    REF 131  LAST  835    30,2747  1 5155 1  ASCTERM3 TCF        ENDOFJOB
 0334                          30,2750   77776 1  ASCTERM4 EXIT
 0335                          30,2751  0 0004 0           INHINT
 0336    REF  38  LAST  840    30,2752  0 4674 0           TC         IBNKCALL             NO GUIDANCE THIS CYCLE -- HENCE ZERO
 0337    REF   7  LAST  791    30,2753   40153 1           CADR       ZATTEROR             THE DAP ATTITUDE ERRORS.
 0338    REF   1               30,2754  1 2732 1           TCF        ASCTERM1 +1

 0339                          30,2755   45345 1  CHECKALT DLOAD      DSU
 0340    REF   5  LAST  847    30,2756   02301 1                      /R/MAG
 0341    REF   8  LAST  842    30,2757   02333 0                      /LAND/
 0342                          30,2760   50025 0           DSU        BMN                  IF H LT 25K CHECK Z AXIS ORIENTATION.
 0343    REF   1               30,2761   26700 1                      25KFT
 0344    REF   1               30,2762   16667 1                      CHECKYAW
 0345                             30,2763   43014 0  EXITVR   CLEAR   BON
 0346    REF   4  LAST  850       30,2764   04661 1                   FLVR
 0347    REF   3  LAST  850       30,2765   04711 1                   ROTFLAG
 0348    REF   1                  30,2766   60704 1                   MAINLINE
 0349                             30,2767   43345 1           DLOAD   DAD
 0350    REF  17  LAST  850       30,2770   01235 1                   PIPTIME
 0351    REF   1                  30,2771   25755 1                   10SECS
 0352    REF   4  LAST  850       30,2772   37654 1           STCALL  TXO
 0353    REF   2  LAST  851       30,2773   60704 1                   MAINLINE
 0354                             30,2774   77614 1  EXITVR1  CLRGO
 0355    REF   4  LAST  851       30,2775   04631 1                   ROTFLAG
 0356    REF   1                  30,2776   60763 0                   EXITVR

 0357    REF   3  LAST   44       27,2000                     SETLOC  ASENT1
 0358                             27,3273                     BANK
 0359    REF   1                                              COUNT*  $$/ASENT

 0360                             27,3273   50375 0  ANG1CHEK VLOAD   DOT
 0361    REF  17  LAST  849       27,3274   03254 1                   UNFC/2
 0362    REF   5  LAST  846       27,3275   02146 0                   XNBPIP
 0363                             27,3276   51025 1           DSU     BPL
 0364    REF   2  LAST  122       27,3277   02577 0                   COSTHET1
 0365    REF   1                  27,3300   57307 1                   OFFROT
 0366                             27,3301   50375 0           VLOAD   DOT
 0367    REF   6  LAST  851       27,3302   02146 0                   XNBPIP
 0368    REF  21  LAST  850       27,3303   03537 0                   UNIT/R/
 0369                             27,3304   50025 0           DSU     BMN
 0370    REF   2  LAST  122       27,3305   02601 1                   COSTHET2
 0371    REF   1                  27,3306   30351 0                   KEEPVR1
 0372                             27,3307   77614 1  OFFROT   CLRGO
 0373    REF   5  LAST  851       27,3310   04631 1                   ROTFLAG
 0374    REF   1                  27,3311   60716 1                   CLRXFLAG

 0375                             07,2667                     BANK    7
 0376    REF   1                  07,2000                     SETLOC  ASENT2
 0377                             07,2667                     BANK
 0378    REF   1                                              COUNT*  $$/ASENT

 0379    REF   2  LAST  850       07,2667            SETXFLAG =       CHECKYAW

 0380                             07,2667   77614 1  CHECKYAW SET
 0381    REF   6  LAST  850       07,2670   06466 0                   XOVINFLG          PROHIBIT X-AXIS OVERRIDE
 0382                             07,2671   74345 0           DLOAD   VXSC
 0383    REF   5  LAST  849       07,2672   02355 0                   ATY
 0384    REF   5  LAST  849       07,2673   02303 0                   LAXIS
 0385                             07,2674   74325 0           PDDL    VXSC
 0386    REF   4  LAST  849       07,2675   02361 1                   ATP
 0387    REF   6  LAST  849       07,2676   03726 1                   ZAXIS1
 0388                             07,2677   53455 0           VAD     UNIT
 0389                             07,2700   50206 0           PUSH    DOT
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L          ASCENT GUIDANCE                                                                                 USER'S PAGE NO.  10       F7 S3

 0390    REF    4  LAST  804    07,2701    02154 0                        YNBPIP
 0391                           07,2702    45246 0              ABS       DSU
 0392    REF    1               07,2703    13503 0                        SIN5DEG
 0393                           07,2704    71244 0              BPL       DLOAD
 0394    REF    1               07,2705    30347 1                        KEEPVR
 0395    REF    4  LAST  847    07,2706    03474 0                        RDOT
 0396                           07,2707    51025 1              DSU       BPL
 0397    REF    1               07,2710    13505 0                        40FPS
 0398    REF    1               07,2711    60774 0                        EXITVR1
 0399                           07,2712    77650 1              GOTO
 0400    REF    2  LAST  852    07,2713    30347 1                        KEEPVR

 0401                           05,3502                         BANK      5
 0402    REF    1               05,2000                         SETLOC    ASENT3
 0403                           05,3502                         BANK
 0404    REF    1                                               COUNT*    $$/ASENT

 0405                           05,3502    00545 0   SIN5DEG    2DEC      0.08716 B-2
 0405                           05,3503    00171 0
 0406                           05,3504    00017 1   40FPS      2DEC      0.12192 B-7
 0406                           05,3505    23305 0
 0407                           14,2347                         BANK      14
 0408    REF    1               14,2000                         SETLOC    ASENT4
 0409                           14,2347                         BANK
 0410    REF    1                                               COUNT*    $$/ASENT

 0411                           14,2347    45575 1   KEEPVR     VLOAD     STADR                    RECALL LOSVEC FROM PUSHLIST
 0412    REF [illegible] LAST  850    14,2350    74515 0              STORE     UNWC/2
 0413                           14,2351    77775 1   KEEPVR1    VLOAD
 0414    REF   22  LAST  851    14,2352    03537 0                        UNIT/R/
 0415    REF   13  LAST  851    14,2353    37254 0              STCALL    UNFC/2
 0416    REF    2  LAST  850    14,2354    60721 0                        ASCTERM


 0417                           14,2355    77634 0   ENGOFF     RTB
 0418    REF   24  LAST  841    14,2356    21573 0                        LOADTIME
 0419                           14,2357    43225 0              DSU       DAD
 0420    REF   13  LAST  851    14,2360    01235 1                        PIPTIME
 0421    REF   24  LAST  846    14,2361    03454 1                        TTOGO
 0422                           14,2362    77476 1              DCOMP     EXIT
 0423    REF   11  LAST  796    14,2363   0 7257 0              TC        TPAGREE                  FORCE SIGN AGREEMENT ON MPAC, MPAC +1.
 0424    REF    8  LAST  794    14,2364   3 5016 0              CAF       EBANK7
 0425    REF   32  LAST  826    14,2365   54 003 0              TS        EBANK
 0426    REF   36  LAST  848    E7,1516                         EBANK=    TGO
 0427                           14,2366   0 0004 0              INHINT
 0428    REF  332  LAST  843    14,2367   10 155 1              CCS       MPAC +1
 0429                           14,2370   1 2373 0              TCF       +3                       C(A) = DT - 1 BIT
 0430                           14,2371   1 2373 0              TCF       +2                       C(A) = 0
 0431    REF  157  LAST  838    14,2372   3 4755 1              CAF       ZERO                     C(A) = 0
 0432    REF   41  LAST  830    14,2373   6 4753 1              AD        BIT1                     C(A) = 1 BIT OR DT.
 0433  REF   2  LAST  152   14,2374  55644 1             TS       ENGOFFDT
 0434  REF  24  LAST  829   14,2375  0 5173 1            TC       TWIDDLE
 0435  REF   1              14,2376   02410 0            ADRES    ENGOFF1
 0436  REF  70  LAST  843   14,2377  0 5353 1            TC       PHASCHNG
 0437                       14,2400   47014 1            OCT      47014
 0438  REF   3  LAST  853   14,2401   76133 1           -GENADR   ENGOFFDT
 0439  REF  37  LAST  852   E7,1516                      EBANK=   TGO
 0440  REF   2  LAST  853   14,2402   02410 0            2CADR    ENGOFF1
 0440                       14,2403   30067 0
 0441  REF 147  LAST  850   14,2404  0 6037 0            TC       INTPRET
 0442                       14,2405   52014 0            SET      GOTO
 0443  REF   7  LAST  846   14,2406   03470 1                     IDLEFLAG         DISABLE DELTA-V MONITOR
 0444  REF   2  LAST  846   14,2407   60451 1                     T2TEST

 0445  REF  39  LAST  850   14,2410  0 4674 0  ENGOFF1   TC       IBNKCALL         SHUT OFF THE ENGINE.
 0446  REF   1              14,2411   75551 1            CADR     ENGINOF2

 0447  REF   4  LAST  747   14,2412  3 5027 1            CAF      PRIO17           SET UP A JOB FOR THE ASCENT GUIDANCE
 0448  REF  36  LAST  816   14,2413  0 5105 0            TC       FINDVAC          POSTBURN LOGIC.
 0449  REF  29  LAST  839   E7,1455                      EBANK=   WHICH
 0450  REF   3  LAST  747   14,2414   02424 1            2CADR    CUTOFF
 0450                       14,2415   30067 0
 0451  REF  71  LAST  853   14,2416  0 5353 1            TC       PHASCHNG
 0452                       14,2417   07024 0            OCT      07024
 0453                       14,2420   17000 1            OCT      17000
 0454  REF  38  LAST  853   E7,1516                      EBANK=   TGO
 0455  REF   4  LAST  853   14,2421   02424 1            2CADR    CUTOFF
 0455                       14,2422   30067 0
 0456  REF  58  LAST  829   14,2423  1 5261 0            TCF      TASKOVER

 0457  REF  54  LAST  838   14,2424  0 5504 0  CUTOFF    TC       UPFLAG           SET FLRCS FLAG.
 0458  REF   4  LAST  846   14,2425   00214 0            ADRES    FLRCS

 0459  REF   1              14,2426  3 2445 0     -5     CAF      V16N63
 0460  REF 235  LAST  850   14,2427  0 4616 1            TC       BANKCALL
 0461  REF  25  LAST  839   14,2430   20476 0            CADR     GOFLASH
 0462                       14,2431  1 2434 1            TCF      +3
 0463  REF   1              14,2432  1 2436 0            TCF      CUTOFF1
 0464                       14,2433  1 2426 1            TCF      -5

 0465  REF  51  LAST  840   14,2434  0 4635 0     +3     TC       POSTJUMP
 0466  REF   1              14,2435   61007 1            CADR     TERMASC

 0467                       14,2436  0 0004 0  CUTOFF1   INHINT
 0468  REF  40  LAST  853   14,2437  0 4674 0            TC       IBNKCALL         ZERO ATTITUDE ERRORS BEFORE REDUCING DB.
 0469  REF   8  LAST  850   14,2440   40153 1            CADR     ZATTEROR
 0470  REF  41  LAST  853   14,2441  0 4674 0            TC       IBNKCALL
 0471  REF   5  LAST  756   14,2442   40140 0            CADR     SETMINDB
 0472  REF  52  LAST  853   14,2443  0 4635 0            TC       POSTJUMP
 0473  REF   1              14,2444   60777 0            CADR     CUTOFF2
 0474                    14,2445   04077 0  V16N63    VN      1663
 0475                    30,2777                      BANK    30
 0476    REF   1         30,2000                      SETLOC  ASENT5
 0477                    30,2777                      BANK
 0478    REF   3 LAST  845 TO  851:    302    304*    COUNT*  $$/ASENT

 0479    REF  72  LAST  853   30,2777  0 5353 1  CUTOFF2   TC      PHASCHNG
 0480                    30,3000   04024 0            OCT     04024

 0481    REF   1         30,3001  3 3017 1            CAF     V16N85C
 0482    REF 236  LAST  853   30,3002  0 4616 1            TC      BANKCALL
 0483    REF  26  LAST  853   30,3003   20476 0            CADR    GOFLASH
 0484    REF   2  LAST  853   30,3004  1 3007 1            TCF     TERMASC
 0485                    30,3005  1 3007 1            TCF     +2                      PROCEED
 0486    REF   2  LAST  853   30,3006  1 2777 0            TCF     CUTOFF2

 0487    REF  73  LAST  854   30,3007  0 5353 1  TERMASC   TC      PHASCHNG
 0488                    30,3010   04024 0            OCT     04024

 0489                    30,3011  0 0004 0            INHINT                          RESTORE DEADBAND DESIRED BY ASTRONAUT.
 0490    REF  42  LAST  853   30,3012  0 4674 0            TC      IBNKCALL
 0491    REF   7  LAST  755   30,3013   40123 0            CADR    RESTORDB
 0492    REF  81  LAST  840   30,3014  0 5516 0            TC      DOWNFLAG                DISALLOW ABORTS AT THIS TIME.
 0493    REF   3  LAST  835   30,3015   00215 1            ADRES   LETABORT
 0494    REF  36  LAST  839   30,3016  1 6001 1            TCF     GOTOPOOH

 049405                  30,3017   04125 0  V16N85C   VN      1685

 04941                   27,3312                      BANK    27
 049415  REF   4  LAST  851   27,2000                      SETLOC  ASENT1
 04942                   27,3312                      BANK
 049425  REF   2 LAST  851 TO  851:     15     15*    COUNT*  $$/ASENT

 0495                    27,3312   50375 0  YCOMP     VLOAD   DOT
 0496    REF  23  LAST  852   27,3313   03537 0                    UNIT/R/
 0497    REF   3  LAST  841   27,3314   03720 1                    QAXIS
 0498                    27,3315   41312 1            SL2     DMP
 0499    REF   4  LAST  847   27,3316   03631 0                    RCO
 0503    REF   6  LAST  848   27,3317   02335 0            STORE   Y
 0504                    27,3320   77616 0            RVQ

R0506
 0507                    30,3020                      BANK    30
 0508    REF   3  LAST  845   30,2000                      SETLOC  ASENT
 0509                    30,3020                      BANK
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P0510    ASCENT GUIDANCE CONSTANTS

 0511    REF    2  LAST  845    33,3146                 100CS     EQUALS 2SEC(18)
 0512    REF    1               30,3022                 T2A       EQUALS 2SEC(17)
 0513                           30,3020    00062 0    4SEC(17) 2DEC    400 B-17
 0513                           30,3021    00000 1
 0514                           30,3022    00031 0    2SEC(17) 2DEC    200 B-17
 0514                           30,3023    00000 1
 0515                           30,3024    00175 1    T3       2DEC    1000 B-17
 0515                           30,3025    00000 1
 0516                           30,3026    00045 0    6SEC(18) 2DEC    600 B-18
 0516                           30,3027    20000 0
 0517                           30,3030    00010 0    BIT4H    OCT     10

 0518                           30,3031    14400 0    2SEC(9)  2DEC    200 B-9
 0518                           30,3032    00000 1
 0519                           30,3033    01477 1    V06N63*  VN      0663
 0520                           30,3034    01514 0    V06N76   VN      0676
 0521                           30,3035    01441 1    V06N33A  VN      0633

 0522                           33,2200                        BANK    33
 0523    REF    1               33,2000                        SETLOC  ASENT6
 0524                           33,2200                        BANK
 0525    REF    1                                              COUNT*  $$/ASENT

 0526                           33,2200    20000 0    KT1      2DEC    0.5000
 0526                           33,2201    00000 1
 0527                           33,2202    75751 0    PRLIMIT  2DEC    -.0639              (B/TBUP)MIN=-.1FT.SEC(-3)
 0527                           33,2203    41775 1
 0528                           33,2204    00022 1    MINABDV  2DEC    .0356 B-3           10 PERCENT BIGGER THAN GRAVITY
 0528                           33,2205    07212 1
 0529    REF    2  LAST  147    E7,1570               1/DVO    =       MASS1
```

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P0530    THE LOGARITHM SUBROUTINE

 0531                          24,3 70                             BANK    24
 0532    REF    1              30,2000                             SETLOC  FLOGSUB
 0533                          30,3036                             BANK

R0534    INPUT ..... X IN MPAC
R0535    OUTPUT ..... -LOG(X) IN MPAC

 0536                          30,3036    44301 0  LOGSUB    NORM    BDSU
 0537    REF 333  LAST  852    30,3037    00163 0                    MPAC +6
 0538    REF   2  LAST  846    30,3040    17771 0                    NEARONE
 0539                          30,3041    77776 1            EXIT
 0540    REF   1               30,3042  0 7222 1            TC      POLY
 0541                          30,3043    00006 1            DEC     6
 0542                          30,3044    00000 1            2DEC    .0000000060
 0542                          30,3045    00002 0
 0543                          30,3046    76777 1            2DEC    -.0312514377
 0543                          30,3047    77175 1
 0544                          30,3050    77400 0            2DEC    -.0155686771
 0544                          30,3051    75416 0
 0545                          30,3052    77507 0            2DEC    -.0112502068
 0545                          30,3053    65515 0
 0546                          30,3054    77741 0            2DEC    -.0018545108
 0546                          30,3055    63547 1
 0547                          30,3056    77052 0            2DEC    -.0286607906
 0547                          30,3057    55373 0
 0548                          30,3060    01167 0            2DEC    .0385598563
 0548                          30,3061    30361 0
 0549                          30,3062    76520 1            2DEC    -.0419361902
 0549                          30,3063    75267 0
 0550    REF 158  LAST  852    30,3064  3 4755 1            CAF     ZERO
 0551    REF 334  LAST  856    30,3065 54 156 1             TS      MPAC +2
 0552                          30,3066  0 0006 1            EXTEND
 0553    REF   1               30,3067  3 3103 0            DCA     CLOG2/32
 0554    REF 335  LAST  856    30,3070 52 155 1             DXCH    MPAC
 0555    REF  76  LAST  824    30,3071 52 132 0             DXCH    BUF +1
 0556    REF 336  LAST  856    30,3072  3 0162 1            CA      MPAC +6
 0557    REF   8  LAST  823    30,3073  0 7307 1            TC      SHORTMP
 0558    REF 337  LAST  856    30,3074 52 156 1             DXCH    MPAC +1
 0559    REF 338  LAST  856    30,3075 52 155 1             DXCH    MPAC
 0560    REF  77  LAST  856    30,3076 52 132 0             DXCH    BUF +1
 0561    REF 339  LAST  856    30,3077 20 155 1             DAS     MPAC
 0562    REF 148  LAST  853    30,3100  0 6037 0            TC      INTPRET
 0563                          30,3101    43476 0            DCOMP   RVQ

 0564                          30,3102    00542 1  CLOG2/32  2DEC    .0216608494
 0564                          30,3103    34414 1
 0001                      37,3410                        BANK    37
 0002   REF    1           37,2000                        SETLOC  SERVI
 0003                      37,3410                        BANK

 0004   REF   41  LAST  843  E7,1515                      EBANK=  DVCNTR
R0005   ***********************************    PREREAD   *****************************************************************
R0007

 0008   REF    1                                          COUNT*  $$/SERV

 0009   REF   10  LAST  820  37,3410  3 4757 0  PREREAD   CAF     SEVEN            5.7 SPOT TO SKIP LASTBIAS AFTER
 0010   REF    1             37,3411  0 3531 0            TC      GNUFAZE5         RESTART.
 0011   REF    4  LAST  599  37,3412  3 5031 0            CAF     PRIO21
 0012   REF   21  LAST  781  37,3413  0 5072 1            TC      NOVAC
 0013   REF    5  LAST  334  E3,1460                      EBANK=  NBDX
 0014   REF    1             37,3414   03663 1            2CADR   LASTBIAS         DO LAST GYRO COMPENSATION IN FREE FALL
 0014   REF    1             37,3415   14063 1

 0015   REF    2  LAST  334  37,3416  0 3544 1  BIBIBIAS TC      PIPASR +3        CLEAR + READ PIPS LAST TIME IN FREE FALL
A0016                                                                              DO NOT DESTROY VALUE OF PIPTIME1

 0017   REF   19  LAST  836  37,3417  4 0103 1            CS      FLAGWRD7
 0018   REF    1             37,3420  7 4773 1            MASK    SUPER011         SET V37FLAG AND AVEGFLAG (BITS 5 AND 6
 0019   REF   20  LAST  857  37,3421  26 103 1            ADS     FLAGWRD7            OF FLAGWRD7)

 0020   REF    2  LAST  165  37,3422  4 4735 0            CS      DRFTBIT
 0021   REF   21  LAST  813  37,3423  7 0076 1            MASK    FLAGWRD2         RESET DRIFTFLAG
 0022   REF   22  LAST  857  37,3424  54 076 1            TS      FLAGWRD2

 0023   REF   17  LAST  838  37,3425  3 4751 0            CAF     FOUR             INITIALIZE DV MONITOR
 0025   REF    3  LAST  107  37,3426  55'257 1            TS      PIPAGE

 0026   REF    1             37,3427  3 3537 0            CAF     ENDJBCAD         POINT OUTROUTE TO END-OF-JOB.
 0027   REF    2  LAST  228  37,3430  55'260 0            TS      OUTROUTE

 0028   REF    5  LAST  316  37,3431  3 7710 0            CAF     PRIO22
 0029   REF   37  LAST  853  37,3432  0 5105 0            TC      FINDVAC          TO FIRST ENTRY TO AVERAGE G.
 0030   REF   42  LAST  857  E7,1515                      EBANK=  DVCNTR
 0031   REF    2  LAST  242  37,3433   02461 0            2CADR   NORMLIZE
 0031                        37,3434   46067 1

 0032   REF   53  LAST  830  37,3435  3 4752 0            CA      TWO              5.2SPOT FOR REREADAC AND NORMLIZE
 0033   REF    1             37,3436  0 3525 0  GOREADAX TC      GNUTFAZ5
 0034   REF    6  LAST  795  37,3437  3 5000 1            CA      2SECS            WAIT TWO SECONDS FOR READACCS
 0035   REF    8  LAST  820  37,3440  0 5224 0            TC      VARDELAY
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P0036   *********************************** READACCS  ****************************************************************
 0038   REF   1                37,3441  4 3540 1  READACCS CS      OCT37771        THIS PIECE OF CODING ATTEMPTS TO
 0039   REF   3  LAST  832     37,3442  6 0030 1           AD      TIME5           SYNCHRONIZE READACCS WITH THE DIGITAL
 0040   REF 249  LAST  850     37,3443 10 000  0           CCS     A               AUTOPILOT SO THAT A PAXIS RUPT WILL
 0041   REF  92  LAST  824     37,3444  4 4753 0           CS      ONE             OCCUR APPROXIMATELY 70 MILLISECONDS
 0042                          37,3445  1 3447 1           TCF     +2              FOLLOWING THE READACCS RUPT.  THE 70 MS
 0043   REF  93  LAST  858     37,3446  3 4753 1           CA      ONE             OFFSET WAS CHOSEN SO THAT THE PAXIS
 0044   REF   4  LAST  858     37,3447 26 030  0     +2    ADS     TIME5           RUPT WOULD NOT OCCUR SIMULTANEOUSLY
A0045                                                                              WITH ANY OF THE 8 SUBSEQUENT R10,R11
A0046                                                                              INTERRUPTS -- THUS MINIMIZING THE POSS-
A0047                                                                              IBILITY OF LOSING DOWNRUPTS.

 0048   REF   3  LAST  857     37,3450  0 3541 1           TC      PIPASR          READ THE PIPAS.

 0049   REF  17  LAST  820     37,3451  3 4756 1  PIPSDONE CA      FIVE
 0050   REF   2  LAST  857     37,3452  0 3531 0           TC      GNUFAZE5
 0051   REF  94  LAST  858     37,3453  3 4753 1  REDO5.5  CAF     ONE
 0052   REF   4  LAST  857     37,3454 55'257  1           TS      PIPAGE

 0053   REF   7  LAST  760     37,3455  3 4736 1           CA      PRIO20
 0054   REF  33  LAST  857     37,3456  0 5105 0           TC      FINDVAC
 0055   REF  43  LAST  857     E7,1515                     EBANK=  DVCNTR
 0056   REF   2  LAST  242     37,3457   02206 1           2CADR   SERVICER        SET UP SERVICER JOB
 0056                          37,3460   66067 0

 0057   REF  21  LAST  745     37,3461  3 4743 0           CA      BIT9
 0058                          37,3462  0 0006 1           EXTEND
 0059   REF  28  LAST  831     37,3463 05 011  1           WOR     DSALMOUT        TURN ON TEST CONNECTOR OUTBIT

 0060   REF  21  LAST  857     37,3464  3 0103 0           CA      FLAGWRD7
 0061   REF   6  LAST  836     37,3465  7 4747 0           MASK    AVEGFBIT
 0062                          37,3466  0 0006 1           EXTEND
 0063   REF   1                37,3467  1 3517 0           BZF     AVEGOUT         AVEGFLAG DOWN - SET UP FINAL EXIT

 0064   REF   6  LAST  814     37,3470  3 0102 1           CA      FLAGWRD6
 0065   REF   3  LAST  707     37,3471  7 4744 0           MASK    MUNFLBIT
 0066                          37,3472  0 0006 1           EXTEND
 0067   REF   1                37,3473  1 3515 1           BZF     MAKEACCS        MUNFLAG CLEAR - BYPASS LR AND DISP.

 0068   REF   2  LAST  761     37,3474 10 755  1           CCS     PHASE2
 0069   REF   2  LAST  858     37,3475  1 3515 1           TCF     MAKEACCS        PHASE 2 ACTIVATED - AVOID MULTIPLE R10.

 0070   REF  11  LAST  857     37,3476  3 4757 0           CAF     SEVEN           SET PIPCTR FOR 4X/SEC RATE.
 0071   REF   4  LAST  829     37,3477 55'056  1           TS      PIPCTR

 0072   REF  11  LAST  795     37,3500  4 0025 1           CS      TIME1           SET TBASE2 .05 SECONDS IN THE PAST.
 0073   REF  18  LAST  858     37,3501  6 4756 1           AD      FIVE
 0074   REF   2  LAST  220     37,3502  6 4734 0           AD      NEG1/2
 0075   REF   3  LAST  858     37,3503  6 4734 0           AD      NEG1/2
 0076   REF   3  LAST  475     37,3504 57'055  0           XCH     TBASE2
 0077   REF   3  LAST  375   37,3505  3 4361 1            CAF     DEC17         2.21SPOT FOR R10,R11
 0078   REF 131  LAST  832   37,3506  54 001 1            TS      L
 0079                        37,3507  4 0000 0            COM
 0080   REF   5  LAST  737   37,3510  52 755 1            DXCH    -PHASE2

 0081   REF   6  LAST  497   37,3511  3 6007 0            CAF     OCT24         FIRST R10,R11 IN .200 SECONDS.
 0082   REF  35  LAST  760   37,3512  0 5203 0            TC      WAITLIST
 0083   REF  24  LAST  854   E7,1536                      EBANK=  UNIT/R/
 0084   REF   3  LAST  829   37,3513   02006 0            2CADR   R10,R11
 0084                        37,3514   42067 0
 0085   REF  18  LAST  857   37,3515  3 4751 0  MAKEACCS  CA      FOUR
 0086   REF   1              37,3516  1 3436 1            TCF     GOREADAX       DO PHASE CHANGE AND RECALL READACCS


 0087                        37,3517  0 0006 1  AVEGOUT   EXTEND
 0088   REF   1              37,3520  3 3536 1            DCA     AVOUTCAD       SET UP FINAL SERVICER EXIT
 0089   REF   5  LAST  834   37,3521  53 1253 0           DXCH    AVGEXIT

 0090   REF  19  LAST  859   37,3522  3 4751 0            CA      FOUR           SET 5.4 SPOT FOR REREADAC AND SERVICER
 0091   REF   2  LAST  857   37,3523  0 3525 0            TC      GNUTFAZ5       IF REREADAC IS CALLED, IT WILL EXIT
 0092   REF  59  LAST  853   37,3524  0 5261 1            TC      TASKOVER       END TASK WITHOUT CALLING READACCS


 0093   REF 132  LAST  859   37,3525  54 001 1  GNUTFAZ5  TS      L              SAVE INPUT IN L
 0094   REF  12  LAST  858   37,3526  4 0025 1            CS      TIME1
 0095   REF   1              37,3527  55 1063 1           TS      TBASE5         SET TBASE5
 0096                        37,3530  1 3532 1            TCF     +2

 0097   REF 133  LAST  859   37,3531  54 001 1  GNUFAZE5  TS      L              SAVE INPUT IN L
 0098   REF 134  LAST  859   37,3532  4 0001 1            CS      L              -PHASE IN A, PHASE IN L
 0099   REF   2  LAST  214   37,3533  52 763 1            DXCH    -PHASE5        SET -PHASE5,PHASE5
 0100   REF 208  LAST  836   37,3534  0 0002 0            TC      Q


 0101   REF  44  LAST  858   E7,1515                      EBANK=  DVCNTR
 0102   REF   1              37,3535   03661 0  AVOUTCAD  2CADR   AVGEND
 0102   REF   1              37,3536   44067 0

 0103   REF   7  LAST  832   37,3537   65772 0  ENDJBCAD  CADR    SERVEXIT +2

 0104                        37,3540   37771 1  OCT37771  OCT     37771

 0105                        33,2206                      BANK    33
 0106   REF   4  LAST   44   33,2000                      SETLOC  SERVICES
 0107                        33,2206                      BANK

 0108   REF   4 LAST   44 TO   45:     12     37*          COUNT*  $$/SERV
```

```
P0109    **************************************    SERVICER    *******************************************************************
R0111

 0112    REF  74   LAST  854   33,2206   0 5353 1  SERVICER TC      PHASCHNG          RESTART REREADAC + SERVICER
 0113                          33,2207   16035 0            OCT     16035
 0114                          33,2210   20000 0            OCT     20000
 0115    REF  45   LAST  859   E7,1515                      EBANK=  DVCNTR
 0116    REF   1               33,2211   02217 1            2CADR   GETABVAL
 0116    REF   1               33,2212   66067 0
 0117    REF   2   LAST  336   33,2213   3 7716 0           CAF     PRIO31            INITIALIZE 1/PIPADT IN CASE RESTART HAS
 0118    REF   7   LAST  336   33,2214   55'075 0           TS      1/PIPADT          CAUSED LASTBIAS TO BE SKIPPED.

 0119    REF 237   LAST  854   33,2215   0 4616 1           TC      BANKCALL          PIPA COMPENSATION CALL
 0120    REF   2   LAST  385   33,2216   15263 1            CADR    1/PIPA

 0121    REF 149   LAST  856   33,2217   0 6037 0  GETABVAL TC      INTPRET
 0122                          33,2220   51575 1            VLOAD   ABVAL
 0123    REF   5   LAST  195   33,2221   00325 0                    DELV
 0124                          33,2222   77776 1            EXIT
 0125    REF 340   LAST  856   33,2223   3 0154 1           CA      MPAC
 0126    REF   4   LAST  793   33,2224   55'246 1           TS      ABDELV            ABDELV = CM/SEC*2(-14).
 0127                          33,2225   0 0006 1           EXTEND
 0128    REF   1               33,2226   7 2020 0           MP      KPIP
 0129    REF   4   LAST  843   33,2227   53'514 1           DXCH    ABDVCONV          ABDVCONV = M/CS *2(-5).
 01292                         33,2230   0 0006 1           EXTEND
 01294   REF  12   LAST  833   33,2231   3 1245 0           DCA     MASS
 01296   REF   3   LAST  855   33,2232   53'571 1           DXCH    MASS1             INITIALIZE MASS1 IN CASE WE SKIP MASSMON
 0130    REF  13   LAST  850   33,2233   4 0104 0  MASSMON  CS      FLAGWRD8          ARE WE ON THE SURFACE?
 0131    REF   8   LAST  704   33,2234   7 4744 0           MASK    SURFFBIT
 0132                          33,2235   0 0006 1           EXTEND
 0133    REF   1               33,2236   1 2254 1           BZF     MOONSPOT          YES:  BYPASS MASS MESS

 0134    REF  18   LAST  831   33,2237   3 0106 0           CA      FLGWRD10          NO:   WHICH VEX SHOULD BE USED?
 0135    REF  12   LAST  831   33,2240   7 4737 1           MASK    APSFLBIT
 0136    REF 250   LAST  858   33,2241   10 000 Q           CCS     A
 0137                          33,2242   0 0006 1           EXTEND                    IF EXTEND IS EXECUTED, APSVEX --> A,
 0138    REF   3   LAST  841   33,2243   3 2001 1           DCA     APSVEX             OTHERWISE DPSVEX --> A
 0139    REF 209   LAST  859   33,2244   54 002 1           TS      Q

 0140                          33,2245   0 0006 1           EXTEND
 0141    REF   5   LAST  860   33,2246   3 1514 0           DCA     ABDVCONV
 0142                          33,2247   0 0006 1           EXTEND
 0143    REF 210   LAST  860   33,2250   10 002 1  OCT10002 DV      Q                 WHERE APPROPRIATE VEX RESIDES
 0144                          33,2251   0 0006 1           EXTEND
 0145    REF  13   LAST  860   33,2252   7 1244 0           MP      MASS
 0146    REF   4   LAST  860   33,2253   21'571 1           DAS     MASS1

 0150    REF   3   LAST  818   33,2254   3 2021 0  MOONSPOT CA      KPIP1             TP MPAC = ABDELV AT 2(14) CM/SEC
 0151    REF   9   LAST  856   33,2255   0 7307 1           TC      SHORTMP           MULTIPLY BY KPIP1 TO GET
 0152   REF 341  LAST  860   33,2256  52 155 1             DXCH    MPAC         ABDELV AT 2(7) M/CS
 0153   REF   6  LAST  733   33,2257  21'510 0             DAS     DVTOTAL      UPDATE DVTOTAL FOR DISPLAY

 0156   REF   1              33,2260  0 2440 0             TC      TMPTOSPT

 0157   REF 238  LAST  860   33,2261  0 4616 1             TC      BANKCALL
 0158   REF   2  LAST  601   33,2262   47615 0             CADR    QUICTRIG

 0159   REF   1              33,2263  3 2414 1             CAF     XNBPIPAD
 0160   REF 239  LAST  861   33,2264  0 4616 1             TC      BANKCALL
 0161   REF   1              33,2265   20037 1             CADR    FLESHPOT
 0166   REF 150  LAST  860   33,2266  0 6037 0             TC      INTPRET
 0167                        33,2267   45014 0  AVERAGEG BON     CALL
 0168   REF   6  LAST  838   33,2270   03307 0                     MUNFLAG
 0169   REF   1              33,2271   67032 1                     /VBOTH
 0170   REF   1              33,2272   66776 1                     CALCRVG
 0171                        33,2273   77776 1             EXIT
 0172   REF   1              33,2274  0 3552 0  GOSERV     TC      QUIKFAZ5

 0173   REF   1              33,2275  0 2423 0  COPYCYCL TC      COPYCYC

A0174                                                      CA      ZERO         A IS ZERO ON RETURN FROM COPYCYC
 0175   REF   2  LAST  817   33,2276  55'160 0             TS      PIPATMPX     STILL UNDER INHINT
 0176   REF   2  LAST  817   33,2277  55'161 1             TS      PIPATMPY
 0177   REF   2  LAST  817   33,2300  55'162 1             TS      PIPATMPZ

 0178   REF   2  LAST  813   33,2301  4 4741 0             CS      STEERBIT     CLEAR STEERSW PRIOR TO DVMON.
 0179   REF  23  LAST  857   33,2302  7 0076 1             MASK    FLAGWRD2
 0180   REF  24  LAST  861   33,2303  54 076 1             TS      FLAGWRD2

 0181   REF   3  LAST  762   33,2304  3 4745 0             CAF     IDLEFBIT     IS THE IDLE FLAG SET?
 0182   REF  22  LAST  858   33,2305  7 0103 1             MASK    FLAGWRD7
 0183   REF 251  LAST  860   33,2306  10 000 0             CCS     A
 0184   REF   1              33,2307  1 2342 1             TCF     NODVMON1     IDLEFLAG = 1, HENCE SET AUXFLAG TO 0.

 0185   REF   7  LAST  858   33,2310  4 0102 0             CS      FLAGWRD6
 0186   REF   1              33,2311  7 4752 1             MASK    AUXFLBIT
 0187   REF 252  LAST  861   33,2312  10 000 0             CCS     A
 0188   REF   1              33,2313  1 2346 0             TCF     NODVMON2     AUXFLAG = 0, HENCE SET AUXFLAG TO 1.

 0189   REF   7  LAST  838   33,2314  4 1251 1  DVMON      CS      DVTHRUSH
 0190   REF   5  LAST  860   33,2315  6 1246 0             AD      ABDELV
 0191                        33,2316  0 0006 1             EXTEND
 0192   REF   1              33,2317  6 2352 1             BZMF    LOTHRUST

 0193   REF  25  LAST  861   33,2320  4 0076 1             CS      FLAGWRD2     SET STEERSW.
 0194   REF   3  LAST  861   33,2321  7 4741 0             MASK    STEERBIT
 0195   REF  26  LAST  861   33,2322  26 076 1             ADS     FLAGWRD2

 0196   REF  95  LAST  858   33,2323  3 4753 1  DVCNTSET CAF     ONE          ALLOW TWO PASSES MAXIMUM NOW THAT
 0197   REF  46  LAST  860   33,2324  55'515 0                TS       DVCNTR          THRUST HAS BEEN DETECTED.

 0198   REF  19  LAST  860   33,2325  3 0106 0                CA       FLGWRD10        BRANCH IF APSFLAG IS SET.
 0199   REF  13  LAST  860   33,2326  7 4737 1                MASK     APSFLBIT
 0200   REF 253  LAST  861   33,2327  10 000 0                CCS      A
 0201   REF   1              33,2330  1 2375 0                TCF      USEJETS

 0202   REF  22  LAST  858   33,2331  3 4743 0                CA       BIT9            CHECK GIMBAL FAIL BIT
 0203                        33,2332  0 0006 1                EXTEND
 0204   REF   3  LAST  191   33,2333  02 032 1                RAND     CHAN32
 0205                        33,2334  0 0006 1                EXTEND
 0206   REF   2  LAST  862   33,2335  1 2375 0                BZF      USEJETS

 0207   REF   2  LAST  760   33,2336  4 4736 0    USEGTS      CS       USEQRJTS
 0208   REF  29  LAST  831   33,2337  7 0111 1                MASK     DAPBOOLS
 0209   REF  30  LAST  862   33,2340  54 111 1                TS       DAPBOOLS
 0210   REF   1              33,2341  1 2400 0                TCF      SERVOUT

 0211   REF   2  LAST  861   33,2342  4 4752 1    NODVMON1    CS       AUXFLBIT        SET AUXFLAG TO 0.
 0212   REF   8  LAST  861   33,2343  7 0102 0                MASK     FLAGWRD6
 0213   REF   9  LAST  862   33,2344  54 102 0                TS       FLAGWRD6
 0214   REF   3  LAST  862   33,2345  1 2375 0                TCF      USEJETS
 0215   REF  10  LAST  862   33,2346  4 0102 0    NODVMON2    CS       FLAGWRD6        SET AUXFLAG TO 1.
 0216   REF   3  LAST  862   33,2347  7 4752 1                MASK     AUXFLBIT
 0217   REF  11  LAST  862   33,2350  26 102 0                ADS      FLAGWRD6
 0218   REF   4  LAST  862   33,2351  1 2375 0                TCF      USEJETS

 0219   REF   2  LAST  861   33,2352  0 3552 0    LOTHRUST    TC       QUIKFAZ5
 0220   REF  47  LAST  862   33,2353  11'515 0                CCS      DVCNTR
 0221   REF   1              33,2354  1 2366 1                TCF      DECCNTR

 0222   REF   1              33,2355  10 761 0                CCS      PHASE4          COMFAIL JOB ACTIVE?
 02222  REF   2  LAST  862   33,2356  1 2400 0                TCF      SERVOUT         YES   WON'T NEED ANOTHER.

 02224  REF  75  LAST  860   33,2357  0 5353 1                TC       PHASCHNG        4.37SPOT FOR COMFAIL.
 02226                       33,2360   00374 1                OCT      00374

 02228  REF   4  LAST  716   33,2361  3 7713 0                CAF      PRIO25
 0223   REF  22  LAST  857   33,2362  0 5072 1                TC       NOVAC
 02232  REF  30  LAST  853   E7,1455                          EBANK=   WHICH
 02234  REF   2  LAST  242   33,2363   02571 0                2CADR    COMFAIL
 02234                       33,2364   74067 0
 02236  REF   3  LAST  862   33,2365  1 2400 0                TCF      SERVOUT

 0224   REF   1              33,2366  55'570 0    DECCNTR     TS       DVCNTR1
 0225   REF   3  LAST  862   33,2367  0 3552 0                TC       QUIKFAZ5
 0226   REF   2  LAST  862   33,2370  3 1570 1                CA       DVCNTR1
 0227   REF  48  LAST  862   33,2371  55'515 0                TS       DVCNTR
 0228                        33,2372  0 0004 0                INHINT
 0229   REF  43  LAST  854   33,2373  0 4674 0                TC       IBNKCALL        IF THRUST IS LOW, NO STEERING IS DONE
```

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L         SERVICE                                                                                    USER'S PAGE NO.   7       E7 S3

  0230    REF   6  LAST  813    33,2374   40165 1            CADR    STOPRATE         AND THE DESIRED RATES ARE SET TO ZERO.
  0231    REF  31  LAST  862    33,2375  4 0111 1  USEJETS   CS      DAPBOOLS
  0232    REF   3  LAST  862    33,2376  7 4736 0            MASK    USEQRJTS
  0233    REF  32  LAST  863    33,2377  26 111 1            ADS     DAPBOOLS
  0234                          33,2400  0 0003 1  SERVOUT   RELINT
  0235    REF 240  LAST  861    33,2401  0 4616 1            TC      BANKCALL
  0236    REF   1               33,2402   40457 0            CADR    1/ACCS

  0239    REF  11  LAST  269    33,2403  3 0167 1            CA      PRIORITY
  0240    REF   8  LAST  430    33,2404  7 5004 1            MASK    LOW9
  0241    REF   8  LAST  806    33,2405  54 166 1            TS      PUSHLOC
  0242                          33,2406  22 007 0            ZL
  0243    REF  25  LAST  825    33,2407  52 121 1            DXCH    FIXLOC           FIXLOC AND OVFIND

  0244    REF   4  LAST  862    33,2410  0 3552 0            TC      QUIKFAZ5
  0245                          33,2411  0 0006 1            EXTEND                   EXIT TO SELECTED ROUTINE WHETHER THERE
  0246    REF   6  LAST  859    33,2412  3 1253 1            DCA     AVGEXIT          IS THRUST OR NOT.  THE STATE OF STEERSW
  0247    REF  21  LAST  755    33,2413  52 006 0            DXCH    Z                WILL CONVEY THIS INFORMATION.

  02475   REF   7  LAST  851    33,2414   02145 0  XNBPIPAD  ECADR   XNBPIP

  0248                          32,3770                      BANK    32
  0249    REF   1               22,2000                      SETLOC  SERV2
  0250                          22,3661                      BANK
  0251    REF   1                                            COUNT*  $$/SERV

  0252    REF  19  LAST  852    22,3661  3 1235 1  AVGEND    CA      PIPTIME +1       FINAL AVERAGE G EXIT
  0253    REF   8  LAST  860    22,3662  55 075 0            TS      1/PIPADT         SET UP FREE FALL GYRO COMPENSATION.

  0254    REF  55  LAST  853    22,3663  0 5504 0            TC      UPFLAG           SET DRIFT FLAG.
  0255    REF   1               22,3664   00036 1            ADRES   DRIFTFLG

  0256    REF 241  LAST  863    22,3665  0 4616 1            TC      BANKCALL
  0257    REF   1               22,3666   17310 0            CADR    PIPFREE

  0258    REF  23  LAST  862    22,3667  4 4743 1            CS      BIT9
  0259                          22,3670  0 0006 1            EXTEND
  0260    REF  29  LAST  858    22,3671  03 011 1            WAND    DSALMOUT

  0261    REF  10  LAST  762    22,3672  0 5327 1            TC      2PHSCHNG
  0262                          22,3673   00005 1            OCT     5                GROUP 5 OFF
  0263                          22,3674   05022 1            OCT     05022            GROUP 2 ON
  0264                          22,3675   20000 0            OCT     20000

  0265    REF 151  LAST  861    22,3676  0 6037 0            TC      INTPRET
  0266                          22,3677   43014 0            SET     CLEAR
  0267    REF   2  LAST  850    22,3700   01464 0                    NOR29FLG         SHUT OFF R29 WHEN SERVICER ENDS.
  0268    REF   1               22,3701   03664 0                    SWANDISP         SHUT OFF R10 WHEN SERVICER ENDS.
  0269                          22,3702   45014 0            CLEAR   CALL             RESET MUNFLAG.
  0270    REF   7  LAST  861    22,3703   03267 1                    MUNFLAG
```

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 0271   REF   1                 22,3704   27467 1                    AVETOMID
 0272                           22,3705   77414 0           CLEAR    EXIT
 0273   REF   1                 22,3706   03671 1                    V37FLAG
 0274   REF   3  LAST  857      22,3707   3 1260 1  AVERTRN  CA      OUTROUTE          RETURN TO DESIRED POINT.
 0275   REF  14  LAST  748      22,3710   0 4640 1           TC      BANKJUMP

 0276   REF   1                 22,3707             OUTGRAVE =       AVERTRN

 0277   REF   5  LAST  860      E7,1570             DVCNTR1  =       MASS1
```

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P0278

 02782  REF   1                 27,2000                        SETLOC SERV3
 02784                          27,3321                        BANK
 02786  REF   1                                                COUNT* $$/SERV

 0279                           27,3321  0 0006 1  SERVIDLE EXTEND                DISCONNECT SERVICER FROM ALL GUIDANCE
 0280   REF   1                 27,3322  3 3357 0           DCA     SVEXTADR
 0281   REF   7  LAST  863      27,3323  53'253 0           DXCH    AVGEXIT

 0282   REF  23  LAST  861      27,3324  4 0103 1           CS      FLAGWRD7        DISCONNECT THE DELTA-V MONITOR
 0283   REF   4  LAST  861      27,3325  7 4745 1           MASK    IDLEFBIT
 0284   REF  24  LAST  865      27,3326  26 103 1           ADS     FLAGWRD7

 0285   REF   5  LAST  831      27,3327  3 4735 1           CAF     LRBYBIT         TERMINATE R12 IF RUNNING.
 0286   REF  15  LAST  831      27,3330  54 107 0           TS      FLGWRD11

 0287                           27,3331  0 0006 1           EXTEND
 0288   REF  18  LAST  832      27,3332  3 4755 1           DCA     NEGO
 0289   REF   5  LAST  832      27,3333  52 753 1           DXCH    -PHASE1

 0290   REF  12  LAST  862      27,3334  3 0102 1           CA      FLAGWRD6        DO NOT TURN OFF PHASE 2 IF MUNFLAG SET.
 0291   REF   4  LAST  858      27,3335  7 4744 0           MASK    MUNFLBIT
 0292   REF 254  LAST  862      27,3336  10 000 0           CCS     A
 0293                           27,3337  1 3343 1           TCF     +4

 0294                           27,3340  0 0006 1           EXTEND
 0295   REF  19  LAST  865      27,3341  3 4755 1           DCA     NEGO
 0296   REF   6  LAST  859      27,3342  52 755 1           DXCH    -PHASE2

 0297                           27,3343  0 0006 1     +4    EXTEND
 0298   REF  20  LAST  865      27,3344  3 4755 1           DCA     NEGO
 0299   REF   5  LAST  832      27,3345  52 757 0           DXCH    -PHASE3

 0300                           27,3346  0 0006 1           EXTEND
 0301   REF  21  LAST  865      27,3347  3 4755 1           DCA     NEGO
 0302   REF   4  LAST  832      27,3350  52 765 1           DXCH    -PHASE6

 0303   REF   2  LAST  224      27,3351  3 4764 0           CAF     OCT33           4.33SPOT FOR GOPOOFIX
 0304   REF 135  LAST  859      27,3352  54 001 1           TS      L
 0305                           27,3353  4 0000 0           COM
 0306   REF   8  LAST  832      27,3354  52 761 0           DXCH    -PHASE4

 0307   REF   1                 27,3355  1 5644 0           TCF     WHIMPER         PERFORM A SOFTWARE RESTART AND PROCEED
A0308                                                                               TO GOTOPOOH WHILE SERVICER CONTINUES TO
A0309                                                                               RUN, ALBEIT IN A GROUND STATE WHERE
A0310                                                                               ONLY STATE-VECTOR DEPENDENT FUNCTIONS
A0311                                                                               ARE MAINTAINED.

 0312   REF  49  LAST  862      E7,1515                        EBANK= DVCNTR
 0313    REF   8  LAST  859    27,3356    03770 1  SVEXTADR 2CADR   SERVEXIT
 0313                          27,3357    64067 1
 0314                          32,3770                      BANK    32
 0315    REF   1               32,2000                      SETLOC  SERV
 0316                          32,3770                      BANK
 0317    REF   1                                            COUNT*  $$/SERV

 0318    REF  76  LAST  862    32,3770  0 5353 1  SERVEXIT  TC      PHASCHNG
 0319                          32,3771    00035 1           OCT     00035

 0320    REF 132  LAST  850    32,3772  1 5155 1      +2    TCF     ENDOFJOB

 0321                          23,2461                      BANK    23
 0322    REF   1               23,2000                      SETLOC  NORMLIZ
 0323                          23,2461                      BANK

 0324    REF   1                                            COUNT*  $$/SERV
```

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P0325   NORMLIZE AND COPYCYCL

 0326   REF 152  LAST  863   23,2461  0 4037 0  NORMLIZE TC      INTPRET
 0327                        23,2462   43175 0           VLOAD   BOFF
 0328   REF   3  LAST  149   23,2463   03545 0                   RN1
 0329   REF   [illegible]  LAST  863   23,2464   03347 1                   MUNFLAG
 0330   REF   1              23,2465   66415 1                   NORMLIZ1
 0331                        23,2466   64252 0           VSL6    MXV
 0332   REF  32  LAST  842   23,2467   01734 0                   REFSMMAT
 0333   REF  19  LAST  845   23,2470   37521 0           STCALL  R
 0334   REF   4  LAST  839   23,2471   67130 1                   MUNGRAV
 0335                        23,2472   76575 1           VLOAD   VSL1
 0336   REF   4  LAST  779   23,2473   03553 1                   VN1
 0337                        23,2474   77721 0           MXV
 0338   REF  33  LAST  867   23,2475   01734 0                   REFSMMAT
 0339   REF  12  LAST  845   23,2476   27527 1           STOVL   V
 0340   REF   4  LAST  734   23,2477   01726 0                   V(CSM)
 0341                        23,2500   53435 0           VXV     UNIT
 0342   REF   4  LAST  734   23,2501   01720 0                   R(CSM)
 0343   REF   3  LAST  151   23,2502   03720 1           STORE   UHYP
 0344                        23,2503   77776 1  ASCSPOT  EXIT
 0345                        23,2504  0 0006 1           EXTEND               MAKE SURE GOUP 2 IS OFF.
 0346   REF  22  LAST  865   23,2505  3 4755 1           DCA     NEGO
 0347   REF   7  LAST  865   23,2506  52 755 1           DXCH    -PHASE2

 0348   REF  53  LAST  853   23,2507  0 4635 0           TC      POSTJUMP
 03482  REF   1              23,2510   66420 1           CADR    NORMLIZ2

 03483                       33,2415                     BANK    33
 03484  REF   5  LAST  859   33,2000                     SETLOC  SERVICES
 03485                       33,2415                     BANK
 03486  REF    5 LAST  859 TO  863:   135    172*        COUNT*  $$/SERV

 0349                        33,2415   77624 1  NORMLIZ1 CALL
 0350   REF   1              33,2416   66730 0                   CALCGRAV
 0351                        33,2417   77776 1           EXIT

 0352   REF   1              33,2420  3 2437 0  NORMLIZ2 CA      EIGHTEEN
 0353   REF   2  LAST  861   33,2421  0 2424 1           TC      COPYCYC +1     DO NOT COPY MASS IN NORMLIZE
 0354   REF 133  LAST  866   33,2422  0 5155 0           TC      ENDOFJOB


 0355   REF   7  LAST  859   33,2423  3 6007 0  COPYCYC  CA      OCT24          DEC 20
 0356                        33,2424  0 0004 0  +1       INHINT
 0357   REF   4  LAST  333   33,2425  7 7747 0  +2       MASK    NEG1           REDUCE BY 1 IF ODD
 0358   REF  31  LAST  751   33,2426  54 061 1           TS      ITEMP1
 0359                        33,2427  0 0006 1           EXTEND
 0360   REF  32  LAST  867   33,2430  5 0061 0           INDEX   ITEMP1
 0361   REF   4  LAST  867   33,2431  3 1545 1           DCA     RN1
 0362   REF  33  LAST  867   33,2432  50 061 0           INDEX   ITEMP1
 0363    REF  13  LAST  791    33,2433  53'221 0               DXCH    RN
 0364    REF  34  LAST  867    33,2434  10 061 1               CCS     ITEMP1
 0365    REF   3  LAST  867    33,2435  1 2425 1               TCF     COPYCYC +2
 0366    REF 211  LAST  860    33,2436  0 0002 0               TC      Q                   RETURN UNDER INHINT


 0367                          33,2437   00022 1  EIGHTEEN DEC     18
```

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P0368    ****************** PIPA READER ******************

R0369                  MOD NO. 00  BY D. LICKLY  DEC.9 1966

R0370    FUNCTIONAL DESCRIPTION

R0371       SUBROUTINE TO READ PIPA COUNTERS, TRYING TO BE VERY CAREFUL SO THAT IT WILL BE RESTARTABLE.
R0373       PIPA READINGS ARE STORED IN THE VECTOR DELV. THE HIGH ORDER PART OF EACH COMPONENT CONTAINS THE PIPA READING,
R0375       RESTARTS BEGIN AT REREADAC.


R0376       AT THE END OF THE PIPA READER THE CDUS ARE READ AND STORED AS A
R0377    VECTOR IN CDUTEMP.  THE HIGH ORDER PART OF EACH COMPONENT CONTAINS
R0378    THE CDU READING IN 2S COMP IN THE ORDER CDUX,Y,Z.  THE THRUST
R0379    VECTOR ESTIMATOR IN FINDCDUD REQUIRES THE CDUS BE READ AT PIPTIME.

R0380    CALLING SEQUENCE AND EXIT

R0381       CALL VIA TC, ISWCALL, ETC.

R0382       EXIT IS VIA Q.


R0383

R0384    INPUT

R0385       INPUT IS THROUGH THE COUNTERS PIPAX, PIPAY, PIPAZ, AND TIME2.


R0386    OUTPUT

R0387       HIGH ORDER COMPONENTS OF THE VECTOR DELV CONTAIN THE PIPA READINGS.
R0388       PIPTIME CONTAINS TIME OF PIPA READING.


R0389    DEBRIS (ERASABLE LOCATIONS DESTROYED BY PROGRAM)

R0390               TEMX    TEMY    TEMZ    PIPAGE


 0391                          37,3541                         BANK    37
 0392    REF   2  LAST  857    37,2000                         SETLOC  SERV1
 0393                          37,3541                         BANK

 0394    REF   2 LAST  857 TO  859:      89      89*           COUNT*  $$/SERV

 0395                          37,3541   0 0006 1   PIPASR     EXTEND
 0396    REF  26  LAST  331    37,3542  3 0025 0                DCA      TIME2
 0397    REF   8  LAST  802    37,3543  53'561 0                DXCH     PIPTIME1           CURRENT TIME  POSITIVE VALUE
 0398    REF 159  LAST  856    37,3544  4 4755 0            +3  CS       ZERO               INITIALIZE THESE AT NEG. ZERO.
 0399    REF   5  LAST  817    37,3545  55'254 1                TS       TEMX
 0400    REF   4  LAST  817    37,3546  55'255 0                TS       TEMY
 0401    REF   4  LAST  817    37,3547  55'256 0                TS       TEMZ

 0402    REF 160  LAST  870    37,3550  3 4755 1                CA       ZERO
 0403    REF   4  LAST  384    37,3551  54 330 0                TS       DELVZ
 04031   REF   5  LAST  870    37,3552  54 331 1                TS       DELVZ +1
 0404    REF   5  LAST  384    37,3553  54 326 1                TS       DELVY
 04041   REF   6  LAST  870    37,3554  54 327 0                TS       DELVY +1
 04042   REF   9  LAST  385    37,3555  54 325 1                TS       DELVX +1
 0405    REF   5  LAST  858    37,3556  55'257 1                TS       PIPAGE             SHOW PIPA READING IN PROGRESS

 0406                          37,3557  0 0006 1  REPIP1        EXTEND
 0407    REF   9  LAST  816    37,3560  4 0040 1                DCS      PIPAX              X AND Y PIPS READ
 0408    REF   6  LAST  870    37,3561  53'255 0                DXCH     TEMX
 0409    REF  10  LAST  870    37,3562  52 040 1                DXCH     PIPAX              PIPAS SET TO NEG ZERO AS READ.
 0410    REF  10  LAST  870    37,3563  54 324 0                TS       DELVX
 0411    REF   7  LAST  870    37,3564  22 326 0                LXCH     DELVY

 0412    REF   4  LAST  816    37,3565  4 0041 0  REPIP3        CS       PIPAZ              REPEAT PROCESS FOR Z PIP
 0413    REF   5  LAST  870    37,3566  57'256 1                XCH      TEMZ
 0414    REF   5  LAST  870    37,3567  56 041 1                XCH      PIPAZ
 0415    REF   6  LAST  870    37,3570  54 330 0  DODELVZ       TS       DELVZ

 0416                          37,3571  0 0006 1  REPIP4        EXTEND                      COMPUTE GUIDANCE PERIOD
 0417    REF   9  LAST  870    37,3572  3 1561 1                DCA      PIPTIME1
 0418    REF   2  LAST  105    37,3573  53'250 0                DXCH     PGUIDE
 0419                          37,3574  0 0006 1                EXTEND
 0420    REF  20  LAST  863    37,3575  4 1235 0                DCS      PIPTIME
 0421    REF   3  LAST  870    37,3576  21'250 0                DAS      PGUIDE

 0422    REF  13  LAST  606    37,3577  3 0032 0                CA       CDUX               READ CDUS INTO HIGH ORDER CDUTEMPS
 0423    REF   1               37,3600  55'155 0                TS       CDUTEMPX
 0424    REF   5  LAST  606    37,3601  3 0033 1                CA       CDUY
 0425    REF   1               37,3602  55'156 0                TS       CDUTEMPY
 0426    REF   7  LAST  601    37,3603  3 0034 0                CA       CDUZ
 0427    REF   1               37,3604  55'157 1                TS       CDUTEMPZ
 0428    REF  11  LAST  870    37,3605  3 0324 1                CA       DELVX
 0429    REF   3  LAST  861    37,3606  55'160 0                TS       PIPATMPX
 0430    REF   8  LAST  870    37,3607  3 0326 0                CA       DELVY
 0431    REF   3  LAST  861    37,3610  55'161 1                TS       PIPATMPY
 0432    REF   7  LAST  870    37,3611  3 0330 1                CA       DELVZ
 0433    REF   3  LAST  861    37,3612  55'162 1                TS       PIPATMPZ

 0434    REF 212  LAST  868    37,3613  0 0002 0                TC       Q
 0435   REF   6  LAST  870    37,3614  11'257 1  REREADAC CCS     PIPAGE
 0436   REF   1               37,3615  1 3441 1           TCF     READACCS        PIP READING NOT STARTED. GO TO BEGINNING

 0437   REF   1               37,3616  3 3654 0           CAF     DONEADR         SET UP RETURN FROM PIPASR
 0438   REF 213  LAST  870    37,3617  54 002 1           TS      Q

 0439   REF   8  LAST  870    37,3620  10 330 0           CCS     DELVZ
 0440   REF   1               37,3621  1 3571 0           TCF     REPIP4          Z DONE, GO DO CDUS
 0441                         37,3622  1 3625 1           TCF     +3              Z NOT DONE, CHECK Y.
 0442   REF   2  LAST  871    37,3623  1 3571 0           TCF     REPIP4
 0443   REF   3  LAST  871    37,3624  1 3571 0           TCF     REPIP4

 0444                         37,3625  22 007 0           ZL
 0445   REF   9  LAST  870    37,3626  10 326 1           CCS     DELVY
 0446                         37,3627  1 3632 1           TCF     +3
 0447   REF   1               37,3630  1 3641 0           TCF     CHKTEMX         Y NOT DONE, CHECK X.
 0448                         37,3631  1 3632 1           TCF     +1
 0449   REF   6  LAST  870    37,3632  22 041 1           LXCH    PIPAZ           Y DONE, ZERO Z PIP.

 0450   REF   6  LAST  870    37,3633  11'256 0           CCS     TEMZ
 0451   REF   7  LAST  871    37,3634  4 1256 0           CS      TEMZ            TEMZ NOT = -0, CONTAINS -PIPAZ VALUE.
 0452   REF   1               37,3635  1 3570 1           TCF     DODELVZ
 0453                         37,3636  1 3634 1           TCF     -2
 0454   REF   9  LAST  871    37,3637  22 330 1           LXCH    DELVZ           TEMZ = -0, L HAS ZPIP VALUE.
 0455   REF   4  LAST  871    37,3640  1 3571 0           TCF     REPIP4

 0456   REF   7  LAST  870    37,3641  11'254 1  CHKTEMX  CCS     TEMX            HAS THIS CHANGED
 0457   REF   8  LAST  871    37,3642  4 1254 1           CS      TEMX            YES
 0458                         37,3643  1 3646 1           TCF     +3              YES
 0459                         37,3644  1 3642 0           TCF     -2              YES
 0460   REF   1               37,3645  1 3557 1           TCF     REPIP1          NO
 0461   REF  12  LAST  870    37,3646  54 324 0           TS      DELVX

 0462   REF   5  LAST  870    37,3647  4 1255 0           CS      TEMY
 0463   REF  10  LAST  871    37,3650  54 326 1           TS      DELVY

 0464   REF 161  LAST  870    37,3651  4 4755 0           CS      ZERO            ZERO X AND Y PIPS
 0465   REF  11  LAST  870    37,3652  52 040 1           DXCH    PIPAX           L STILL ZERO FROM ABOVE

 0466   REF   1               37,3653  1 3565 0           TCF     REPIP3

 0467   REF   1               37,3654   03451 1  DONEADR  GENADR  PIPSDONE
 0468                        33,2440                       BANK    33
 0469   REF    6  LAST  867  33,2000                       SETLOC  SERVICES
 0470                        33,2440                       BANK

 0471   REF    6 LAST  867 TO  869:    19    191*          COUNT*  $$/SERV

 0472   REF    2  LAST  870  33,2440  3 1156 1  TMPTOSPT CA      CDUTEMPY     THIS SUBROUTINE, CALLED BY AN RTB FROM
 0473   REF    1             33,2441  54 766 1           TS      CDUSPOTY     INTERPRETIVE, LOADS THE CDUS CORRESPON-
 0474   REF    2  LAST  870  33,2442  3 1157 0           CA      CDUTEMPZ     DING TO PIPTIME INTO THE CDUSPOT VECTOR.
 0475   REF    1             33,2443  54 770 0           TS      CDUSPOTZ
 0476   REF    2  LAST  870  33,2444  3 1155 1           CA      CDUTEMPX
 0477   REF    1             33,2445  54 772 1           TS      CDUSPOTX
 0478   REF 214  LAST  871  33,2446  0 0002 0           TC      Q

R0479   LRHTASK IS A WAITLIST TASK SET BY READACCS DURING THE DESCENT BRAKING
R0480   PHASE WHEN THE ALT TO THE LUNAR SURFACE IS LESS THAN 25,000 FT.  THIS
R0481   TASK CLEARS THE ALTITUDE MEASUREMENT MADE DISCRETE AND INITIATES THE
R0482   LANDING RADAR MEASUREMENT JOB (LRHJOB) TO TAKE A ALTITUDE MEASUREMENT
R0483   50 MS PRIOR TO THE NEXT READACCS TASK.

 0484                        21,2130                       BANK    21
 0485   REF    2  LAST   42  21,2000                       SETLOC  R10
 0486                        21,2130                       BANK

 0487   REF    1                                           COUNT*  $$/SERV

 0488   REF   16  LAST  865  21,2130  4 0107 0  LRHTASK  CS      FLGWRD11
 0489   REF    6  LAST  865  21,2131  7 4735 0           MASK    LRBYBIT
 0490                        21,2132  0 0006 1           EXTEND
 0491   REF    1             21,2133  1 2150 0           BZF     GRP2OFF      LR BYPASS SET - BYPASS ALL LR READING.

 0492   REF    1             21,2134  3 4746 0           CA      READLBIT
 0493   REF   17  LAST  872  21,2135  7 0107 0           MASK    FLGWRD11     IS READLR FLAG SET?
 0494                        21,2136  0 0006 1           EXTEND
 0495   REF    2  LAST  872  21,2137  1 2150 0           BZF     GRP2OFF      NO.  BYPASS LR READ.

 0496   REF   18  LAST  872  21,2140  4 0107 0           CS      FLGWRD11
 0497   REF    1             21,2141  7 4742 0           MASK    NOLRRBIT     IS LR READ INHIBITED?
 0498                        21,2142  0 0006 1           EXTEND
 0499   REF    3  LAST  872  21,2143  1 2150 0           BZF     GRP2OFF      YES.  BYPASS LR READ.

 0500   REF    1             21,2144  3 7720 0           CA      PRIO32       LR READ OK   SET JOB TO DO IT
 0501   REF   23  LAST  862  21,2145  0 5072 1           TC      NOVAC        ABOUT 50 MS PRIOR TO PIPA READ
 0502   REF    3  LAST  201  E7,1654                       EBANK=  HMEAS
 0503   REF    1             21,2146   03716 1           2CADR   LRHJOB
 0503   REF    1             21,2147   70067 1
 0504                        21,2150  0 0006 1  GRP2OFF  EXTEND
 0505   REF   23  LAST  867  21,2151  3 4755 1           DCA     NEG0
 0506   REF    8  LAST  867  21,2152  52 755 1           DXCH    -PHASE2
 0507   REF    1             21,2153  1 2021 1           TCF     R10,R11A
 0508                          33,2447                        BANK    33
 0509   REF    7  LAST  872    33,2000                        SETLOC SERVICES
 0510                          33,2447                        BANK

 0511   REF    7 LAST  872 TO  872:    7    198*              COUNT* $$/SERV

R0512   HIGATASK IS ENTERED APPROXIMATELY 6 SECS PRIOR TO HIGATE DURING THE
R0513   DESCENT PHASE.  HIGATASK SETS THE HIGATE FLAG (BIT11) AND THE LR INHIBIT
R0514   FLAG (BIT10) IN LRSTAT.  THE HIGATJOB IS SET UP TO REPOSITION THE LR
R0515   ANTENNA FROM POSITION 1 TO POSITION 2.  IF THE REPOSITIONING IS
R0516   SUCCESSFUL THE ALT BEAM AND VELOCITY BEAMS ARE TRANSFORMED TO THE NEW
R0517   ORIENTATION IN NB COORDINATES AND STORED IN ERASABLE.

 0518                          33,2447  0 0004 0  HIGATASK INHINT
 0519   REF   11  LAST  [illegible]    33,2450  4 5015 1           CS      PRIO3              SET HIGATE AND LR INHIBIT FLAGS
 0520   REF   19  LAST  872    33,2451  7 0107 0           MASK    FLGWRD11
 0521   REF   12  LAST  873    33,2452  6 5015 0           AD      PRIO3
 0522   REF   20  LAST  873    33,2453  54 107 0           TS      FLGWRD11
 0523   REF    2  LAST  872    33,2454  3 7720 0           CAF     PRIO32
 0524   REF   39  LAST  858    33,2455  0 5105 0           TC      FINDVAC            SET LR POSITIONING JOB (POS2)
 0525   REF    4  LAST  872    E7,1654                     EBANK=  HMEAS
 0526   REF    1               33,2456   03670 0           2CADR   HIGATJOB
 0526   REF    1               33,2457   66067 0
 0527   REF    1               33,2460  1 2540 0           TCF     CONTSERV           CONTINUE SERVICER
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P0528        MUNRETRN IS THE RETURN LOC FROM SPECIAL AVE G ROUTINE (MUNFVG)

 0529                            33,2461   77776 1  MUNRETRN EXIT

 0530   REF  21  LAST  873       33,2462   4 0107 0           CS       FLGWRD11
 0531   REF   7  LAST  872       33,2463   7 4735 0           MASK     LRBYBIT
 0532                            33,2464   0 0006 1           EXTEND
 0533   REF   1                  33,2465   1 2546 0           BZF      COPYCYC1         BYPASS LR LOGIC IF BIT15 IS SET.

 0534   REF   2  LAST  872       33,2466   3 4746 0           CA       READLBIT         SEE IF ALT < 35000 FT LAST CYCLE
 0535   REF  22  LAST  874       33,2467   7 0107 0           MASK     FLGWRD11
 0536                            33,2470   0 0006 1           EXTEND
 0537   REF   1                  33,2471   1 2721 0           BZF      35KCHK           ALT WAS > 35000 FT LAST CYCLE  CHK NOW

 0538   REF   1                  33,2472   3 4743 0           CAF      XORFLBIT         WERE WE BELOW 30000 FT LAST PASS?
 0539   REF  23  LAST  874       33,2473   7 0107 0           MASK     FLGWRD11
 0540                            33,2474   0 0006 1           EXTEND
 0541   REF   1                  33,2475   1 2710 1           BZF      XORCHK           NO - TEST THIS PASS

 0542   REF   1                  33,2476   3 4741 1  HITEST   CAF      PSTHIBIT         CHECK FOR HIGATE
 0543   REF  24  LAST  874       33,2477   7 0107 0           MASK     FLGWRD11
 0544                            33,2500   0 0006 1           EXTEND
 0545   REF   1                  33,2501   1 2515 0           BZF      HIGATCHK         NOT AT HIGATE LAST CYCLE-CHK THIS CYCLE

 0546   REF  27  LAST  822       33,2502   3 4745 0  POS2CHK  CAF      BIT7             VERIFY LR IN POS2
 0547                            33,2503   0 0006 1           EXTEND
 0548   REF  22  LAST  789       33,2504   02 033 0           RAND     CHAN33
 0549                            33,2505   0 0006 1           EXTEND
 0550   REF   1                  33,2506   1 3155 1           BZF      UPDATCHK         IT IS-CHECK FOR LR UPDATE
 0551   REF  35  LAST  836       33,2507   3 4737 0           CAF      BIT13            NOT IN POS2-MAYBE REPOSITIONING
 0552                            33,2510   0 0006 1           EXTEND
 0553   REF  50  LAST  785       33,2511   02 012 0           RAND     CHAN12
 0554                            33,2512   0 0006 1           EXTEND
 0555   REF   1                  33,2513   1 2536 1           BZF      LRPOSALM         LR NOT IN POS2 OR REPOSITIONING-BAD
 0556   REF   2  LAST  873       33,2514   1 2540 0           TCF      CONTSERV         LR BEING REPOSITIONED-CONTINUE SERV

 0557   REF  20  LAST  826       33,2515   3 1642 0  HIGATCHK CA       TTF/8            IS TTF > CRITERION?   (TTF IS NEGATIVE)
 0558   REF   1                  33,2516   6 1427 1           AD       RPCRTIME
 0559                            33,2517   0 0006 1           EXTEND
 0560   REF   1                  33,2520   6 2531 1           BZMF     POS1CHK          NO

 0561   REF   3  LAST  279       33,2521   3 4741 1           CA       EBANK4           MUST SWITCH EBANKS
 0562   REF  33  LAST  852       33,2522   56 003 1           XCH      EBANK
 0563   REF 136  LAST  865       33,2523   54 001 1           TS       L                SAVE IN L

 05635  REF   8  LAST  863       E4,1545                      EBANK=   XNBPIP
 0564   REF   9  LAST  874       33,2524   4 1545 0           CS       XNBPIP           UXBXP IN GSOP CH5
 056405 REF  50  LAST  865       E7,1515                      EBANK=   DVCNTR
 05641  REF  34  LAST  874       33,2525   22 003 1           LXCH     EBANK            RESTORE EBANK
 05642  REF   1                  33,2526   6 1430 1           AD       RPCRTQSW         QSW - UXBXP
 05643                           33,2527  0 0006 1            EXTEND
 05644  REF   1                  33,2530  6 2447 1            BZMF    HIGATASK          IF UXBXP > QSW,THEN REPOSITION

 0565   REF  42  LAST  821       33,2531  3 4746 0  POSICHK   CAF     BIT6              HIGATE NOT IN SIGHT-DO POS1 CHK
 0566                            33,2532  0 0006 1            EXTEND
 0567                            33,2533  02 033 0            RAND    33
 0568                            33,2534  0 0006 1            EXTEND
 0569   REF   2  LAST  874       33,2535  1 3155 1            BZF     UPDATCHK          LR IN POS1-CHECK FOR LR UPDATE

 0570   REF  34  LAST  826       33,2536  0 5567 0  LRPOSALM  TC      ALARM             LR NOT IN PROPER POS-ALARM-BYPASS UPDATE
 0571                            33,2537   00511 1            OCT     511      329      AND CONTINUE SERVICER
 0572                            33,2540  0 0004 0  CONTSERV  INHINT
 0573   REF   1                  33,2541  4 3154 0            CS      BITS4-7
 0574   REF  25  LAST  874       33,2542  7 0107 0            MASK    FLGWRD11          CLEAR LR MEASUREMENT MADE DISCRETES.
 0575   REF  26  LAST  875       33,2543  54 107 0            TS      FLGWRD11

 0576   REF  44  LAST  862       33,2544  0 4674 0            TC      IBNKCALL          SET LR LITES PROPERLY
 05761  REF   1                  33,2545   53607 0            CADR    R12LITES
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P0577
 0578   REF   5  LAST  363   33,2546  0 3552 0  COPYCYC1 TC      QUIKFAZ5

 0579   REF  14  LAST  605   33,2547  3 0077 1  R29?     CA      FLAGWRD3
 0580   REF   1              33,2550  7 5014 0           MASK    NR29&RDR
 0581   REF 255  LAST  865   33,2551 10 0000 0           CCS     A                IS NOR29FLG OR READRFLG SET?
 0582   REF   1              33,2552  1 2564 0           TCF     R29NODES         YES, SO DON'T DESIGNATE.

 0583   REF 114  LAST  612   33,2553  3 0110 1           CA      RADMODES         NO, SO R29 IS CALLED FOR.
 0584   REF   1              33,2554  7 2250 0           MASK    OCT10002         IS THE RR NOT ZEROING ITS CDUS, AND
 0585   REF 256  LAST  876   33,2555 10 0000 0           CCS     A                IS THE RENDEZVOUS RADAR IN AUTO MODE?
 0586   REF   2  LAST  876   33,2556  1 2564 0           TCF     R29NODES         NO, SO DON'T DESIGNATE.

 0587   REF 115  LAST  876   33,2557  3 0110 1           CA      RADMODES
 0588   REF   6  LAST  857   33,2560  7 7710 1           MASK    PRIO22
 0589   REF 257  LAST  876   33,2561 10 0000 0           CCS     A                IS RR REPOSITIONING OR REMODING?
 0590   REF   6  LAST  598   33,2562  1 2570 0           TCF     NOR29NOW         YES: COME BACK IN 2 SECONDS & TRY AGAIN.

 0591   REF   2  LAST  597   33,2563  1 2045 0           TCF     R29

 0592                        33,2564  0 0004 0  R29NODES INHINT                   R29 NOT ALLOWED THIS CYCLE.
 0593   REF  10  LAST  604   33,2565  4 4742 0           CS      DESIGBIT         SHOW THAT DESIGNATION IS OFF.
 0594   REF 116  LAST  876   33,2566  7 0110 0           MASK    RADMODES
 0595   REF 117  LAST  876   33,2567 54 0110 0           TS      RADMODES

 0596   REF 153  LAST  867   33,2570  0 6037 0  NOR29NOW TC      INTPRET          INTPRET DOES A RELINT.
 0597                        33,2571    51575 1          VLOAD   ABVAL            MPAC = ABVAL( NEW SM. POSITION VECTOR)
 0598   REF   2  LAST  147   33,2572    03573 0                  R1S
 0599                        33,2573    45206 1          PUSH    DSU                                                     (2)
 0600   REF   9  LAST  850   33,2574    02333 0                  /LAND/
 0601   REF   4  LAST  315   33,2575    03535 1          STORE   HCALC            NEW HCALC*2(24)M.
 06015  REF   3  LAST  818   33,2576    03775 1          STORE   HCALC1
 0602                        33,2577    47075 0          DMPR    RTB
 0603   REF   1              33,2600    26026 1                  ALTCONV
 0604   REF   3  LAST  702   33,2601    21612 1                  SGNAGREE
 0605   REF   2  LAST  151   33,2602    27742 0          STOVL   ALTBITS          ALTITUDE FOR R10 IN BIT UNITS.
 0606   REF  25  LAST  859   33,2603    03537 0                  UNIT/R/
 0607                        33,2604    53435 0          VXV     UNIT
 0608   REF   4  LAST  867   33,2605    03720 1                  UHYP
 0609   REF   3  LAST  151   33,2606    27726 1          STOVL   UHZP             DOWNRANGE HALF-UNIT VECTOR FOR R10.
 0610   REF   3  LAST  876   33,2607    03573 0                  R1S
 0611                        33,2610    60505 1          VXM     VSR4
 0612   REF  34  LAST  867   33,2611    01734 0                  REFSMMAT
 0613   REF   5  LAST  867   33,2612    27545 0          STOVL   RN1              TEMP. REF. POSITION VECTOR*2(29)M.
 0614   REF   4  LAST  840   33,2613    03601 0                  V1S
 0615                        33,2614    76505 0          VXM     VSL1
 0616   REF  35  LAST  876   33,2615    01734 0                  REFSMMAT
 0617   REF   5  LAST  867   33,2616    27553 1          STOVL   VN1              TEMP. REF. VELOCITY VECTOR*2(7)M/CS.
 0618   REF  26  LAST  876   33,2617    03537 0                  UNIT/R/
 0619                        33,2620    51435 1          VXV     ABVAL
 0620   REF    5  LAST  876    33,2621    03601 0                      V1S
 0621                          33,2622    63552 0             SL1      DSQ
 0622                          33,2623    77671 1             DDV
 0623                          33,2624    47075 0             DMPR     RTB
 0624   REF    1               33,2625    26030 0                      ARCC[illegible]V1
 0625   REF    4  LAST  876    33,2626    21612 1                      SGNAGREE
 0626                          33,2627    77776 1   COPYCYC2  EXIT                        LEAVE ALTITUDE RATE COMPENSATION IN MPAC
 0627                          33,2630  0 0004 0              INHINT
 0628   REF   27  LAST  876    33,2631  3 1536 0              CA       UNIT/R/            UPDATE RUNIT FOR R10.
 0629   REF    3  LAST  151    33,2632  55'743 1              TS       RUNIT
 0630   REF   28  LAST  877    33,2633  3 1540 1              CA       UNIT/R/ +2
 0631   REF    4  LAST  877    33,2634  55'744 0              TS       RUNIT +1
 0632   REF   29  LAST  877    33,2635  3 1542 0              CA       UNIT/R/ +4
 0633   REF    5  LAST  877    33,2636  55'745 1              TS       RUNIT +2
 0634   REF  342  LAST  861    33,2637  3 0154 1              CA       MPAC               LOAD NEW DALTRATE FOR R10.
 0635   REF    2  LAST  151    33,2640  55'716 1              TS       DALTRATE

 0636                          33,2641  0 0006 1              EXTEND
 0637   REF    4  LAST  876    33,2642  3 1573 1              DCA      R1S
 0638   REF   20  LAST  867    33,2643  53'521 1              DXCH     R
 0639                          33,2644  0 0006 1              EXTEND
 0640   REF    5  LAST  877    33,2645  3 1575 1              DCA      R1S +2
 0641   REF   21  LAST  877    33,2646  53'523 0              DXCH     R +2
 0642                          33,2647  0 0006 1              EXTEND
 0643   REF    6  LAST  877    33,2650  3 1577 0              DCA      R1S +4
 0644   REF   22  LAST  877    33,2651  53'525 0              DXCH     R +4
 0645                          33,2652  0 0006 1              EXTEND
 0646   REF    6  LAST  877    33,2653  3 1601 1              DCA      V1S
 0647   REF   13  LAST  867    33,2654  53'527 1              DXCH     V
 0648                          33,2655  0 0006 1              EXTEND
 0649   REF    7  LAST  877    33,2656  3 1603 0              DCA      V1S +2
 0650   REF   14  LAST  877    33,2657  53'531 0              DXCH     V +2
 0651                          33,2660  0 0006 1              EXTEND
 0652   REF    8  LAST  877    33,2661  3 1605 0              DCA      V1S +4
 0653   REF   15  LAST  877    33,2662  53'533 1              DXCH     V +4

 0654   REF    1               33,2663  1 2275 1              TCF      COPYCYCL           COMPLETE THE COYPCYCL.
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P0655      ALTCHK COMPARES CURRENT ALTITUDE (IN HCALC) WITH A SPECIFIED ALTITUDE FROM A TABLE BEGINNING AT ALTCRIT.
R0657   ITS CALLING SEQUENCE IS AS FOLLOWS:-

R0658            L          CAF     N
R0659            L+1        TC      BANKCALL
R0660            L+2        CADR    ALTCHK
R0661            L+3        RETURN HERE IF HCALC STILL > SPECIFIED CRITERION.    C(L) = +0.
R0663            L+4        RETURN HERE IF HCALC < OR = SPECIFIED CRITERION.   C(A) = C(L) = +0

R0665   ALTCHK MUST BE BANKCALLED EVEN FROM ITS OWN BANK.    N IS THE LOCATION, RELATIVE TO THE TAG ALTCRIT,
R0667   OF THE BEGINNING OF THE DP CONSTANT TO BE USED AS A CRITERION.

 0668                             33,2664  0 0006 1  ALTCHK    EXTEND
 0669   REF 258  LAST  876        33,2665  5 0000 1            INDEX   A
 0670   REF   1                   33,2666  3 2700 1            DCA     ALTCRIT
 0671   REF 343  LAST  877        33,2667  52 156 1            DXCH    MPAC +1
 0672                             33,2670  0 0006 1            EXTEND
 0673   REF   5  LAST  876        33,2671  4 1535 1            DCS     HCALC
 0674   REF 344  LAST  878        33,2672  20 156 1            DAS     MPAC +1
 0675   REF   1                   33,2673  0 6727 0            TC      BRANCH +4
 0676   REF 162  LAST  871        33,2674  3 4755 1            CAF     ZERO                BETTER THAN A NOOP, PERHAPS
 0677   REF   6  LAST  491        33,2675  24 133 0            INCR    BUF2
 0678   REF   4  LAST  537        33,2676  1 4631 0            TCF     SWRETURN

 0679   REF   2  LAST  850        33,2677            ALTCRIT   =       25KFT

 0680                             33,2677   00007 0  25KFT     2DEC    7620   B-24         (0)
 0680                             33,2700   16100 1
 0681                             33,2701   00016 0  50KFT     2DEC    15240 B-24          (2)
 0681                             33,2702   34200 1
 0682                             33,2703   00000 1  50FT      2DEC    15.24  B-24         (4)
 0682                             33,2704   00364 0
 0683                             33,2705   00010 0  30KFT     2DEC    9144  B-24          (6)
 0683                             33,2706   35600 1
 0684                             33,2707   01414 1  2KFT/SEC DEC      6.096 B-7           2000 FT/SEC AT 2(7) M/CS

R0685

 0686   REF  17  LAST  813        33,2710  3 6242 0  XORCHK    CAF     SIX                 ARE WE BELOW 30000 FT?
 0687   REF 242  LAST  863        33,2711  0 4616 1            TC      BANKCALL
 0688   REF   1                   33,2712   66664 0            CADR    ALTCHK
 0689   REF   1                   33,2713  1 2476 1            TCF     HITEST              CONTINUE LR UPDATE
 0690   REF  56  LAST  863        33,2714  0 5504 0            TC      UPFLAG              YES: INHIBIT X-AXIS OVERRIDE
 0691   REF   7  LAST  851        33,2715   00311 1            ADRES   XCVINFLG
 0692   REF  57  LAST  878        33,2716  0 5504 0            TC      UPFLAG
 0693   REF   1                   33,2717   00253 0            ADRES   XORFLG
 0694   REF   2  LAST  878        33,2720  1 2476 1            TCF     HITEST              CONTINUE LR UPDATE

 0695   REF  54  LAST  857        33,2721  3 4752 0  35KCHK    CAF     TWO                 ARE WE BELOW 35000 FT?
 0696    REF 243  LAST  878     33,2722   0 4616 1            TC       BANKCALL
 0697    REF   2  LAST  878     33,2723    66664 0            CADR     ALTCHK
 0698    REF   3  LAST  874     33,2724   1 2540 0            TCF      CONTSERV
 0699    REF  58  LAST  878     33,2725   0 5504 0            TC       UPFLAG
 0700    REF   1                33,2726    00256 0            ADRES    READLR      *   SET READLR FLAG TO ENABLE LR READING.
 0701    REF   4  LAST  879     33,2727   1 2540 0            TCF      CONTSERV
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P0702    ***********************************************************************************************************
P0705

 0706                           33,2730   41456 0  CALCGRAV UNIT   PUSH               SAVE UNIT/R/ IN PUSHLIST          (18)
 0707    REF  30  LAST  877     33,2731   03537 0           STORE  UNIT/R/
 0708                           33,2732   67340 1           LXC,1  SLOAD              RTX2 = 0 IF EARTH ORBIT, =2 IF LUNAR.
 0709    REF  16  LAST  779     33,2733   02777 1                  RTX2
 0710    REF  17  LAST  880     33,2734   03000 1                  RTX2
 0711                           33,2735   50076 0           DCOMP  BMN
 0712    REF   1                33,2736   66765 0                  CALCGRV1
 0713                           33,2737   50375 0           VLOAD  DOT                                                  (12)
 0714    REF   9  LAST  841     33,2740   06514 1                  UNITZ
 0715    REF  31  LAST  880     33,2741   03537 0                  UNIT/R/
 0716                           33,2742   41552 0           SL1    PUSH                                                 (14)
 0717                           33,2743   44316 0           DSQ    BDSU
 0718    REF   1                33,2744   27027 1                  DP1/20
 0719                           33,2745   56325 0           PDDL   DDV
 0720    REF   1                33,2746   26040 1                  RESQ
 0721                           33,2747   00043 0                  34D                (RN)SQ
 0722                           33,2750   00041 1           STORE  32D                TEMP FOR (RE/RN)SQ
 0723                           33,2751   41205 0           DMP    DMP
 0724    REF   1                33,2752   26042 0                  20J
 0725                           33,2753   65361 0           VXSC   PDDL
 0726    REF  32  LAST  880     33,2754   03537 0                  UNIT/R/
 0727                           33,2755   41205 0           DMP    DMP
 0728    REF   1                33,2756   26044 0                  2J
 0729                           33,2757   00041 1                  32D
 0730                           33,2760   76561 1           VXSC   VSL1
 0731    REF  10  LAST  880     33,2761   06514 1                  UNITZ
 0732                           33,2762   45455 1           VAD    STADR
 0733    REF   2  LAST  780     33,2763   74256 0           STORE  UNITGOBL
 0734                           33,2764   41455 0           VAD    PUSH               MPAC = UNIT GRAVITY VECTOR.        (18)
 0735                           33,2765   60345 0  CALCGRV1 DLOAD  NORM               PERFORM A NORMALIZATION ON RMAGSQ IN
 0736                           33,2766   00043 0                  34D                ORDER TO BE ABLE TO SCALE THE MU FOR
 0737    REF  14  LAST  777     33,2767   00050 1                  X2                 MAXIMUM PRECISION.
 0738                           33,2770   53663 1           BDDV*  SLR*
 0739    REF   1                33,2771   26032 1                  -MUDT,1
 0740                           33,2772   56623 0                  0 -21D,2
 0741                           33,2773   45561 1           VXSC   STADR
 0742    REF   3  LAST  845     33,2774   74214 0           STORE  GDT1/2             SCALED AT 2(+7) M/CS
 0743                           33,2775   77616 0           RVQ

 0744                           33,2776   61375 1  CALCRVG  VLOAD  VXM
 0745    REF   6  LAST  860     33,2777   00325 0                  DELV
 0746    REF  36  LAST  876     33,3000   01734 0                  REFSMMAT
 0747                           33,3001   76561 1           VXSC   VSL1
 0748    REF   4  LAST  860     33,3002   26022 0                  KPIP1
 0749    REF   5  LAST  771     33,3003   03527 1           STORE  DELVREF
 0750                           33,3004   41562 0           VSR1   PUSH
 0751                           33,3005   41455 0           VAD    PUSH               (DV-OLDGDT)/2 TO PD SCALED AT 2(+7)M/CS
 0752    REF   8  LAST  818    33,3006   01237 0                  GDT/2
 0753                          33,3007   65255 0           VAD    PDDL                                           (18)
 0754    REF   8  LAST  761    33,3010   01227 1                  VN
 0755    REF   4  LAST  870    33,3011   01250 1                  PGUIDE
 0756                          33,3012   74201 1           SL     VXSC
 0757                          33,3013   20207 0                  6D
 0758                          33,3014   44055 1           VAD    STQ
 0759    REF  14  LAST  868    33,3015   01221 1                  RN
 0760                          33,3016   00037 0                  31D
 0761    REF   6  LAST  876    33,3017   37545 1           STCALL RN1            TEMP STORAGE OF RN SCALED 2(+29)M
 0762    REF   2  LAST  867    33,3020   66730 0                  CALCGRAV

 0763                          33,3021   53255 0           VAD    VAD
 0764                          33,3022   77655 1           VAD
 0765    REF   9  LAST  881    33,3023   01227 1                  VN
 0766    REF   6  LAST  876    33,3024   37553 0           STCALL VN1            TEMP STORAGE OF VN SCALED 2(+7)M/CS
 0767                          33,3025   00037 0                  31D

 0768                          33,3026   01463 1  DP1/20   2DEC   0.05
 0768                          33,3027   06315 0
 0769                          33,3030   00010 0  SHIFT11  2DEC   1 B-11
 0769                          33,3031   00000 1
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P0770   *********************************************************************************************************************

R0772   MUNRVG IS A SPECIAL AVERAGE G INTEGRATION ROUTINE USED BY THRUSTING
R0773   PROGRAMS WHICH FUNCTION IN THE VICINITY OF AN ASSUMED SPHERICAL MOON.
R0774   THE INPUT AND OUTPUT QUANTITIES ARE REFERENCED TO THE STABLE MEMBER
R0775   COORDINATE SYSTEM.

 0776                          33,3032   41575 0  RVBOTH   VLOAD   PUSH
 0777   REF   3  LAST  734     33,3033   02317 0                   G(CSM)
 0778                          33,3034   65255 0           VAD     PDDL
 0779   REF   5  LAST  867     33,3035   01726 0                   V(CSM)
 0780   REF   5  LAST  881     33,3036   01250 1                   PGUIDE
 0781                          33,3037   74271 0           DDV     VXSC
 0782   REF   1                33,3040   27031 0                   SHIFT11
 0783                          33,3041   77655 1           VAD
 0784   REF   5  LAST  867     33,3042   01720 0                   R(CSM)
 0785   REF   7  LAST  877     33,3043   37573 1           STCALL  R1S
 0786   REF   5  LAST  867     33,3044   67130 1                   MUNGRAV
 0787                          33,3045   53255 0           VAD     VAD
 0788   REF   6  LAST  882     33,3046   01726 0                   V(CSM)
 0789                          33,3047   77626 0           STADR
 0790   REF   9  LAST  877     33,3050   74176 1           STORE   V1S
 0791                          33,3051   77776 1           EXIT
 0792   REF   6  LAST  876     33,3052   0 3552 0          TC      QUIKFAZ5
 0793   REF 154  LAST  876     33,3053   0 6037 0          TC      INTPRET
 0794                          33,3054   77775 1           VLOAD
 0795   REF   4  LAST  880     33,3055   03563 1                   GDT1/2
 0796   REF   4  LAST  882     33,3056   26317 0           STOVL   G(CSM)
 0797   REF   8  LAST  882     33,3057   03573 0                   R1S
 0798   REF   6  LAST  882     33,3060   25720 0           STOVL   R(CSM)
 0799   REF  10  LAST  882     33,3061   03601 0                   V1S
 0800   REF   7  LAST  882     33,3062   01726 0           STORE   V(CSM)
 0801                          33,3063   77776 1           EXIT
 0802   REF   7  LAST  882     33,3064   0 3552 0          TC      QUIKFAZ5
 0803   REF 155  LAST  882     33,3065   0 6037 0          TC      INTPRET
 0804                          33,3066   74375 0  MUNRVG   VLOAD   VXSC
 0805   REF   7  LAST  880     33,3067   00325 0                   DELV
 0806   REF   1                33,3070   26024 0                   KPIP2
 0807                          33,3071   53206 0           PUSH    VAD             1ST PUSH: DELV IN UNITS OF 2(8) M/CS
 0808   REF   9  LAST  881     33,3072   01237 0                   GDT/2
 0809                          33,3073   53206 0           PUSH    VAD             2ND PUSH: (DELV + GDT)/2, UNITS OF 2(7)
 0810   REF  16  LAST  877     33,3074   03527 1                   V                                                      (12)
 0811                          33,3075   56325 0           PDDL    DDV
 0812   REF   6  LAST  882     33,3076   01250 1                   PGUIDE
 0813   REF   2  LAST  882     33,3077   27031 0                   SHIFT11
 0814                          33,3100   77761 1           VXSC
 0815                          33,3101   77655 1           VAD
 0816   REF  23  LAST  877     33,3102   03521 1                   R
 0817   REF   9  LAST  882     33,3103   37573 1           STCALL  R1S             STORE R SCALED AT 2(+24)M.
 0818   REF   6  LAST  882     33,3104   67130 1                   MUNGRAV
 0819                          33,3105   53255 0              VAD     VAD
 0820                          33,3106   77655 1              VAD                                                            (0)
 0821  REF  17  LAST  882      33,3107   03527 1                      V
 0822  REF  11  LAST  882      33,3110   03601 0              STORE   V1S           STORE V SCALED AT 2(+7)M/CS.
 0823                          33,3111   77646 0              ABVAL
 0824  REF   5  LAST  735      33,3112   27472 0              STOVL   ABVEL         STORE SPEED FOR LR AND DISPLAYS.
 0825  REF  33  LAST  880      33,3113   03537 0                      UNIT/R/
 0826                          33,3114   72441 0              DOT     SL1
 0827  REF  12  LAST  883      33,3115   03601 0                      V1S
 0828  REF  11  LAST  819      33,3116   27474 0              STOVL   HDOTDISP      HDOT = V. UNIT(R)*2(7)M/CS.
 0829  REF  10  LAST  882      33,3117   03573 0                      R1S
 0830                          33,3120   72435 0              VXV     VSL2
 0831  REF   5  LAST  842      33,3121   02325 1                      WM
 0832  REF   3  LAST  819      33,3122   17734 1              STODL   DELVS         LUNAR ROTATION CORRECTION TERM*2(5)M/CS.
 0833                          33,3123   00045 0                      36D
 0834                          33,3124   77625 0              DSU
 0835  REF  10  LAST  876      33,3125   02333 0                      /LAND/
 0836  REF   6  LAST  878      33,3126   37535 0              STCALL  HCALC         FOR NOW, DISPLAY WHETHER POS OR NEG
 0837  REF   1                 33,3127   66461 1                      MUNRETRN
 0838                          33,3130   77656 1  MUNGRAV     UNIT                  AT 36D HAVE ABVAL(R), AT 34D R.R
 0839  REF  34  LAST  883      33,3131   17537 0              STODL   UNIT/R/
 0840                          33,3132   00043 0                      34D
 0841                          33,3133   55261 1              SL      BDDV
 0842                          33,3134   20207 0                      6D
 0843  REF   1                 33,3135   26036 0                      -MUDTMUN
 0844                          33,3136   74205 0              DMP     VXSC
 0845  REF   3  LAST  882      33,3137   27031 0                      SHIFT11
 0846  REF  35  LAST  883      33,3140   03537 0                      UNIT/R/
 0847  REF   5  LAST  882      33,3141   03563 1              STORE   GDT1/2        1/2GDT SCALED AT 2(7)M/CS.
 0848                          33,3142   77615 0              RVQ

 0849                          33,3143   00303 1  1.95SECS    DEC     195
 0850                          33,3144   00005 1  7.5         2DEC    .02286 B-6    7.5 FT/SEC AT 2(6) M/CS
 0850                          33,3145   33212 0
 0851                          33,3146   00014 1  2SEC(18)    2DEC    200 B-18
 0851                          33,3147   20000 0
 0852                          33,3150   00000 1  2SEC(28)    2OCT    00000 00310   2SEC AT 2(28)
 0852                          33,3151   00310 0
 08525                         33,3152   00000 1  4SEC(28)    2DEC    400 B-28
 08525                         33,3153   00620 0
 0853                          33,3154   00110 1  [illegible] OCT     110
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P0854
 0855   REF   2  LAST  872   33,3155  3 4742 1  UPDATCHK CAF    NOLRRBIT        SEE IF LR UPDATE INHIBITED.
 0856   REF  27  LAST  875   33,3156  7 0107 0           MASK   FLGWRD11
 0857   REF 259  LAST  878   33,3157  10 000 0           CCS    A
 0858   REF   5  LAST  879   33,3160  1 2540 0           TCF    CONTSERV        IT IS-NO LR UPDATE
 0859   REF   1              33,3161  3 4750 1           CAF    RNGEDBIT        NO INHIBIT - SEE ALT MEAS. THIS CYCLE.
 0860   REF  28  LAST  884   33,3162  7 0107 0           MASK   FLGWRD11
 0861                        33,3163  0 0006 1           EXTEND
 0862   REF   1              33,3164  1 3310 1           BZF    VMEASCHK        NO ALT MEAS THIS CYCLE-CHECK FOR VEL

 0863  *REF  26  LAST  863   33,3165  3 0120 1  POSUPDAT CA     FIXLOC          SET PUSHLIST TO ZERO
 0864  *REF   9  LAST  863   33,3166  54 166 1           TS     PUSHLOC

 0865  *REF 156  LAST  882   33,3167  0 6037 0           TC     INTPRET
 0866  *                     33,3170   61375 1           VLOAD  VXM
 0867  *REF   1              33,3171   02273 0                  HBEAMNB
 0868  *REF  10  LAST  874   33,3172   02146 0                  XNBPIP          HBEAM SM AT 2(2)
 0869  *                     33,3173   72515 0           PDV1   VSL2            STORE HBEAM IN PD 0-5
 0870  *REF  13  LAST  883   33,3174   03601 0                  V1S             SCALE V AT 2(5) M/CS
 0871  *                     33,3175   50255 0           VAD    DOT
 0872  *REF   4  LAST  883   33,3176   03734 1                  DELVS           V RELATIVE TO SURFACE AT 2(5) M/CS
 0873  *                     33,3177   00001 0                  0D              V ALONG HBEAM AT 2(7) M/CS
 0874  *                     33,3200   77405 0           DMP    EXIT
 0875  *REF   1              33,3201   01355 0                  RADSKAL         SCALE TO RADAR COUNTS X 5

 0876  *REF   2  LAST   85   33,3202  4 0110 0           CS     FLGWRD12        TEST LR ALTITUDE SCALE FACTOR
 0877  *REF   1              33,3203  7 4743 1           MASK   ALTSCBIT
 0878  *                     33,3204  0 0006 1           EXTEND
 0879  *                     33,3205  1 3210 0           BZF    +3              BRANCH IF HIGH SCALE

 0880  *REF   1              33,3206  3 1356 0           CA     SKALSKAL        RESCALE IF LOW SCALE
 0881  *REF  10  LAST  860   33,3207  0 7307 1           TC     SHORTMP

 0882  *REF 157  LAST  884   33,3210  0 6037 0  +3       TC     INTPRET
 0883  *                     33,3211   54215 0           DAD    SL              CORRECT HMEAS FOR DOPPLER EFFECT
 0884  *REF   5  LAST  873   33,3212   03655 1                  HMEAS
 0885  *                     33,3213   20210 0                  7D
 0886  *                     33,3214   74205 0           DMP    VXSC            SLANT RANGE AT 2(21),PUSH UP FOR HBEAM
 0887  *REF   1              33,3215   26011 0                  HSCAL           SLANT RANGE VECTOR AT 2(23) M
 0888                        33,3216   45241 1           DOT    0SU
 0889   REF  36  LAST  883   33,3217   03537 0                  UNIT/R/         ALTITUDE AT 2(24)M
 0890   REF   7  LAST  883   33,3220   03535 1                  HCALC           DELTA H AT 2(24) M
 0891   REF   5  LAST  786   33,3221   03665 1           STORE  DELTAH
 0892                        33,3222   77776 1           EXIT

 0893   REF  29  LAST  884   33,3223  3 0107 1           CA     FLGWRD11
 0894   REF   2  LAST  874   33,3224  7 4741 0           MASK   PSTHIBIT
 0895                        33,3225  0 0006 1           EXTEND                 DO NOT PERFORM DATA REASONABLENESS TEST
 0896   REF   1              33,3226  1 3243 0           BZF    NOREASON        UNTIL AFTER HIGATE
 0897   REF 158  LAST  884    33,3227  0 6037 0             TC      INTPRET
 0898                         33,3230   45246 0             ABS     DSU
 0899   REF   2  LAST  121    33,3231   02521 0                     DELQFIX      ABS(DELTAH) - DQFIX   50 FT NOM
 0900                         33,3232   45252 0             SL3     DSU          SCALE TO 2(21)
 0901   REF   8  LAST  884    33,3233   03535 1                     HCALC        ABS(DELTAH) - (50 + HCALC/8) AT 2(21)
 0902                         33,3234   77776 1             EXIT

 0903   REF   2  LAST  150    33,3235  25'670 1             INCR    LRLCTR
 0904   REF   2  LAST  878    33,3236  0 6723 1             TC      BRANCH
 0905   REF   1               33,3237  1 3560 0             TCF     HFAIL        DELTA H TOO LARGE
 0906   REF   2  LAST  885    33,3240  1 3560 0             TCF     HFAIL        DELTA H TOO LARGE
 0907   REF  82  LAST  854    33,3241  0 5516 0             TC      DOWNFLAG     TURN OFF ALT FAIL LAMP
 0908   REF   1               33,3242   00263 0             ADRES   HFLSHFLG

 0909   REF  30  LAST  884    33,3243  4 0107 0   NOREASON  CS      FLGWRD11
 0910   REF   1               33,3244  7 4744 0             MASK    LRINHBIT
 0911   REF 260  LAST  884    33,3245  10 000 0             CCS     A
 0912   REF   2  LAST  884    33,3246  1 3310 1             TCF     VMEASCHK     UPDATE INHIBITED - TEST VELOCITY ANYWAY

 0913   REF 159  LAST  885    33,3247  0 6037 0             TC      INTPRET      DO POSITION UPDATE
 0914                         33,3250   [illegible] 1             DLOAD   SR4
 0915   REF   9  LAST  88[illegible]    33,3251   03535 1                     HCALC        RESCALE H TO 2(28)M
 0916                         33,3252   77776 1             EXIT
 0917                         33,3253  0 0006 1             EXTEND
 0918   REF   6  LAST  884    33,3254  3 1665 0             DCA     DELTAH       STORE DELTAH IN MPAC AND
 0919   REF 345  LAST  878    33,3255  52 155 1             DXCH    MPAC         BRING HCALC INTO A,L
 0920   REF   1               33,3256  0 7544 0             TC      ALSIGNAG
 0921                         33,3257  0 0006 1             EXTEND               IF HIGH PART OF HCALC IS NON ZERO, THEN
 0922                         33,3260  1 3262 0             BZF     +2           HCALC > HMAX,
 0923   REF   3  LAST  885    33,3261  1 3310 1             TCF     VMEASCHK     SO UPDATE IS BYPASSED
 0924   REF 346  LAST  885    33,3262  54 156 1             TS      MPAC +2        FOR LATER SHORTMP

 0925   REF 137  LAST  874    33,3263  4 0001 1             CS      L            -H AT 2(14)M
 0926   REF   1               33,3264  6 1420 0             AD      LRHMAX       HMAX - H
 0927                         33,3265  0 0006 1             EXTEND
 0928   REF   4  LAST  885    33,3266  6 3310 0             BZMF    VMEASCHK     IF H >HMAX, BYPASS UPDATE
 0929                         33,3267  0 0006 1             EXTEND
 0930   REF   1               33,3270  7 1421 0             MP      LRWH         WH(HMAX - H)
 0931                         33,3271  0 0006 1             EXTEND
 0932   REF   2  LAST  885    33,3272  11'420 1             DV      LRHMAX       WH(1 - H/HMAX)
 0933   REF   4  LAST  462    33,3273  54 135 1             TS      MPTEMP
 0934   REF   1               33,3274  0 7313 1             TC      SHORTMP2     DELTAH (WH)(1 - H/HMAX) IN MPAC
 0935   REF 160  LAST  885    33,3275  0 6037 0             TC      INTPRET      MODE IS DP FROM ABOVE
 0936                         33,3276   77752 1             SL1
 0937                         33,3277   53361 0             VXSC    VAD
 0938   REF  37  LAST  884    33,3300   03537 0                     UNIT/R/      DELTAR = DH(WH)(1 - H/HMAX) UNIT/R/
 0939   REF  11  LAST  883    33,3301   03573 0                     R1S
 0940   REF   1               33,3302   37657 1             STCALL  GNUR
 0941   REF   7  LAST  882    33,3303   67130 1                     MUNGRAV
 0942                         33,3304   77776 1             EXIT
 0943   REF   8  LAST  882   33,3305   0 3552 0            TC       QUIKFAZ5

 0944   REF 163  LAST  878   33,3306   3 4755 1            CA       ZERO
 0945   REF   1              33,3307   0 3534 0  RUPDATED  TC       GNURVST

 0946   REF   9  LAST  886   33,3310   0 3552 0  VMEASCHK  TC       QUIKFAZ5       RESTART AT NEXT LOCATION
 0947   REF  31  LAST  885   33,3311   4 0107 0            CS       FLGWRD11
 0948   REF   1              33,3312   7 4745 1            MASK     VELDABIT       IS V READING AVAILABLE?
 0949   REF 261  LAST  885   33,3313  10 000 0             CCS      A
 0950   REF   1              33,3314   1 3514 0            TCF      VALTCHK        NO   SEE IF V READING TO BE TAKEN

 0951   REF   3  LAST  200   33,3315   4 1651 0  VELUPDAT  CS       VSELECT        PROCESS VELOCITY DATA
 0952   REF 138  LAST  885   33,3316  54 001 1             TS       L
 0953   REF 139  LAST  886   33,3317  26 001 1             ADS      L              -2 VSELECT IN L
 0954   REF 140  LAST  886   33,3320   6 0001 0            AD       L
 0955   REF 141  LAST  886   33,3321   6 0001 0            AD       L              -6 VSELECT IN A
 0956   REF  27  LAST  884   33,3322  50 120 1             INDEX    FIXLOC
 0957   REF  24  LAST  825   33,3323  52 047 0             DXCH     X1             X1 = -6 VSELECT, X2 = -2 VSELECT

 0958   REF   4  LAST  874   33,3324   3 4741 1            CA       EBANK4
 0959   REF  35  LAST  874   33,3325  54 003 0             TS       EBANK
 0960   REF   2  LAST  116   E4,1654                       EBANK=   LRXCDU

 0961   REF   2  LAST  116   33,3326   3 1655 0            CA       LRYCDU         STORE LRCDUS IN CDUSPOTS
 0962   REF  19  LAST  601   33,3327  54 766 1             TS       CDUSPOT
 0963   REF   2  LAST  116   33,3330   3 1656 0            CA       LRZCDU
 0964   REF  20  LAST  886   33,3331  54 770 0             TS       CDUSPOT +2
 0965   REF   3  LAST  886   33,3332   3 1654 1            CA       LRXCDU
 0966   REF  21  LAST  886   33,3333  54 772 1             TS       CDUSPOT +4

 0967   REF 244  LAST  879   33,3334   0 4616 1            TC       BANKCALL
 0968   REF   3  LAST  861   33,3335    47615 0            CADR     QUICTRIG       GET SINES AND COSINES FOR NBSM

 0969   REF  28  LAST  886   33,3336   3 0120 1            CA       FIXLOC
 0970   REF  10  LAST  884   33,3337  54 166 1             TS       PUSHLOC        SET PD TO ZERO

 0971   REF 161  LAST  885   33,3340   0 6037 0            TC       INTPRET
 0972                        33,3341    45173 0            VLOAD*   CALL
 0973   REF   2  LAST  116   33,3342    02231 0                     VZBEAMNB,1     CONVERT VBEAM FROM NB TO SM
 0974   REF   4  LAST  580   33,3343    47673 0                     *NBSM*
 0975                        33,3344    54325 1            PDDL     SL             STORE IN PD 0-5
 0976   REF   3  LAST  201   33,3345    03653 1                     VMEAS          LOAD VELOCITY MEASUREMENT
 0977                        33,3346    20215 0                     12D
 0978                        33,3347    41403 0            DMP*     PUSH           SCALE TO M/CS AT 2(6)
 0979   REF   1              33,3350    51764 0                     VZSCAL,2       AND STORE IN PD 6-7
 0980                        33,3351    77776 1            EXIT
 0981   REF  96  LAST  861   33,3352   4 4753 0            CS       ONE
 0982   REF  14  LAST  825   33,3353  54 163 1             TS       MODE           CHANGE STORE MODE TO VECTOR

 0983   REF   3  LAST  119   33,3354   3 1657 1            CA       PIPTEM         STORE DELV IN MPAC
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L          SERVICER                                                                              USER'S PAGE NO.  31       E4 S3

 0984                                  33,3355  22 007 0           ZL
 0985     REF 347  LAST  885           33,3356  52 155 1           DXCH     MPAC

 0986     REF   4  LAST  886           33,3357  3 1660 0           CA       PIPTEM +1
 0987                                  33,3360  22 007 0           ZL
 0988     REF 348  LAST  887           33,3361  52 160 1           DXCH     MPAC +3

 0989     REF   5  LAST  887           33,3362  3 1661 1           CA       PIPTEM +2
 0990                                  33,3363  22 007 0           ZL
 0991     REF 349  LAST  887           33,3364  52 162 0           DXCH     MPAC +5

 0992     REF   5  LAST  852           33,3365  3 5016 0           CA       EBANK7
 0993     REF  36  LAST  886           33,3366  54 003 0           TS       EBANK              RESTORE EBANK 7
 0994     REF  51  LAST  874           E7,1515                     EBANK=   DVCNTR
 0995     REF 162  LAST  886           33,3367  0 6037 0           TC       INTPRET
 0996                                  33,3370   65361 0           VXSC     PDDL
 0997     REF   5  LAST  880           33,3371   26022 0                    KPIP1              SCALE DELV TO 2(7) M/CS AND PUSH
 0998     REF   2  LAST  116           33,3372   02253 1                    LRVTIME            TIME OF DELV AT 2(28)CS
 0999                                  33,3373   56225 1           DSU      DDV
 1000     REF  21  LAST  870           33,3374   01235 1                    PIPTIME            TU - T(N-1)
 1001     REF   1                      33,3375   27151 1                    2SEC(28)
 1002                                  33,3376   76561 1           VXSC     VSL1               G(N-1)(TU - T(N-1))
 1003     REF  10  LAST  882           33,3377   01237 0                    GDT/2              SCALED AT 2(7) M/CS
 1004                                  33,3400   53255 0           VAD      VAD                PUSH UP FOR DELV
 1005     REF  18  LAST  883           33,3401   03527 1                    V                  VU = V(N-1) + DELVU + G(N-1) DTU
 1006                                  33,3402   53352 0           VSL2     VAD                SCALE TO 2(5) M/CS AND SUBTRACT
 1007     REF   5  LAST  884           33,3403   03734 1                    DELVS                          MOON ROTATION.
 1008                                  33,3404   51406 1           PUSH     ABVAL              STORE IN PD
 1009                                  33,3405   43202 0           SR4      DAD                ABS(VM)/8 + 7.5 AT 2(6)
 1010     REF   1                      33,3406   27145 1                    7.5
 1011                                  33,3407   24025 0           STOVL    20D                STORE IN 20D AND PICK UP VM
 1012                                  33,3410   44241 0           DOT      BDSU               V(EST) AT 2(6)
 1013                                  33,3411   00001 0                    0                  DELTAV = VMEAS - V(EST)
 1014                                  33,3412   51406 1           PUSH     ABS
 1015                                  33,3413   77425 1           DSU      EXIT               ABS(DV) - (7.5 + ABS(VM)/8))
 1016                                  33,3414   00025 0                    20D

 1017     REF   2  LAST  150           33,3415  25 672 0           INCR     LRMCTR
 1018     REF   3  LAST  885           33,3416  0 6723 1           TC       BRANCH
 1019     REF   1                      33,3417  1 3575 1           TCF      VFAIL              DELTA V TOO LARGE      ALARM
 1020     REF   2  LAST  887           33,3420  1 3575 1           TCF      VFAIL              DELTA V TOO LARGE      ALARM

 1021     REF  83  LAST  885           33,3421  0 5516 0           TC       DOWNFLAG           TURN OFF VEL FAIL LAMP
 1022     REF   1                      33,3422   00262 1           ADRES    VFLSHFLG

 1023     REF  32  LAST  886           33,3423  3 0107 1           CA       FLGWRD11
 1024     REF   1                      33,3424  7 4740 1           MASK     VXINHBIT
 1025                                  33,3425  0 0006 1           EXTEND
 1026     REF   1                      33,3426  1 3435 1           BZF      VUPDAT             IF VX INHIBIT RESET, INCORPORATE DATA.
 1027   REF  84  LAST  887   33,3427  0 5516 0              TC      DOWNFLAG
 1028   REF   1              33,3430   00250 0              ADRES   VXINH            RESET VX INHIBIT

 1029   REF   4  LAST  886   33,3431  3 1651 1              CA      VSELECT
 1030   REF   4  LAST  497   33,3432  6 7746 0              AD      NEG2             IF VSELECT = 2 (X AXIS),
 1031                        33,3433  0 0006 1              EXTEND                   BYPASS UPDATE
 1032   REF   1              33,3434  1 3514 0              BZF     ENDVDAT

 1033   REF  33  LAST  887   33,3435  4 0107 0  VUPDAT      CS      FLGWRD11
 1034   REF   2  LAST  885   33,3436  7 4744 0              MASK    LRINHBIT
 1035   REF 262  LAST  886   33,3437  10 000 0              CCS     A
 1036   REF   2  LAST  886   33,3440  1 3514 0              TCF     VALTCHK          UPDATE INHIBITED

 1037   REF 350  LAST  887   33,3441  54 155 1              TS      MPAC +1

 1038   REF   6  LAST  883   33,3442  3 1471 1              CA      ABVEL            STORE E7 ERASABLES NEEDED IN TEMPS
 1039   REF   1              33,3443  54 130 1              TS      ABVEL*
 1040   REF   5  LAST  888   33,3444  3 1651 1              CA      VSELECT
 1041   REF   1              33,3445  54 131 0              TS      VSELECT*
 1042   REF   9  LAST  825   33,3446  3 5014 1              CA      EBANK5
 1043   REF  37  LAST  887   33,3447  54 003 0              TS      EBANK            CHANGE EBANKS

 1044   REF   2  LAST  122   E5,1527                        EBANK=  LRVF
 1045   REF   3  LAST  888   33,3450  4 1527 1              CS      LRVF
 1046   REF   2  LAST  888   33,3451  6 0130 0              AD      ABVEL*           IF V < VF, USE WVF
 1047                        33,3452  0 0006 1              EXTEND
 1048   REF   1              33,3453  6 3466 0              BZMF    USEVF

 1049   REF   3  LAST  888   33,3454  4 0130 1              CS      ABVEL*
 1050   REF   2  LAST  122   33,3455  6 1526 1              AD      LRVMAX           VMAX - V
 1051                        33,3456  0 0006 1              EXTEND
 1052   REF   1              33,3457  6 3471 0              BZMF    WSTOR -1         IF V > VMAX, W = 0

 1053                        33,3460  0 0006 1              EXTEND
 1054   REF   2  LAST  888   33,3461  5 0131 1              INDEX   VSELECT*
 1055   REF   2  LAST  122   33,3462  7 1530 1              MP      LRWVZ            WV(VMAX - V)

 1056                        33,3463  0 0006 1              EXTEND
 1057   REF   3  LAST  888   33,3464  11 1526 0             DV      LRVMAX           WV( 1 - V/VMAX )
 1058   REF   2  LAST  888   33,3465  1 3472 1              TCF     WSTOR

 1059   REF   3  LAST  888   33,3466  50 131 1  USEVF       INDEX   VSELECT*
 1060   REF   2  LAST  122   33,3467  3 1533 0              CA      LRWVFZ           USE APPROPRIATE CONSTANT WEIGHT
 1061   REF   3  LAST  888   33,3470  1 3472 1              TCF     WSTOR

 1062   REF 164  LAST  [illegible]86   33,3471  3 4755 1  -1          CA      ZERO
 1063   REF 351  LAST  888   33,3472  54 155 0  WSTOR       TS      MPAC
 1064   REF  28  LAST  874   33,3473  4 4745 1              CS      BIT7             (=64D)
 1065   REF  18  LAST  835   33,3474  6 1011 0              AD      MODREG
 1066                        33,3475  0 0006 1              EXTEND
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1067                        33,3476  6 3501 0                BZMF     +3           IF IN P65,P66,P67, USE ANOTHER CONSTANT

1068  REF   2  LAST  122    33,3477  3 1536 0                CA       LRWVFF
1069  REF 352  LAST  888    33,3500  54 154 0                TS       MPAC

1070  REF  10  LAST  887    33,3501  3 5016 0  +3            CA       EBANK7
1071  REF  38  LAST  888    33,3502  54 003 0                TS       EBANK        CHANGE EBANKS

1072  REF   7  LAST  888    E7,1471                          EBANK=   ABVEL
1073  REF 163  LAST  887    33,3503  0 6037 0                TC       INTPRET
1074                        33,3504   74205 0                DMP      VXSC         W(DELTA V)(VBEAMSM)  UP 6-7, 0-5
1075                        33,3505   77655 1                VAD
1076  REF  14  LAST  884    33,3506   03601 0                         V1S          ADD WEIGHTED DELTA V TO VELOCITY
1077  REF   1               33,3507   03657 0                STORE    GNUV
1078                        33,3510   77776 1                EXIT

1079  REF  10  LAST  886    33,3511  0 3552 0                TC       QUIKFAZ5     DO NOT RE-UPDATE

1080  REF  18  LAST  878    33,3512  3 6242 0                CA       SIX
1081  REF   2  LAST  886    33,3513  0 3534 0  VUPDATED      TC       GNURVST      STORE NEW VELOCITY VECTOR
1082  REF   3  LAST  888    33,3514            ENDVDAT       =        VALTCHK

1083  REF  11  LAST  889    33,3514  0 3552 0  VALTCHK       TC       QUIKFAZ5     DO NOT REPEAT ABOVE

1084  REF   1               33,3515  3 4747 1                CAF      READVBIT     TEST READVEL TO SEE IF VELOCITY READING
1085  REF  34  LAST  888    33,3516  7 0107 0                MASK     FLGWRD11     IS DESIRED.
1086  REF 263  LAST  888    33,3517  10 000 0                CCS      A
1087  REF   1               33,3520  1 3527 0                TCF      READV        YES - READ VELOCITY
1088  REF   8  LAST  889    33,3521  4 1471 0                CS       ABVEL        NO - SEE IF VELOCITY < 2000 FT/SEC
1089  REF   1               33,3522  6 2707 0                AD       2KFT/SEC
1090                        33,3523  0 0006 1                EXTEND
1091  REF   6  LAST  884    33,3524  6 2540 1                BZMF     CONTSERV     V > 2000 FT/SEC   DO NOT READ VEL

1092  REF  59  LAST  879    33,3525  0 5504 0                TC       UPFLAG       V < 2000 FT/SEC   SET READVEL AND READ
1093  REF   1               33,3526   00257 1                ADRES    READVEL

1094  REF   3  LAST  873    33,3527  3 7720 0  READV         CAF      PRIO32       SET UP JOB TO READ VELOCITY BEAMS.
1095  REF  24  LAST  872    33,3530  0 5072 1                TC       NOVAC
1096  REF   6  LAST  884    E7,1654                          EBANK=   HMEAS
1097  REF   1               33,3531   03616 0                2CADR    LRVJOB
1097  REF   1               33,3532   66067 0
1098  REF   7  LAST  889    33,3533  1 2540 0                TCF      CONTSERV     CONTIMUE WITH SERVICER


1099  REF  78  LAST  856    33,3534  54 130 1  GNURVST       TS       BUF          STORE GNUR (=GNUV) IN R1S OR V1S
1100                        33,3535  0 0006 1                EXTEND                A = 0 FOR R, A = 6 FOR V
1101  REF   2  LAST  885    33,3536  3 1657 1                DCA      GNUR
1102  REF  79  LAST  889    33,3537  50 130 0                INDEX    BUF
1103  REF  12  LAST  885    33,3540  53 573 0                DXCH     R1S
1104                        33,3541  0 0006 1                EXTEND
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 1105   REF   3  LAST  889   33,3542  3 1661 1              DCA      GNUR  +2
 1106   REF  80  LAST  889   33,3543  50 130 0              INDEX    BUF
 1107   REF  13  LAST  889   33,3544  53'575 0              DXCH     R1S   +2
 1108                        33,3545  0 0006 1              EXTEND
 1109   REF   4  LAST  890   33,3546  3 1663 0              DCA      GNUR  +4
 1110   REF  81  LAST  890   33,3547  50 130 0              INDEX    BUF
 1111   REF  14  LAST  890   33,3550  53'577 1              DXCH     R1S   +4
 1112   REF 215  LAST  872   33,3551  0 0002 0              TC       Q


 1113   REF   3  LAST  826   33,3552  3 5007 0  QUIKFAZ5   CA       EBANK3
 1114   REF  39  LAST  889   33,3553  56 003 1              XCH      EBANK              SET EBANK 3
 1115   REF 142  LAST  886   33,3554  52 002 1              DXCH     L                  Q TO A, A TO L
 1116   REF   1              E3,1446                        EBANK=   PHSNAME5
 1117   REF   2  LAST  890   33,3555  55'446 1              TS       PHSNAME5
 1118   REF  40  LAST  890   33,3556  22 003 1              LXCH     EBANK
 1119   REF  52  LAST  887   E7,1515                        EBANK=   DVCNTR
 1120   REF 264  LAST  889   33,3557  0 0000 1              TC       A


 1121   REF   2  LAST  150   33,3560  4 1671 1  HFAIL       CS       LRRCTR
 1122                        33,3561  0 0006 1              EXTEND
 1123   REF   1              33,3562  1 3572 0              BZF      NORLITE            IF R = 0, DO NOT TURN ON TRK FAIL
 1124   REF   3  LAST  885   33,3563  6 1670 1              AD       LRLCTR
 1125   REF   1              33,3564  7 7745 1              MASK     NEG3
 1126                        33,3565  0 0006 1              EXTEND                      IF L-R LT 4, DO NOT TURN ON TRK FAIL
 1127                        33,3566  1 3570 1              BZF      +2
 1128   REF   2  LAST  890   33,3567  1 3572 0              TCF      NORLITE

 1129   REF  60  LAST  889   33,3570  0 5504 0              TC       UPFLAG             AND SET BIT TO TURN ON TRACKER FAIL LITE
 1130   REF   2  LAST  885   33,3571   00263 0              ADRES    HFLSHFLG

 1131   REF   4  LAST  890   33,3572  3 1670 1  NORLITE     CA       LRLCTR
 1132   REF   3  LAST  890   33,3573  55'671 1              TS       LRRCTR             SET R = L

 1133   REF   5  LAST  885   33,3574  1 3310 1              TCF      VMEASCHK


 1134   REF   2  LAST  150   33,3575  4 1673 0  VFAIL       CS       LRSCTR                DELTA Q LARGE
 1135                        33,3576  0 0006 1              EXTEND                       IF S = 0, DO NOT TURN ON TRACKER FAIL
 1136   REF   1              33,3577  1 3607 1              BZF      NOLITE
 1137   REF   3  LAST  887   33,3600  6 1672 0              AD       LRMCTR                M-S
 1138   REF   2  LAST  890   33,3601  7 7745 1              MASK     NEG3                  TEST FOR M-S > 3
 1139                        33,3602  0 0006 1              EXTEND                       IF M-S > 3, THEN TWO OR MORE OF THE
 1140                        33,3603  1 3605 0              BZF      +2                      LAST FOUR V READINGS WERE BAD,
 1141   REF   2  LAST  890   33,3604  1 3607 1              TCF      NOLITE                  SO TURN ON VELOCITY FAIL LIGHT

 1142   REF  61  LAST  890   33,3605  0 5504 0              TC       UPFLAG             AND SET BIT TO TURN ON TRACKER FAIL LITE
 1143   REF   2  LAST  887   33,3606   00262 1              ADRES    VFLSHFLG
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  1144     REF   4  LAST  890    33,3607  3 1672 0  NOLITE     CA      LRMCTR          SET S = M
  1145     REF   3  LAST  890    33,3610  55'673 0             TS      LRSCTR

  1146     REF   6  LAST  888    33,3611  11'651 0             CCS     VSELECT         TEST FOR Z COMPONENT
  1147     REF   2  LAST  888    33,3612  1 3514 0             TCF     ENDVDAT         NOT Z, DO NOT SET VX INHIBIT

  1148     REF  62  LAST  890    33,3613  0 5504 0             TC      UPFLAG          Z COMPONENT - SET FLAG TO SKIP X
  1149     REF   2  LAST  888    33,3614   00250 0             ADRES   VXINH           COMPONENT,AS ERROR MAY BE DUE TO CROSS
  1150     REF   3  LAST  891    33,3615  1 3514 0             TCF     ENDVDAT         LOBE LOCK UP NOT DETECTED ON X AXIS.
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P1151         ******************************************************************************************************
R1153            LRVJOB IS SET WHEN THE LEM IS BELOW 15000 FT DURING THE LANDING PHASE
R1154            THIS JOB INITIALIZES THE LANDING RADAR READ ROUTINE FOR 5 VELOCITY
R1155            SAMPLES AND GOES TO SLEEP WHILE THE SAMPLING IS DONE-ABOUT 500 MS.
R1156            WITH A GOODEND RETURN THE DATA IS STORED IN VMEAS AND BIT7 OF LRSTAT
R1157            IS SET.  THE GIMBAL ANGLES ARE READ ABOUT MIDWAY IN THE SAMPLING .

 1158    REF   6  LAST  447       4361                 170MS     EQUALS NO1


 1159    REF   1                33,3616  3 4361 1  LRVJOB   CA       170MS           SET TASK TO READ CDUS + PIPAS
 1160    REF  36  LAST  859     33,3617  0 5203 0           TC       WAITLIST
 1161    REF   3  LAST  887     E4,1652                     EBANK=   LRVTIME
 1162    REF   1                33,3620   03757 1           2CADR    RDGIMS
 1162    REF   1                33,3621   70064 1
 1163    REF   7  LAST  891     33,3622  11'651 0           CCS      VSELECT         SEQUENCE LR VEL BEAM SELECTOR
 1164                           33,3623  1 3625 1           TCF      +2
 1165    REF  55  LAST  878     33,3624  3 4752 0           CAF      TWO             IF ZERO-RESET TO TWO
 1166                           33,3625  6 0000 1           DOUBLE                   2XVSELECT USED FOR VBEAM INDEX IN LRVEL
 1167    REF 245  LAST  886     33,3626  0 4616 1           TC       BANKCALL        GO INITIALIZE LR VEL READ ROUTINE
 1168    REF   1                33,3627   53107 1           CADR     LRVEL
 1169    REF 246  LAST  892     33,3630  0 4616 1           TC       BANKCALL        PUT LRVJOB TO SLEEP ABOUT 500 MS
 1170    REF  13  LAST  606     33,3631   17714 0           CADR     RADSTALL
 1171    REF   1                33,3632  1 3665 0           TCF      VBAD
 1172    REF   2  LAST  150     33,3633  11'675 0           CCS      STILBADV        IS DATA GOOD JUST PRESENT?
 1173    REF   1                33,3634  1 3666 0           TCF      VSTILBAD        JUST GOOD - MUST WAIT 4 SECONDS.

 1174                           33,3635  0 0004 0           INHINT
 1175                           33,3636  0 0006 1           EXTEND                   GOOD RETURN-STOW AWAY VMEAS
 1176    REF   8  LAST  570     33,3637  3 1102 0           DCA      SAMPLSUM
 1177    REF   4  LAST  886     33,3640  53'653 1           DXCH     VMEAS
 1178    REF   5  LAST  886     33,3641  3 4741 1           CA       EBANK4          FOR DOWNLINK
 1179    REF  41  LAST  890     33,3642  54 0003 0          TS       EBANK
 1180    REF   4  LAST  892     E4,1652                     EBANK=   LRVTIME

 1181                           33,3643  0 0006 1           EXTEND
 1182    REF   5  LAST  892     33,3644  3 1653 0           DCA      LRVTIME
 1183    REF   2  LAST  200     33,3645  53'740 1           DXCH     LRVTIMDL
 1184                           33,3646  0 0006 1           EXTEND
 1185    REF   4  LAST  886     33,3647  3 1655 0           DCA      LRXCDU
 1186    REF   3  LAST  201     33,3650  53'735 0           DXCH     LRXCDUDL
 1187    REF   3  LAST  886     33,3651  3 1656 0           CA       LRZCDU
 1188    REF   3  LAST  200     33,3652  55'736 0           TS       LRZCDUDL
 1189    REF  11  LAST  889     33,3653  3 5016 0           CA       EBANK7
 1190    REF  42  LAST  892     33,3654  54 0003 0          TS       EBANK
 1191    REF   8  LAST  892     E7,1651                     EBANK=   VSELECT


 1192    REF  35  LAST  889     33,3655  4 0107 0           CS       FLGWRD11        SET BIT TO INDICATE VELOCITY
 1193    REF   2  LAST  886     33,3656  7 4745 1           MASK     VELDABIT        MEASUREMENT MADE.
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  1194   REF  36   LAST  892     33,3657   26 107 0               ADS      FLGWRD11
  1195   REF   9   LAST  892     33,3660   11'651 0   ENDLRV      CCS      VSELECT            UPDATE VSELECT
  1196                           33,3661   1 3663 0               TCF      +2
  1197   REF  56   LAST  892     33,3662   3 4752 0               CA       TWO
  1198   REF  10   LAST  893     33,3663   55'651 0               TS       VSELECT
  1199   REF 134   LAST  867     33,3664   1 5155 1               TCF      ENDOFJOB

  1200   REF  57   LAST  893     33,3665   3 4752 0   VBAD        CAF      TWO                SET STILBAD TO WAIT 4 SECONDS
  1201   REF   3   LAST  892     33,3666   55'675 0   VSTILBAD    TS       STILBADV
  1202   REF   1                 33,3667   1 3660 0               TCF      ENDLRV

R1203    LRHJOB IS SET BY LRHTASK WHEN LEM IS BELOW 25000 FT.  THIS JOB
R1204    INITIALIZES THE LR READ ROUTINE FOR AN ALT MEASUREMENT AND GOES TO
R1205    SLEEP WHILE THE SAMPLING IS DONE-ABOUT 95 MS.  WITH A GOODEND RETURN
R1206    THE ALT DATA IS STORED IN HMEAS AND BIT7 OF LRSTAT IS SET.

  1207                           34,3716                          BANK     34
  1208   REF   1                 34,2000                          SETLOC   R12STUFF
  1209                           34,3716                          BANK

  1210   REF   1                                                  COUNT*   $$/SERV

  1211   REF 247   LAST  892     34,3716   0 4616 1   LRHJOB      TC       BANKCALL           INITIATE LR ALT MEASUREMENT
  1212   REF   2   LAST  491     34,3717    53073 0               CADR     LRALT
  1213   REF 248   LAST  893     34,3720   0 4616 1               TC       BANKCALL           LRHJOB TO SLEEP ABOUT 95MS
  1214   REF  14   LAST  892     34,3721    17714 0               CADR     RADSTALL
  1215   REF   1                 34,3722   1 3745 0               TCF      HBAD
  1216   REF   2   LAST  150     34,3723   11'674 1               CCS      STILBADH           IS DATA GOOD JUST PRESENT?
  1217   REF   1                 34,3724   1 3755 1               TCF      HSTILBAD           JUST GOOD - MUST WAIT 4 SECONDS.

  1218                           34,3725   0 0004 0               INHINT
  1219                           34,3726   0 0006 1               EXTEND
  1220   REF   9   LAST  892     34,3727   3 1102 0               DCA      SAMPLSUM           GOOD RETURN-STORE AWAY LRH DATA
  1221   REF   7   LAST  889     34,3730   53'655 1               DXCH     HMEAS              LRH DATA 1.079 FT/BIT
  1222                           34,3731   0 0006 1               EXTEND                      FOR DOWNLINK
  1223   REF  10   LAST  870     34,3732   3 1561 1               DCA      PIPTIME1
  1224   REF   8   LAST  606     34,3733   53'755 0               DXCH     MKTIME

  1225                           34,3734   0 0006 1               EXTEND
  1226   REF   3   LAST  872     34,3735   3 1157 0               DCA      CDUTEMPY           CDUY,Z = AIG,AMG
  1227   REF   9   LAST  606     34,3736   53'460 0               DXCH     AIG

  1228   REF   3   LAST  872     34,3737   3 1155 1               CA       CDUTEMPX           CDUX = AOG
  1229   REF   7   LAST  606     34,3740   55'461 1               TS       AOG

  1230   REF  37   LAST  893     34,3741   4 0107 0               CS       FLGWRD11           SET BIT TO INDICATE RANGE
  1231   REF   2   LAST  884     34,3742   7 4750 0               MASK     RNGEDBIT           MEASUREMENT MADE.
  1232   REF  38   LAST  893     34,3743   26 107 0               ADS      FLGWRD11
  1233   REF 135   LAST  893     34,3744   0 5155 0   ENDLRH      TC       ENDOFJOB           TERMINATE LRHJOB
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 1234   REF  26  LAST  831    34,3745  3 0101 1  HBAD       CA      FLAGWRD5
 1235   REF   2  LAST  571    34,3746  7 4742 0             MASK    RNGSCBIT          IS BAD RETURN DUE TO SCALE CHANGE?
 1236                         34,3747  0 0006 1             EXTEND
 1237   REF   2  LAST  893    34,3750  1 3754 0             BZF     HSTILBAD -1       NO     RESET HSTILBAD
 1238   REF  85  LAST  888    34,3751  0 5516 0             TC      DOWNFLAG          YES    RESET SCALE CHANGE BIT AND IGNORE
 1239   REF   4  LAST  606    34,3752   00120 1             ADRES   RNGSCFLG
 1240   REF 136  LAST  893    34,3753  0 5155 0             TC      ENDOFJOB


 1241   REF  58  LAST  893    34,3754  3 4752 0             CAF     TWO               SET STILBAD TO WAIT 4 SECONDS
 1242   REF   3  LAST  893    34,3755  55'674 1  HSTILBAD   TS      STILBADH
 1243   REF 137  LAST  894    34,3756  0 5155 0             TC      ENDOFJOB

 1244                         34,3757                       BANK    34
 1245   REF   1               34,2000                       SETLOC  SERV4
 1246                         34,3757                       BANK

 1247   REF   2 LAST  893 TO  894:      33     33*          COUNT*  $$/SERV

R1248     RDGIMS  IS A TASK SET UP BY LRVJOB TO PICK UP THE IMU CDUS AND TIME
R1249     AT ABOUT THE MIDPOINT OF THE LR VEL READ ROUTINE WHEN 5 VEL SAMPLES
R1250     ARE SPECIFIED.

 1251   REF   6  LAST  892    E4,1652                       EBANK=  LRVTIME
 1252                         34,3757  0 0006 1  RDGIMS     EXTEND
 1253   REF  27  LAST  870    34,3760  3 0025 0             DCA     TIME2             PICK UP TIME2,TIME1
 1254   REF   7  LAST  894    34,3761  53'653 1             DXCH    LRVTIME              AND SAVE IN LRVTIME

 1255                         34,3762  0 0006 1             EXTEND
 1256   REF  14  LAST  870    34,3763  3 0033 1             DCA     CDUX              PICK UP CDUX AND CDUY
 1257   REF   5  LAST  892    34,3764  53'655 1             DXCH    LRXCDU               AND SAVE IN LRXCDU AND LRYCDU

 1258   REF   8  LAST  870    34,3765  3 0034 0             CA      CDUZ
 1259   REF   4  LAST  892    34,3766  55'656 1             TS      LRZCDU            SAVE CDUZ IN LRZCDU

 1260   REF  12  LAST  871    34,3767  3 0037 0             CA      PIPAX
 1261   REF   6  LAST  887    34,3770  55'657 0             TS      PIPTEM            SAVE PIPAX IN PIPTEM

 1262                         34,3771  0 0006 1             EXTEND
 1263   REF   3  LAST  384    34,3772  3 0041 1             DCA     PIPAY             PICK UP PIPAY AND PIPAZ
 1264   REF   7  LAST  894    34,3773  53'661 0             DXCH    PIPTEM +1            AND SAVE IN PIPTEM +1 AND PIPTEM +2
 1265   REF  60  LAST  859    34,3774  0 5261 1             TC      TASKOVER

 1266                         33,3670                       BANK    33
 1267   REF   8  LAST  873    33,2000                       SETLOC  SERVICES
 1268                         33,3670                       BANK

 1269   REF   8 LAST  873 TO  893:     657    855*          COUNT*  $$/SERV

 1270   REF  53  LAST  890    E7,1515                       EBANK=  DVCNTR
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R1271       HIGATJOB IS SET APPROXIMATELY 6 SECONDS PRIOR TO HIGH GATE DURING
R1272       THE DESCENT BURN PHASE OF LUNAR LANDING.  THIS JOB INITIATES THE
R1273       LANDING RADAR REPOSITIONING ROUTINE AND GOES TO SLEEP UNTIL THE
R1274       LR ANTENNA MOVES FROM POSITION 1 TO POSITION 2.  IF THE LR ANTENNA
R1275       ACHIEVES POSITION 2 WITHIN 22 SECONDS THE ALTITUDE AND VELOCITY
R1276       BEAM VECTORS  ARE RECOMPUTED TO REFLECT THE NEW ORIENTATION WITH
R1277       RESPECT TO THE NB.  BIT10 OF LRSTAT IS CLEARED TO ALLOW LR
R1278       MEASUREMENTS AND THE JOB TERMINATES.

 1279   REF 249  LAST  893   33,3670  0 4616 1  HIGATJOB TC      BANKCALL       START LRPOS2 JOB
 1280   REF   2  LAST  265   33,3671   53471 0           CADR    LRPOS2
 1281   REF 250  LAST  895   33,3672  0 4616 1           TC      BANKCALL       PUT HIGATJOB TO SLEEP UNTIL JOB IS DONE
 1282   REF  15  LAST  893   33,3673   17714 0           CADR    RADSTALL
 1283   REF   1              33,3674  1 3703 1           TCF     POSALARM       BAD END   ALARM

 1284   REF   2  LAST  257   33,3675  3 7711 1  POSGOOD  CA      PRIO23         REDUCE PRIORITY FOR INTERPRETIVE COMPS.
 1285   REF  13  LAST  757   33,3676  0 5146 1           TC      PRIOCHNG

 1286   REF   1              33,3677  0 3737 1           TC      SETPOS2        LR IN POS2 - SET UP TRANSFORMATIONS

 1287   REF  86  LAST  894   33,3700  0 5516 0           TC      DOWNFLAG
 1288   REF   1              33,3701   00252 1           ADRES   NOLRREAD       RESET NOLRREAD FLAG TO ENABLE LR READING
 1289   REF 138  LAST  894   33,3702  0 5155 0           TC      ENDOFJOB

 1290   REF   1              33,3703  3 3720 1  POSALARM CA      OCT523
 1291   REF 251  LAST  895   33,3704  0 4616 1           TC      BANKCALL
 1292   REF   7  LAST  514   33,3705   21532 0           CADR    PRIOLARM       FLASH ALARM CODE
 1293   REF  37  LAST  854   33,3706  1 6001 1           TCF     GOTOPOOH       TERMINATE
 1294                        33,3707  1 3712 1           TCF     +3             PROCEED - TRY AGAIN
 1295   REF 139  LAST  895   33,3710  1 5155 1           TCF     ENDOFJOB       V 32 E    TERMINATE R12
 1296   REF 140  LAST  895   33,3711  0 5155 0           TC      ENDOFJOB

 1297   REF  29  LAST  888   33,3712  3 47[illegible] 0  +3       CA      BIT7           SEE IF IN POS2 YET
 1298                        33,3713  0 0006 1           EXTEND
 1299   REF  23  LAST  874   33,3714  02 033 0           RAND    CHAN33
 1300                        33,3715  0 0006 1           EXTEND
 1301   REF   1              33,3716  1 3675 1           BZF     POSGOOD        POS2 ACHIEVED   SET UP ANTENNA BEAMS
 1302   REF   2  LAST  895   33,3717  1 3703 1           TCF     POSALARM       STILL DIDN'T MAKE IT   REALARM

 1303                        33,3720   00523 0  OCT523   OCT     523


 1304   REF  11  LAST  748   33,3721  0 4645 1  SETPOS1  TC      MAKECADR       MUST BE CALLED BY BANKCALL
 1305   REF   1              33,3722  55'656 1           TS      LRADRET1       SAVE RETURN CADR, SINCE BUF2 CLOBBERED

 1306   REF  59  LAST  894   33,3723  3 4752 0           CAF     TWO
 1307   REF   4  LAST  894   33,3724  55'674 1           TS      STILBADH       INITIALIZE STILBAD
 1308   REF   4  LAST  893   33,3725  55'675 0           TS      STILBADV       INITIALIZE STILBAD

 1309   REF 165  LAST  888   33,3726  3 4755 1           CA      ZERO           INDEX FOR LRALPHA,LRBETA IN POS 1.
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1310   REF   5  LAST  890   33,3727  55'670 0              TS      LRLCTR          SET L,M,R, ANS S TO ZERO
1311   REF   5  LAST  891   33,3730  55'672 1              TS      LRMCTR
1312   REF   4  LAST  890   33,3731  55'671 1              TS      LRRCTR
1313   REF   4  LAST  891   33,3732  55'673 0              TS      LRSCTR
1314   REF  11  LAST  893   33,3733  55'651 0              TS      VSELECT         INITIALIZE VSELECT

1315   REF   1              33,3734  0 3740 1              TC      SETPOS          CONTINUE WITH COMPUTATIONS

1316   REF   2  LAST  895   33,3735  3 1656 0              CA      LRADRET1
1317   REF  15  LAST  864   33,3736  0 4640 1              TC      BANKJUMP        RETURN TO CALLER


1318   REF  60  LAST  895   33,3737  3 4752 0    SETPOS2   CA      TWO             INDEX FOR POS2
1319   REF 216  LAST  890   33,3740  56 002 0    SETPOS    XCH     Q               SAVE INDEX IN Q
1320   REF   2  LAST  149   33,3741  55'650 1              TS      LRADRET         SAVE RETURN

1321   REF  10  LAST  88[illegible]   33,3742  3 5014 1              CA      EBANK5
1322   REF  43  LAST  892   33,3743  54 003 0              TS      EBANK
1323   REF   2  LAST  122   E5,1522                        EBANK=  LRALPHA

1324                        33,3744  0 0006 1              EXTEND
1325   REF 217  LAST  896   33,3745  5 0002 0              INDEX   Q
1326   REF   3  LAST  896   33,3746  3 1523 1              DCA     LRALPHA         LRALPHA IN A, LRBETA IN L
1327   REF  22  LAST  886   33,3747  54 772 1              TS      CDUSPOT +4      ROTATION ABOUT X
1328   REF  23  LAST  896   33,3750  22 766 0              LXCH    CDUSPOT         ROTATION ABOUT Y
1329   REF 166  LAST  895   33,3751  3 4755 1              CA      ZERO
1330   REF  24  LAST  896   33,3752  54 770 0              TS      CDUSPOT +2      ZERO ROTATION ABOUT Z.

1331   REF  12  LAST  892   33,3753  3 5016 0              CA      EBANK7
1332   REF  44  LAST  896   33,3754  54 003 0              TS      EBANK
1333   REF   3  LAST  896   E7,1650                        EBANK=  LRADRET

1334   REF 164  LAST  889   33,3755  0 6037 0              TC      INTPRET
1335                        33,3756   45175 0              VLOAD   CALL
1336   REF   5  LAST  786   33,3757   06516 0                      UNITY           CONVERT UNITY(ANTENNA) TO NB
1337   REF   2  LAST  571   33,3760   47651 0                      TRG*SMNB
1338   REF   2  LAST  116   33,3761   26237 0              STOVL   VYBEAMNB
1339   REF  11  LAST  818   33,3762   06520 0                      UNITX           CONVERT UNITX(ANTENNA) TO NB
1340                        33,3763   77624 1              CALL
1341   REF   4  LAST  548   33,3764   47671 1                      *SMNB*
1342   REF   2  LAST  116   33,3765   02245 0              STORE   VXBEAMNB
1343                        33,3766   76435 1              VXV     VSL1
1344   REF   3  LAST  896   33,3767   02237 0                      VYBEAMNB
1345   REF   3  LAST  886   33,3770   26231 0              STOVL   VZBEAMNB        Z = X * Y
1346   REF   1              33,3771   26003 0                      HBEAMANT
1347                        33,3772   77624 1              CALL
1348   REF   5  LAST  896   33,3773   47671 1                      *SMNB*          CONVERT TO NB
1349   REF   2  LAST  884   33,3774   02273 0              STORE   HBEAMNB
1350                        33,3775   77776 1              EXIT
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 1351   REF   4  LAST  896   33,3776  0 1650 0           TC       LRADRET
 0001                           21,2154                            BANK     21
 0002   REF    3  LAST  872     21,2000                            SETLOC R10
 0003                           21,2154                            BANK

 0004   REF   38  LAST  885     E7,1536                            EBANK=  UNIT/R/
 0005   REF    2 LAST    42 TO   42:       6       6*              COUNT*  $$/R10

 0006   REF    2  LAST  829     21,2154  23'714 1  LANDISP         LXCH    PIPCTR1          UPDATE TBASE2 AND PIPCTR SIMULTANEOUSLY.
 0007   REF   13  LAST  859     21,2155  4 0025 1                  CS      TIME1
 0008   REF    4  LAST  858     21,2156  53'056 1                  DXCH    TBASE2

 0009   REF   25  LAST  865     21,2157  4 0103 1                  CS      FLAGWRD7         IS LANDING ANALOG DISPLAYS FLAG SET?
 0010   REF    3  LAST  740     21,2160  7 4741 0                  MASK    SWANDBIT
 0011   REF  265  LAST  890     21,2161  10 000 0                  CCS     A
 0012   REF    1                21,2162  1 3053 0                  TCF     DISPRSET         NO.
 0013   REF   29  LAST  829     21,2163  3 1303 0                  CA      IMODES33         BIT 7 = 0 (DO ALTRATE), =1 (DO ALT.)
 0014   REF   30  LAST  895     21,2164  7 4745 1                  MASK    BIT7
 0015   REF  266  LAST  898     21,2165  10 000 0                  CCS     A
 0016   REF    1                21,2166  1 2240 1                  TCF     ALTOUT
 0017   REF    1                21,2167  0 2324 0  ALTROUT         TC      DISINDAT         CHECK MODE SELECT SWITCH AND DIDFLG.
 0018   REF   30  LAST  898     21,2170  4 1303 1                  CS      IMODES33
 0019   REF   31  LAST  898     21,2171  7 4745 1                  MASK    BIT7
 0020   REF   31  LAST  898     21,2172  27'303 1                  ADS     IMODES33         ALTERNATE ALTITUDE RATE WITH ALTITUDE.
 0021   REF   39  LAST  821     21,2173  3 4752 0                  CAF     BIT2             RATE COMMAND IS EXECUTED BEFORE RANGE.
 0022                           21,2174  0 0006 1                  EXTEND
 0023   REF   12  LAST  836     21,2175  05 014 1                  WOR     CHAN14           ALTRATE (BIT2 = 1), ALTITUDE (BIT2 = 0).
 0024   REF    6  LAST  877     21,2176  3 1743 0  ARCOMP          CA      RUNIT            COMPUTE ALTRATE=RUNIT.VVECT M/CS *2(-6).
 0025                           21,2177  0 0006 1                  EXTEND
 0026   REF    2  LAST  151     21,2200  7 1706 0                  MP      VVECT            MULTIPLY X-COMPONENTS.
 0027   REF   24  LAST  817     21,2201  56 070 0                  XCH     RUPTREG1         SAVE SINGLE PRECISION RESULT M/CS*2(-6).
 0028   REF    7  LAST  898     21,2202  3 1744 1                  CA      RUNIT +1         MULTIPLY Y-COMPONENTS.
 0029                           21,2203  0 0006 1                  EXTEND
 0030   REF    3  LAST  898     21,2204  7 1707 1                  MP      VVECT +1
 0031   REF   25  LAST  898     21,2205  26 070 1                  ADS     RUPTREG1         ACCUMULATE PARTIAL PRODUCTS.
 0032   REF    8  LAST  898     21,2206  3 1745 0                  CA      RUNIT +2         MULTIPLY Z-COMPONENTS.
 0033                           21,2207  0 0006 1                  EXTEND
 0034   REF    4  LAST  898     21,2210  7 1710 1                  MP      VVECT +2
 0035   REF   26  LAST  898     21,2211  26 070 1                  ADS     RUPTREG1         ALTITUDE RATE IN M/CS *2(-6).
 0036   REF    1                21,2212  3 2000 0                  CA      ARCONV           CONVERT ALTRATE TO BIT UNITS (.5FPS/BIT)
 0037                           21,2213  0 0006 1                  EXTEND
 0038   REF   27  LAST  898     21,2214  7 0070 1                  MP      RUPTREG1
 0039                           21,2215  20 001 1                  DDOUBL
 0040                           21,2216  20 001 1                  DDOUBL
 0041   REF   28  LAST  898     21,2217  56 070 0                  XCH     RUPTREG1         ALTITUDE RATE IN BIT UNITS*2(-14).
 0042   REF    3  LAST  877     21,2220  3 1716 0                  CA      DALTRATE         ALTITUDE RATE COMPENSATION FACTOR.
 0043                           21,2221  0 0006 1                  EXTEND
 0044   REF    2  LAST  151     21,2222  7 1715 1                  MP      DT
 0045   REF   29  LAST  898     21,2223  6 0070 0                  AD      RUPTREG1
 0046   REF    2  LAST  151     21,2224  55'711 0                  TS      ALTRATE          ALTITUDE RATE IN BIT UNITS*2(-14).
 0047   REF    3  LAST  898     21,2225  4 1711 0                  CS      ALTRATE
 0048                              21,2226   0 0006 1              EXTEND              CHECK POLARITY OF ALTITUDE RATE.
 0049                              21,2227   6 2231 0              BZMF     +2
 0050   REF   1                    21,2230   1 2233 0              TCF      DATAOUT    NEGATIVE - SEND POS. PULSES TO ALTM REG.
 0051   REF   4   LAST   898       21,2231   3 1711 1              CA       ALTRATE    POSITIVE OR ZERO - SET SIGN BIT = 1 AND
 0052   REF  32   LAST   532       21,2232   6 4735 1              AD       BIT15      SEND TO ALTM REGISTER. *DO NOT SEND +0*
 0053   REF   1                    21,2233  54 0060 0   DATAOUT    TS       ALTM       ACTIVATE THE LANDING ANALOG DISPLAYS - -
 0054   REF  31   LAST   725       21,2234   3 4751 0              CAF      BIT3
 0055                              21,2235   0 0006 1              EXTEND
 0056   REF  13   LAST   898       21,2236  05 0014 1              WOR      CHAN14     BIT3 DRIVES THE ALT/ALTRATE METER.
 0057   REF  61   LAST   894       21,2237   1 5261 0              TCF      TASKOVER   EXIT

 0058   REF   2   LAST   898       21,2240   0 2324 0   ALTOUT     TC       DISINDAT   CHECK MODE SELECT SWITCH AND DIDFLG.
 0059   REF  32   LAST   898       21,2241   4 4745 1              CS       BIT7
 0060   REF  32   LAST   898       21,2242   7 1303 1              MASK     IMODES33
 0061   REF  33   LAST   899       21,2243  55'303 1               TS       IMODES33   ALTERNATE ALTITUDE RATE WITH ALTITUDE.
 0062   REF  40   LAST   898       21,2244   4 4752 1              CS       BIT2
 0063                              21,2245   0 0006 1              EXTEND
 0064   REF  14   LAST   899       21,2246  03 0014 1              WAND     CHAN14
 0065   REF   3   LAST   876       21,2247  11'741 0               CCS      ALTBITS    =-1 IF OLD ALT. DATA TOBE EXTRAPOLATED.
 0066                              21,2250   1 2254 1              TCF      +4
 0067                              21,2251   1 2254 1              TCF      +3
 0068   REF   1                    21,2252   1 2272 0              TCF      OLDDATA
 0069   REF   4   LAST   899       21,2253  55'741 0               TS       ALTBITS    SET ALTBITS FROM -0 TO +0.
 0070   REF  97   LAST   886       21,2254   4 4753 0              CS       ONE
 0071   REF   5   LAST   899       21,2255  53'742 0               DXCH     ALTBITS    SET ALTBITS=-1 FOR SWITCH USE NEXT PASS.
 0072   REF   2   LAST   151       21,2256  53'713 1               DXCH     ALTSAVE
 0073   REF  31   LAST   782       21,2257   3 4742 1              CA       BIT10      NEW ALTITUDE EXTRAPOLATION WITH ALTRATE.
 0074   REF 218   LAST   896       21,2260  56 0002 0              XCH      Q
 0075                              21,2261  22 0007 0              LXCH     7          ZL
 0076   REF   3   LAST   899       21,2262   3 1715 0              CA       DT
 0077                              21,2263   0 0006 1              EXTEND
 0078   REF 219   LAST   899       21,2264  10 0002 1              DV       Q          RESCALE DT*2(-14) TO *2(-9) TIME IN CS.
 0079                              21,2265   0 0006 1              EXTEND
 0080   REF   1                    21,2266   7 2002 0              MP       ARTOA2     .0021322 *2(+8)
 0081   REF   2   LAST   899       21,2267   1 2273 1              TCF      OLDDATA +1 RATE APPLIES FOR DT CS.

 0082   REF   3   LAST   899       21,2270  53'713 1    ZDATA2    DXCH     ALTSAVE
 0083   REF   1                    21,2271   1 2313 0              TCF      NEWDATA
 0084   REF   1                    21,2272   3 2001 1   OLDDATA    CA       ARTOA      RATE APPLIES FOR .5 SEC. (4X/SEC. CYCLE)
 0085                              21,2273   0 0006 1              EXTEND
 0086   REF   5   LAST   899       21,2274   7 1711 0              MP       ALTRATE    EXTRAPOLATE WITH ALTITUDE RATE.
 0087                              21,2275  20 0001 1              DDOUBL
 0088   REF   4   LAST   899       21,2276   6 1713 0              AD       ALTSAVE +1
 0089   REF   5   LAST   899       21,2277  55'713 1               TS       ALTSAVE +1
 0090   REF 167   LAST   896       21,2300   3 4755 1              CAF      ZERO
 0091   REF   6   LAST   899       21,2301  27'712 0               ADS      ALTSAVE
 0092   REF  20   LAST   826       21,2302   3 4733 1              CAF      POSMAX     FORCE SIGN AGREEMENT ASSUMING A
 0093   REF  98   LAST   899       21,2303   6 4753 1              AD       ONE        NON-NEGATIVE ALTSAVE.
 0094   REF   7   LAST   899       21,2304   6 1713 0              AD       ALTSAVE +1 IF ALTSAVE IS NEGATIVE, ZERO ALTSAVE
 0095   REF   8   LAST   899       21,2305  55'713 1               TS       ALTSAVE +1 AND ALTSAVE +1 AT ZERODATA.
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0096  REF 168  LAST 899  21,2306  3 4755 1            CAF     ZERO
0097  REF  21  LAST 899  21,2307  6 4733 1            AD      POSMAX
0098  REF   9  LAST 899  21,2310  6 1712 1            AD      ALTSAVE
0099  REF  10  LAST 900  21,2311  55'712 0            TS      ALTSAVE         POSSIBLY SKIP TO NEWDATA.
0100  REF   1            21,2312  1 3050 0            TCF     ZERODATA
0101  REF  11  LAST 900  21,2313  11'713 1  NEWDATA   CCS     ALTSAVE +1
0102                     21,2314  1 2320 0            TCF     +4
0103                     21,2315  1 2320 0            TCF     +3
0104  REF 169  LAST 900  21,2316  3 4755 1            CAF     ZERO            SET NEGATIVE ALTSAVE +1 TO +0.
0105  REF  12  LAST 900  21,2317  55'713 1            TS      ALTSAVE +1
0106  REF  13  LAST 900  21,2320  11'712 0            CCS     ALTSAVE         PROVIDE A 15 BIT UNSIGNED OUTPUT.
0107  REF  33  LAST 899  21,2321  3 4735 1            CAF     BIT15           THE HI-ORDER PART IS +1 OR +0.
0108  REF  14  LAST 900  21,2322  6 1713 0            AD      ALTSAVE +1
0109  REF   2  LAST 899  21,2323  1 2233 0            TCF     DATAOUT         DISPATCH UNSIGNED BITS TO ALTM REG.
0110                     21,2324  0 0006 1  DISINDAT  EXTEND
0111  REF   3  LAST 829  21,2325  23'714 1            QXCH    LADQSAVE        SAVE RETURN TO ALTROUT +1 OR ALTOUT +1
0112  REF  43  LAST 875  21,2326  3 4746 0            CAF     BIT6
0113                     21,2327  0 0006 1            EXTEND                  WISHETH THE ASTRONAUT THE ANALOG
0114  REF   7  LAST 830  21,2330  02 030 0            RAND    CHAN30          DISPLAYS?  I.E.,
0115  REF 267  LAST 898  21,2331  10 000 0            CCS     A               IS THE MODE SELECT SWITCH IN PGNCS?
0116  REF   2  LAST 898  21,2332  1 3053 0            TCF     DISPRSET        NO.  ASTRONAUT REQUESTS NO INERTIAL DATA
0117  REF  27  LAST 801  21,2333  4 0075 1            CS      FLAGWRD1        YES. CHECK STATUS OF DIDFLAG.
0118  REF   2  LAST 217  21,2334  7 4736 0            MASK    DIDFLBIT
0119                     21,2335  0 0006 1            EXTEND
0120  REF   1            21,2336  1 2374 1            BZF     SPEEDRUN        SET. PERFORM DATA DISPLAY SEQUENCE.
0121  REF  28  LAST 900  21,2337  4 0075 1            CS      FLAGWRD1        RESET. PERFORM INITIALIZATION FUNCTIONS.
0122  REF   3  LAST 900  21,2340  7 4736 0            MASK    DIDFLBIT
0123  REF  29  LAST 900  21,2341  26 075 1            ADS     FLAGWRD1        SET DIDFLAG.
0124  REF  33  LAST 899  21,2342  4 4745 1            CS      BIT7
0125  REF  34  LAST 899  21,2343  7 1303 1            MASK    IMODES33        TO DISPLAY ALTRATE FIRST AND ALT. SECOND
0126  REF  35  LAST 900  21,2344  55'303 1            TS      IMODES33
0127  REF  27  LAST 831  21,2345  4 0074 0            CS      FLAGWRD0        ARE WE IN DESCENT TRAJECTORY?
0128  REF   2  LAST 831  21,2346  7 4752 1            MASK    R10FLBIT
0129                     21,2347  0 0006 1            EXTEND
0130  REF  62  LAST 899  21,2350  1 5261 0            BZF     TASKOVER        NO
0131  REF  28  LAST 807  21,2351  3 4744 1            CAF     BIT8            YES.
0132                     21,2352  0 0006 1            EXTEND
0133  REF  51  LAST 874  21,2353  05 012 1            WOR     CHAN12          SET DISPLAY INERTIAL DATA OUTBIT.
0134  REF 170  LAST 900  21,2354  3 4755 1            CAF     ZERO
0135  REF   2  LAST 150  21,2355  55'702 1            TS      TRAKLATV        LATERAL VELOCITY MONITOR FLAG
0136  REF   2  LAST 150  21,2356  55'703 0            TS      TRAKFWDV        FORWARD VELOCITY MONITOR FLAG
0137  REF   2  LAST 150  21,2357  55'676 0            TS      LATVMETR        LATVEL MONITOR METER
0138  REF   2  LAST 150  21,2360  55'677 1            TS      FORVMETR        FORVEL MONITOR METER
0139  REF  36  LAST 836  21,2361  3 4750 1            CAF     BIT4
0140  REF  25  LAST 853  21,2362  0 5173 1            TC      TWIDDLE
0141  REF   1            21,2363   02365 0            ADRES   INTLZE
0142  REF  63  LAST 900  21,2364  1 5261 0            TCF     TASKOVER
0143  REF  41  LAST 899  21,2365  3 4752 0  INTLZE    CAF     BIT2
0144                     21,2366  0 0006 1            EXTEND
0145  REF  52  LAST 900  21,2367  05 012 1            WOR     CHAN12          ENABLE RR ERROR COUNTER.
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 0146    REF  36  LAST  900    21,2370  4 1303 1              CS      IMODES33
 0147    REF  29  LAST  900    21,2371  7 4744 0              MASK    BIT8
 0148    REF  37  LAST  901    21,2372  27'303 1              ADS     IMODES33         SET INERTIAL DATA FLAG.
 0149    REF  64  LAST  900    21,2373  1 5261 0              TCF     TASKOVER

 0150    REF  22  LAST  887    21,2374  4 1235 0    SPEEDRUN  CS      PIPTIME +1       UPDATE THE VELOCITY VECTOR
 0151    REF  14  LAST  898    21,2375  6 0025 0              AD      TIME1            COMPUTE T - TN
 0152    REF   7  LAST  532    21,2376  6 4736 1              AD      HALF             CORRECT FOR POSSIBLE OVERFLOW OF TIME1.
 0153    REF   8  LAST  901    21,2377  6 4736 1              AD      HALF
 0154    REF   4  LAST  899    21,2400  57'715 0              XCH     DT               SAVE FOR LATER USE
 0155    REF  17  LAST  816    21,2401  3 4777 1              CA      1SEC
 0156    REF   8  LAST  613    21,2402  54 065 0              TS      ITEMP5           INITIALIZE FOR DIVISION LATER
 0157                          21,2403  0 0006 1              EXTEND
 0158    REF  11  LAST  887    21,2404  3 1237 0              DCA     GDT/2            COMPUTE THE X-COMPONENT OF VELOCITY.
 0159                          21,2405  20 001 1              DDOUBL
 0160                          21,2406  20 001 1              DDOUBL
 0161                          21,2407  0 0006 1              EXTEND
 0162    REF   5  LAST  901    21,2410  7 1715 1              MP      DT
 0163                          21,2411  0 0006 1              EXTEND
 0164    REF   9  LAST  901    21,2412  10 065 0              DV      ITEMP5
 0165    REF   5  LAST  898    21,2413  57'706 1              XCH     VVECT            VVECT = G(T-TN) M/CS *2(-5)
 0166                          21,2414  0 0006 1              EXTEND
 0167    REF  19  LAST  887    21,2415  3 1527 0              DCA     V                M/CS *2(-7)
 0168                          21,2416  20 001 1              DDOUBL                   RESCALE TO 2(-5)
 0169                          21,2417  20 001 1              DDOUBL
 0170    REF   6  LAST  901    21,2420  27'706 0              ADS     VVECT            VVECT = VN + G(T-TN) M/CS *2(-5)
 0171    REF  13  LAST  894    21,2421  3 0037 0              CA      PIPAX            DELV CM/SEC *2(-14)
 0172    REF   4  LAST  870    21,2422  6 1160 1              AD      PIPATMPX         IN CASE PIPAX HAS BEEN ZEROED
 0173                          21,2423  0 0006 1              EXTEND
 0174    REF   1               21,2424  7 2004 0              MP      KPIP1(5)         DELV M/CS *2(-5)
 0175    REF   7  LAST  901    21,2425  27'706 0              ADS     VVECT            VVECT = VN + DELV + GN(T-TN) M/CS *2(-5)
 0176                          21,2426  0 0006 1              EXTEND
 0177    REF  12  LAST  901    21,2427  3 1241 1              DCA     GDT/2 +2         COMPUTE THE Y-COMPONENT OF VELOCITY.
 0178                          21,2430  20 001 1              DDOUBL
 0179                          21,2431  20 001 1              DDOUBL
 0180                          21,2432  0 0006 1              EXTEND
 0181    REF   6  LAST  901    21,2433  7 1715 1              MP      DT
 0182                          21,2434  0 0006 1              EXTEND
 0183    REF  10  LAST  901    21,2435  10 065 0              DV      ITEMP5
 0184    REF   8  LAST  901    21,2436  57'707 0              XCH     VVECT +1
 0185                          21,2437  0 0006 1              EXTEND
 0186    REF  20  LAST  901    21,2440  3 1531 1              DCA     V +2
 0187                          21,2441  20 001 1              DDOUBL
 0188                          21,2442  20 001 1              DDOUBL
 0189    REF   9  LAST  901    21,2443  27'707 1              ADS     VVECT +1
 0190    REF   4  LAST  894    21,2444  3 0040 0              CA      PIPAY
 0191    REF   4  LAST  870    21,2445  6 1161 0              AD      PIPATMPY
 0192                          21,2446  0 0006 1              EXTEND
 0193    REF   2  LAST  901    21,2447  7 2004 0              MP      KPIP1(5)
 0194    REF  10  LAST  901    21,2450  27'707 1              ADS     VVECT +1
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0195                            21,2451   0 0006 1          EXTEND
0196    REF  13  LAST  901      21,2452   3 1243 0          DCA     GDT/2 +4         COMPUTE THE Z-COMPONENT OF VELOCITY.
0197                            21,2453  20 001  1          DDOUBL
0198                            21,2454  20 001  1          DDOUBL
0199                            21,2455   0 0006 1          EXTEND
0200    REF   7  LAST  901      21,2456   7 1715 1          MP      DT
0201                            21,2457   0 0006 1          EXTEND
0202    REF  11  LAST  901      21,2460  10 065  0          DV      ITEMP5
0203    REF  11  LAST  901      21,2461  57'710  0          XCH     VVECT +2
0204                            21,2462   0 0006 1          EXTEND
0205    REF  21  LAST  901      21,2463   3 1533 0          DCA     V +4
0206                            21,2464  20 001  1          DDOUBL
0207                            21,2465  20 001  1          DDOUBL
0208    REF  12  LAST  902      21,2466  27'710  1          ADS     VVECT +2
0209    REF   7  LAST  871      21,2467   3 0041 1          CA      PIPAZ
0210    REF   4  LAST  870      21,2470   6 1162 0          AD      PIPATMPZ
0211                            21,2471   0 0006 1          EXTEND
0212    REF   3  LAST  901      21,2472   7 2004 0          MP      KPIP1(5)
0213    REF  13  LAST  902      21,2473  27'710  1          ADS     VVECT +2

0214    REF  32  LAST  899      21,2474   3 4751 0          CAF     BIT3             PAUSE 40 MS TO LET OTHER RUPTS IN.
0215    REF   9  LAST  857      21,2475   0 5224 0          TC      VARDELAY

0216    REF  28  LAST  900      21,2476   4 0074 0          CS      FLAGWRD0         ARE WE IN DESCENT TRAJECTORY?
0217    REF   3  LAST  900      21,2477   7 4752 1          MASK    R10FLBIT
0218    REF 268  LAST  900      21,2500  10 000  0          CCS     A
0219                            21,2501   1 2503 1          TCF     +2               YES.
0220    REF   4  LAST  900      21,2502   0 1714 1          TC      LADQSAVE         NO.

0221    REF   6  LAST  887      21,2503   3 1733 1          CA      DELVS            HI X OF VELOCITY CORRECTION TERM.
0222    REF  14  LAST  902      21,2504   6 1706 1          AD      VVECT            HI X OF UPDATED VELOCITY VECTOR.
0223    REF  35  LAST  868      21,2505  54 061  1          TS      ITEMP1           = VX - DVX M/CS*2(-5).
0224    REF   7  LAST  902      21,2506   3 1735 1          CA      DELVS +2            Y
0225    REF  15  LAST  902      21,2507   6 1707 0          AD      VVECT +1            Y
0226    REF  11  LAST  750      21,2510  54 062  1          TS      ITEMP2           = VY - DVY M/CS*2(-5).
0227    REF   8  LAST  902      21,2511   3 1737 0          CA      DELVS +4            Z
0228    REF  16  LAST  902      21,2512   6 1710 0          AD      VVECT +2            Z
0229    REF  20  LAST  751      21,2513  54 063  0          TS      ITEMP3           = VZ - DVZ M/CS*2(-5).
0230    REF  36  LAST  902      21,2514   3 0061 0          CA      ITEMP1           COMPUTE VHY, VELOCITY DIRECTED ALONG THE
0231                            21,2515   0 0006 1          EXTEND                   Y-COORDINATE.
0232    REF   5  LAST  876      21,2516   7 1717 0          MP      UHYP             HI X OF CROSS-RANGE HALF-UNIT VECTOR.
0233    REF  30  LAST  898      21,2517  56 070  0          XCH     RUPTREG1
0234    REF  12  LAST  902      21,2520   3 0062 0          CA      ITEMP2
0235                            21,2521   0 0006 1          EXTEND
0236    REF   6  LAST  902      21,2522   7 1721 0          MP      UHYP +2             Y
0237    REF  31  LAST  902      21,2523  26 070  1          ADS     RUPTREG1         ACCUMULATE PARTIAL PRODUCTS.
0238    REF  21  LAST  902      21,2524   3 0063 1          CA      ITEMP3
0239                            21,2525   0 0006 1          EXTEND
0240    REF   7  LAST  902      21,2526   7 1723 1          MP      UHYP +4             Z
0241    REF  32  LAST  902      21,2527  26 070  1          ADS     RUPTREG1
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 0242   REF  33  LAST  902   21,2530  3 0070 0             CA       RUPTREG1
 0243                        21,2531  6 0000 1             DOUBLE
 0244   REF   2  LAST  151   21,2532  57'704 0             XCH      VHY          VHY=VMP.UHYP M/CS*2(-5).
 0245   REF  37  LAST  902   21,2533  3 0061 0             CA       ITEMP1       NOW COMPUTE VHZ, VELOCITY DIRECTED ALONG
 0246                        21,2534  0 0006 1             EXTEND                THE Z-COORDINATE.
 0247   REF   4  LAST  876   21,2535  7 1725 1             MP       UHZP         HI X OF DOWN-RANGE HALF-UNIT VECTOR.
 0248   REF  34  LAST  903   21,2536  56 070 0             XCH      RUPTREG1
 0249   REF  13  LAST  902   21,2537  3 0062 0             CA       ITEMP2
 0250                        21,2540  0 0006 1             EXTEND
 0251   REF   5  LAST  903   21,2541  7 1727 0             MP       UHZP +2          Y
 0252   REF  35  LAST  903   21,2542  26 070 1             ADS      RUPTREG1     ACCUMULATE PARTIAL PRODUCTS.
 0253   REF  22  LAST  902   21,2543  3 0063 1             CA       ITEMP3
 0254                        21,2544  0 0006 1             EXTEND
 0255   REF   6  LAST  903   21,2545  7 1731 1             MP       UHZP +4          Z
 0256   REF  36  LAST  903   21,2546  26 070 1             ADS      RUPTREG1
 0257   REF  37  LAST  903   21,2547  3 0070 0             CA       RUPTREG1
 0258                        21,2550  6 0000 1             DOUBLE
 0259   REF   2  LAST  151   21,2551  57'705 1             XCH      VHZ          VHZ = VMP.UHZP M/CS*2(-5).
 0260   REF   7  LAST  740   21,2552  3 5015 0  GET22/32   CAF      EBANK6       GET SIN(AOG),COS(AOG) FROM GPMATRIX.
 0261   REF  45  LAST  896   21,2553  54 003 0             TS       EBANK
 0262   REF   3  LAST  183   E6,1417                       EBANK=   M22
 0263   REF   4  LAST  903   21,2554  3 1417 1             CA       M22
 0264   REF  23  LAST  903   21,2555  54 063 0             TS       ITEMP3
 0265   REF   2  LAST  183   21,2556  3 1420 0             CA       M32
 0266   REF   9  LAST  751   21,2557  54 064 1             TS       ITEMP4
 0267   REF  13  LAST  896   21,2560  3 5016 0             CAF      EBANK7
 0268   REF  46  LAST  903   21,2561  54 003 0             TS       EBANK
 0269   REF  39  LAST  898   E7,1535                       EBANK=   UNIT/R/
 0270   REF  10  LAST  903   21,2562  3 0064 0  LATFWDV    CA       ITEMP4       COMPUTE LATERAL AND FORWARD VELOCITIES.
 0271                        21,2563  0 0006 1             EXTEND
 0272   REF   3  LAST  903   21,2564  7 1704 1             MP       VHY
 0273   REF  38  LAST  903   21,2565  56 070 0             XCH      RUPTREG1
 0274   REF  24  LAST  903   21,2566  3 0063 1             CA       ITEMP3
 0275                        21,2567  0 0006 1             EXTEND
 0276   REF   3  LAST  903   21,2570  7 1705 0             MP       VHZ
 0277   REF  39  LAST  903   21,2571  26 070 1             ADS      RUPTREG1     =VHY(COS)AOG+VHZ(SIN)AOG M/CS *2(-5)
 0278   REF   1                  21,2572  3 2003 0             CA       VELCONV      CONVERT LATERAL VELOCITY TO BIT UNITS.
 0279                        21,2573  0 0006 1             EXTEND
 0280   REF  40  LAST  903   21,2574  7 0070 1             MP       RUPTREG1
 0281                        21,2575  20 001 1             DDOUBL
 0282   REF   2  LAST  150   21,2576  57'700 1             XCH      LATVEL       LATERAL VELOCITY IN BIT UNITS *2(-14).
 0283   REF  11  LAST  903   21,2577  3 0064 0             CA       ITEMP4       COMPUTE FORWARD VELOCITY.
 0284                        21,2600  0 0006 1             EXTEND
 0285   REF   4  LAST  903   21,2601  7 1705 0             MP       VHZ
 0286   REF  41  LAST  903   21,2602  56 070 0             XCH      RUPTREG1
 0287   REF  25  LAST  903   21,2603  3 0063 1             CA       ITEMP3
 0288                        21,2604  0 0006 1             EXTEND
 0289   REF   4  LAST  903   21,2605  7 1704 1             MP       VHY
 0290   REF 269  LAST  902   21,2606  4 0000 0             CS       A
 0291   REF  42  LAST  903   21,2607  26 070 1             ADS      RUPTREG1     =VHZ(COS)AOG-VHY(SIN)AOG M/CS *2(-5).
 0292  REF   2  LAST  903    21,2610  3 2003 0            CA      VELCONV         CONVERT FORWARD VELOCITY TO BIT UNITS.
 0293                        21,2611  0 0006 1            EXTEND
 0294  REF  43  LAST  903    21,2612  7 0070 1            MP      RUPTREG1
 0295                        21,2613  20 001 1            DDOUBL
 0296  REF   2  LAST  150    21,2614  57'701 0            XCH     FORVEL          FORWARD VELOCITY IN BIT UNITS *2(-14).

 0297  REF   1               21,2615  4 2005 1            CS      MAXVBITS        ACC.=-199.9989 FT./SEC.
 0298  REF   5  LAST  613    21,2616  54 066 0            TS      ITEMP6          -547 BIT UNITS (OCTAL) AT 0.5571 FPS/BIT

 0299  REF  99  LAST  899    21,2617  3 4753 1            CAF     ONE             LOOP TWICE.
 0300  REF  12  LAST  902    21,2620  54 065 0  VMONITOR  TS      ITEMP5          FORWARD AND LATERAL VELOCITY LANDING
 0301  REF  13  LAST  904    21,2621  50 065 1            INDEX   ITEMP5             ANALOG DISPLAYS MONITOR.
 0302  REF   3  LAST  903    21,2622  11'700 0            CCS     LATVEL
 0303                        21,2623  1 2627 1            TCF     +4
 0304  REF   1               21,2624  1 2730 0            TCF     LVLIMITS
 0305                        21,2625  1 2635 1            TCF     +8D
 0306  REF   2  LAST  904    21,2626  1 2730 0            TCF     LVLIMITS
 0307  REF  14  LAST  904    21,2627  50 065 1            INDEX   ITEMP5
 0308  REF   4  LAST  904    21,2630  4 1700 0            CS      LATVEL
 0309  REF   2  LAST  904    21,2631  6 2005 0            AD      MAXVBITS        +199.9989 FT./SEC.
 0310                        21,2632  0 0006 1            EXTEND
 0311  REF   1               21,2633  6 2643 1            BZMF    CHKLASTY
 0312  REF   3  LAST  904    21,2634  1 2730 0            TCF     LVLIMITS
 0313  REF  15  LAST  904    21,2635  50 065 1            INDEX   ITEMP5
 0314  REF   5  LAST  904    21,2636  3 1700 1            CA      LATVEL
 0315  REF   3  LAST  904    21,2637  6 2005 0            AD      MAXVBITS
 0316                        21,2640  0 0006 1            EXTEND
 0317                        21,2641  6 2643 1            BZMF    +2
 0318  REF   4  LAST  904    21,2642  1 2730 0            TCF     LVLIMITS
 0319  REF  16  LAST  904    21,2643  50 065 1  CHKLASTY  INDEX   ITEMP5
 0320  REF   3  LAST  900    21,2644  11'676 0            CCS     LATVMETR
 0321                        21,2645  1 2651 0            TCF     +4
 0322  REF   1               21,2646  1 2662 0            TCF     LASTOK
 0323                        21,2647  1 2656 1            TCF     +7
 0324  REF   2  LAST  904    21,2650  1 2662 0            TCF     LASTOK
 0325  REF  17  LAST  904    21,2651  50 065 1            INDEX   ITEMP5
 0326  REF   6  LAST  904    21,2652  3 1700 1            CA      LATVEL
 0327                        21,2653  0 0006 1            EXTEND
 0328  REF   1               21,2654  6 2701 0            BZMF    LASTPOSY +5
 0329                        21,2655  1 2662 0            TCF     +5
 0330  REF  18  LAST  904    21,2656  50 065 1            INDEX   ITEMP5
 0331  REF   7  LAST  904    21,2657  4 1700 0            CS      LATVEL
 0332                        21,2660  0 0006 1            EXTEND
 0333  REF   1               21,2661  6 2716 0            BZMF    LASTNEGY +4
 0334  REF  19  LAST  904    21,2662  50 065 1  LASTOK    INDEX   ITEMP5
 0335  REF   3  LAST  900    21,2663  11'702 1            CCS     TRAKLATV
 0336  REF   2  LAST  904    21,2664  1 2674 1            TCF     LASTPOSY
 0337                        21,2665  1 2667 0            TCF     +2
 0338  REF   2  LAST  904    21,2666  1 2712 0            TCF     LASTNEGY
 0339  REF  20  LAST  904    21,2667  50 065 1            INDEX   ITEMP5
 0340  REF   8  LAST  904   21,2670  3 1700 1            CA       LATVEL
 0341                       21,2671  0 0006 1            EXTEND
 0342  REF   1              21,2672  6 2720 0            BZMF     NEGVMAXY
 0343  REF   1              21,2673  1 2703 0            TCF      POSVMAXY
 0344  REF  21  LAST  904   21,2674 50 065  1  LASTPOSY  INDEX    ITEMP5
 0345  REF   9  LAST  905   21,2675  3 1700 1            CA       LATVEL
 0346                       21,2676  0 0006 1            EXTEND
 0347                       21,2677  6 2701 0            BZMF     +2
 0348  REF   2  LAST  905   21,2700  1 2703 0            TCF      POSVMAXY
 0349  REF   4  LAST  904   21,2701  4 2005 1            CS       MAXVBITS
 0350  REF   1              21,2702  1 3024 0            TCF      ZEROLSTY
 0351  REF  22  LAST  905   21,2703 50 065  1  POSVMAXY  INDEX    ITEMP5
 0352  REF   4  LAST  904   21,2704  4 1676 0            CS       LATVMETR
 0353  REF   5  LAST  905   21,2705  6 2005 0            AD       MAXVBITS
 0354  REF  23  LAST  905   21,2706 50 065  1            INDEX    ITEMP5
 0355  REF   4  LAST  817   21,2707 56 072  1            XCH      RUPTREG3
 0356  REF 100  LAST  904   21,2710  3 4753 1            CAF      ONE
 0357  REF   2  LAST  905   21,2711  1 3027 0            TCF      ZEROLSTY +3
 0358  REF  24  LAST  905   21,2712 50 065  1  LASTNEGY  INDEX    ITEMP5
 0359  REF  10  LAST  905   21,2713  3 1700 1            CA       LATVEL
 0360                       21,2714  0 0006 1            EXTEND
 0361  REF   2  LAST  905   21,2715  6 2720 0            BZMF     NEGVMAXY
 0362  REF   6  LAST  905   21,2716  3 2005 0            CA       MAXVBITS
 0363  REF   3  LAST  905   21,2717  1 3024 0            TCF      ZEROLSTY
 0364  REF  25  LAST  905   21,2720 50 065  1  NEGVMAXY  INDEX    ITEMP5
 0365  REF   5  LAST  905   21,2721  3 1676 1            CA       LATVMETR
 0366  REF   7  LAST  905   21,2722  6 2005 0            AD       MAXVBITS
 0367                       21,2723  4 0000 0            COM
 0368  REF  26  LAST  905   21,2724 50 065  1            INDEX    ITEMP5
 0369  REF   5  LAST  905   21,2725 56 072  1            XCH      RUPTREG3
 0370  REF 101  LAST  905   21,2726  4 4753 0            CS       ONE
 0371  REF   4  LAST  905   21,2727  1 3027 0            TCF      ZEROLSTY +3
 0372  REF  27  LAST  905   21,2730 50 065  1  LVLIMITS  INDEX    ITEMP5
 0373  REF   4  LAST  904   21,2731  1 1702 1            CCS      TRAKLATV
 0374  REF   1              21,2732  1 2761 1            TCF      LATVPOS
 0375                       21,2733  1 2735 0            TCF      +2
 0376  REF   1              21,2734  1 2766 0            TCF      LATVNEG
 0377  REF  28  LAST  905   21,2735 50 065  1            INDEX    ITEMP5
 0378  REF   6  LAST  905   21,2736  4 1676 0            CS       LATVMETR
 0379                       21,2737  0 0006 1            EXTEND
 0380                       21,2740  6 2742 1            BZMF     +2
 0381  REF   1              21,2741  1 2775 1            TCF      NEGLMLV
 0382  REF  29  LAST  905   21,2742 50 065  1            INDEX    ITEMP5
 0383  REF  11  LAST  905   21,2743  4 1700 0            CS       LATVEL
 0384                       21,2744  0 0006 1            EXTEND
 0385  REF   1              21,2745  6 3020 0            BZMF     LVMINLM
 0386  REF   6  LAST  904   21,2746  6 0066 1            AD       ITEMP6
 0387  REF  30  LAST  905   21,2747 50 065  1            INDEX    ITEMP5
 0388  REF   7  LAST  905   21,2750  6 1676 1            AD       LATVMETR
 0389                       21,2751  0 0006 1            EXTEND
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0390   REF   2  LAST  905   21,2752  6 3020 0            BZMF    LVMINLM
0391   REF  31  LAST  905   21,2753  50 065 1            INDEX   ITEMP5
0392   REF  12  LAST  905   21,2754  6 1700 1            AD      LATVEL
0393                        21,2755  0 0006 1            EXTEND
0394   REF  32  LAST  906   21,2756  5 0065 1            INDEX   ITEMP5
0395   REF   8  LAST  905   21,2757  61'676 1            SU      LATVMETR
0396   REF   5  LAST  905   21,2760  1 3024 0            TCF     ZEROLSTY
0397   REF  33  LAST  906   21,2761  50 065 1  LATVPOS   INDEX   ITEMP5
0398   REF  13  LAST  906   21,2762  4 1700 0            CS      LATVEL
0399                        21,2763  0 0006 1            EXTEND
0400   REF   3  LAST  906   21,2764  6 3020 0            BZMF    LVMINLM
0401                        21,2765  1 2772 0            TCF     +5
0402   REF  34  LAST  906   21,2766  50 065 1  LATVNEG   INDEX   ITEMP5
0403   REF  14  LAST  906   21,2767  3 1700 1            CA      LATVEL
0404                        21,2770  0 0006 1            EXTEND
0405   REF   4  LAST  906   21,2771  6 3020 0            BZMF    LVMINLM
0406   REF  35  LAST  906   21,2772  50 065 1            INDEX   ITEMP5
0407   REF   9  LAST  906   21,2773  4 1676 0            CS      LATVMETR
0408   REF   6  LAST  906   21,2774  1 3024 0            TCF     ZEROLSTY
0409   REF  36  LAST  906   21,2775  50 065 1  NEGLMLV   INDEX   ITEMP5
0410   REF  15  LAST  906   21,2776  3 1700 1            CA      LATVEL
0411                        21,2777  0 0006 1            EXTEND
0412   REF   5  LAST  906   21,3000  6 3020 0            BZMF    LVMINLM
0413   REF   8  LAST  905   21,3001  3 2005 0            CA      MAXVBITS
0414   REF  37  LAST  906   21,3002  50 065 1            INDEX   ITEMP5
0415   REF  10  LAST  906   21,3003  6 1676 1            AD      LATVMETR
0416                        21,3004  4 0000 0            COM
0417   REF  38  LAST  906   21,3005  50 065 1            INDEX   ITEMP5
0418   REF  16  LAST  906   21,3006  6 1700 1            AD      LATVEL
0419                        21,3007  0 0006 1            EXTEND
0420   REF   6  LAST  906   21,3010  6 3020 0            BZMF    LVMINLM
0421                        21,3011  0 0006 1            EXTEND
0422   REF  39  LAST  906   21,3012  5 0065 1            INDEX   ITEMP5
0423   REF  17  LAST  906   21,3013  61'700 1            SU      LATVEL
0424   REF  40  LAST  906   21,3014  50 065 1            INDEX   ITEMP5
0425   REF  11  LAST  906   21,3015  6 1676 1            AD      LATVMETR
0426                        21,3016  4 0000 0            COM
0427   REF   7  LAST  906   21,3017  1 3024 0            TCF     ZEROLSTY
0428   REF  41  LAST  906   21,3020  50 065 1  LVMINLM   INDEX   ITEMP5
0429   REF  12  LAST  906   21,3021  4 1676 0            CS      LATVMETR
0430   REF  42  LAST  906   21,3022  50 065 1            INDEX   ITEMP5
0431   REF  18  LAST  906   21,3023  6 1700 1            AD      LATVEL
0432   REF  43  LAST  906   21,3024  50 065 1  ZEROLSTY  INDEX   ITEMP5
0433   REF   6  LAST  905   21,3025  56 072 1            XCH     RUPTREG3
0434   REF 171  LAST  900   21,3026  3 4755 1            CAF     ZERO
0435   REF  44  LAST  906   21,3027  50 065 1            INDEX   ITEMP5
0436   REF   5  LAST  905   21,3030  55'702 1            TS      TRAKLATV
0437   REF  45  LAST  906   21,3031  50 065 1            INDEX   ITEMP5
0438   REF   7  LAST  906   21,3032  3 0072 1            CA      RUPTREG3
0439   REF  24  LAST  872   21,3033  6 4754 0            AD      NEGO           AVOIDS +0 DINC HARDWARE MALFUNCTION
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 0440  REF  46  LAST  906   21,3034  50 065 1           INDEX   ITEMP5
 0441  REF   2  LAST  536   21,3035  54 053 0           TS      COUTCMD
 0442  REF  47  LAST  907   21,3036  50 065 1           INDEX   ITEMP5
 0443  REF   8  LAST  906   21,3037  3 0072 1           CA      RUPTREG3
 0444  REF  48  LAST  907   21,3040  50 065 1           INDEX   ITEMP5
 0445  REF  13  LAST  906   21,3041  27 676 0           ADS     LATVMETR
 0446  REF  49  LAST  907   21,3042  10 065 0           CCS     ITEMP5              FIRST MONITOR FORWARD THEN LATERAL VEL.
 0447  REF   1              21,3043  1 2620 0           TCF     VMONITOR

 0448  REF   1              21,3044  3 5020 0           CAF     BITSET              DRIVE THE X-POINTER DISPLAY.
 0449                       21,3045  0 0006 1           EXTEND
 0450  REF  15  LAST  899   21,3046  05 014 1           WOR     CHAN14
 0451  REF   5  LAST  902   21,3047  0 1714 1           TC      LADQSAVE            GO TO ALTROUT +1 OR TO ALTOUT +1
 0452  REF 172  LAST  906   21,3050  3 4755 1  ZERODATA CAF     ZERO                ZERO ALTSAVE AND ALTSAVE +1 - - -
 0453  REF 143  LAST  890   21,3051  54 001 1           TS      L                         NO NEGATIVE ALTITUDES ALLOWED.
 0454  REF   1              21,3052  1 2270 1           TCF     ZDATA2

R0455  ****************************************************************************************

 0456  REF  29  LAST  902   21,3053  4 0074 0  DISPRSET CS      FLAGWRD0            ARE WE IN DESCENT TRAJECTORY?
 0457  REF   4  LAST  902   21,3054  7 4752 1           MASK    R10FLBIT
 0458                       21,3055  0 0006 1           EXTEND
 0459  REF   1              21,3056  1 3067 1           BZF     ABORTON             NO.
 0460  REF  30  LAST  901   21,3057  3 4744 1           CAF     BIT8                YES.
 0461  REF  38  LAST  901   21,3060  7 1303 1           MASK    IMODES33            CHECK IF INERTIAL DATA JUST DISPLAYED.
 0462  REF 270  LAST  903   21,3061  10 000 0           CCS     A
 0463  REF  42  LAST  900   21,3062  3 4752 0           CAF     BIT2                YES. DISABLE RR ERROR COUNTER
 0464  REF  31  LAST  907   21,3063  5 4744 1           AD      BIT8                NO. REMOVE DISPLAY INERTIAL DATA
 0465                       21,3064  4 0000 0           COM
 0466                       21,3065  0 0006 1           EXTEND
 0467  REF  53  LAST  900   21,3066  03 012 1           WAND    CHAN12
 0468  REF   1              21,3067  4 3076 1  ABORTON  CS      BITS8/7             RESET INERTIAL DATA, INTERLEAVE FLAGS.
 0469  REF  39  LAST  907   21,3070  7 1303 1           MASK    IMODES33
 0470  REF  40  LAST  907   21,3071  55 303 1           TS      IMODES33
 0471  REF   4  LAST  900   21,3072  4 4736 0           CS      DIDFLBIT
 0472  REF  30  LAST  900   21,3073  7 0075 1           MASK    FLAGWRD1
 0473  REF  31  LAST  907   21,3074  54 075 1           TS      FLAGWRD1            RESET DIDFLAG.
 0474  REF  65  LAST  901   21,3075  1 5261 0           TCF     TASKOVER
R0475  ****************************************************************************************
 0476                       21,3076   00300 1  BITS8/7  OCT     00300               INERTIAL DATA AND INTERLEAVE FLAGS.

 0477  REF   2  LAST  536       5020           BITSET   =       PRIO6
R0478  ****************************************************************************************
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L         FINDCDUW - GUIDAP INTERFACE                                          USER'S PAGE NO.   1       EO S3

R0001     PROGRAM NAME:     FINDCDUW

R0002     MOD NUMBER:       1          68 07 15

R0003     MOD AUTHOR:       KLUMPP

R0004     OBJECTS OF MOD:  1.          TO SUPPLY COMMANDED GIMBAL ANGLES FOR NOUN 22.
R0005                      2.          TO MAINTAIN CORRECT AND CURRENT THRUST
R0006                                  DIRECTION DATA IN ALL MODES.  THIS IS DONE BY
R0007                                  FETCHING FOR THE THRUST DIRECTION FILTER THE
R0008                                  CDUD'S IN PNGCS-AUTO, THE CDU'S IN ALL OTHER
R0009                                  MODES.
R0010                      3.          TO SUBSTITUTE A STOPRATE FOR THE NORMAL
R0011                                  AUTOPILOT COMMANDS WHENEVER
R0012                                  1) NOT IN PNGCS-AUTO, OR
R0013                                  2) ENGINE IS OFF.

R0014     FUNCTIONAL DESCRIPTION:

R0015     FINDCDUW PROVIDES THE INTERFACES BETWEEN THE VARIOUS POWERED FLITE GUIDANCE PROGRAMS
R0017     AND THE DIGITAL AUTOPILOT.  THE INPUTS TO FINDCDUW ARE THE THRUST COMMAND VECTOR
R0019     AND THE WINDOW COMMAND VECTOR, AND THE OUTPUTS ARE THE GIMBAL ANGLE
R0020     INCREMENTS, THE COMMANDED ATTITUDE ANGLE RATES, AND THE COMMANDED
R0021     ATTITUDE LAG ANGLES (WHICH ACCOUNT FOR THE ANGLES BY WHICH THE BODY WILL
R0022     LAG BEHIND A RAMP COMMAND IN ATTITUDE ANGLE DUE TO THE FINITE ANGULAR
R0023     ACCELERATIONS AVAILABLE).

R0024     FINDCDUW ALINES THE ESTIMATED THRUST VECTOR FROM THE THRUST DIRECTION
R0025     FILTER WITH THE THRUST COMMAND VECTOR, AND, WHEN  XOVINHIB  SET,
R0026     ALINES THE +Z HALF OF THE LM ZX PLANE WITH THE WINDOW COMMAND VECTOR.
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P0027   SPECIFICATIONS:

R0028   INITIALIZATION: A SINGLE INTERPRETIVE CALL TO  INITCDUW  IS REQUIRED
R0029                   BEFORE EACH GUIDED MANEUVER USING FINDCDUW.

R0030   CALL:           INTERPRETIVE CALL TO FINDCDUW WITH THE THRUST COMMAND
R0031                   VECTOR IN MPAC.  INTERPRETIVE CALL TO FINDCDUW -2 WITH
R0032                   THE THRUST COMMAND VECTOR IN UNFC/2 AND NOT IN MPAC.

R0033   RETURNS:        NORMAL INTERPRETIVE IN ALL CASES

R0034                   1.      NORMALLY ALL AUTOPILOT CMDS ARE ISSUED.

R0035                   2.      IF NOT PNGCS AUTO, DO STOPRATE AND RETURN
R0036                           WITHOUT ISSUING AUTOPILOT CMDS.

R0037                   3.      IF ENGINE OFF, DO STOPRATE AND RETURN WITHOUT
R0038                           ISSUING AUTOPILOT CMDS.

R0039   ALARMS:         00401 IF INPUTS DETERMINE AN ATTITUDE IN GIMBAL LOCK.
R0040                           FINDCDUW DRIVES CDUXD AND CDUYD TO THE RQD VALUES,
R0042                           BUT DRIVES CDUZD ONLY TO THE GIMBAL LOCK CONE.
R0043                   00402 IF UNFC/2 OR UNWC/2 PRODUCE OVERFLOW WHEN
R0044                           UNITIZED USING NORMUNIT.  FINDCDUW ISSUES
R0045                           STOPRATE AS ONLY INPUT TO AUTOPILOT.

R0046   INPUTS:         UNFC/2  THRUST COMMAND VECTOR, NEED NOT BE SEMI-UNIT.
R0047                   UNWC/2  WINDOW COMMAND VECTOR, NEED NOT BE SEMI-UNIT.
R0048                   XOVINHIB FLAG DENOTING X AXIS OVERRIDE INHIBITED.
R0049                   CSMDOCKD FLAG DENOTING CSM DOCKED.
R0050                   STEERSW  FLAG DENOTING INSUFF THRUST FOR THRUST DIR FLTR.
P0052
R0053   OUTPUTS:        DELCDUX,Y,Z
R0054                   OMEGAPD,+1,+2
R0055                   DELPEROP,+1,+2
R0056                   CPHI,+1,+2 FOR NOUN22
R0057
R0058   DEBRIS:         FINDCDUW DESTROYS SINCDUX,Y,Z AND COSCDUX,Y,Z BY
R0059                   WRITING INTO THESE LOCATIONS THE SINES AND COSINES
R0060                   OF THE CDUD'S IN PNGCS-AUTO, OF THE CDU'S OTHERWISE.
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L        FINDCDUW - GUIDAP INTERFACE                                                    USER'S PAGE NO.  3       E0 S3

P0061    INITIALIZATION FOR FINDCDUW

 0062                          30,3104                           BANK    30
 0063    REF    1              30,2000                           SETLOC  FCDUW
 0064                          30,3104                           BANK

 0065    REF    2  LAST  136   E6,1646                           EBANK=  ECDUW

 0066    REF    1                                                COUNT*  $$/FCDUW

 0067                          30,3104   77775 1   INITCDUW      VLOAD
 0068    REF   12  LAST  896   30,3105   06520 0                         UNITX
 0069    REF    5  LAST  136   30,3106   03270 1                 STORE   UNFV/2
 0070    REF    9  LAST  852   30,3107   03262 1                 STORE   UNWC/2
 0071                          30,3110   77616 0                 RVQ

R0072    FINDCDUW PRELIMINARIES

 0073                          30,3111   77775 1                 VLOAD                   FINDCDUW -2: ENTRY WHEN UNFC/2 PRE-STORD
 0074    REF   19  LAST  852   30,3112   03254 1                         UNFC/2          INPUT VECTORS NEED NOT BE SEMI-UNIT
 0075                          30,3113   40200 1   FINDCDUW      BOV     SETPD           FINDCDUW: ENTRY WHEN UNFC/2 IN MPAC
 0076    REF    5  LAST  850   30,3114   61113 0                         FINDCDUW        INTERPRETER NOW INITIALIZED
 0077                          30,3115   00023 0                         22              LOCS 0 THRU 21 FOR DIRECTION COSINE MAT
 0078                          30,3116   77420 1                 STO     EXIT
 0079    REF    2  LAST  136   30,3117   03247 0                         QCDUWUSR        SAVE RETURN ADDRESS

R0080    MORE HAUSKEEPING

 0081    REF    1              30,3120  3 3761 1                 CA      ECDUWL
 0082    REF   47  LAST  903   30,3121  56 003 1                 XCH     EBANK           SET EBANK
 0083    REF    2  LAST  136   30,3122  55'646 0                 TS      ECDUWUSR        SAVE USER'S EBANK

 0084    REF   33  LAST  863   30,3123  3 0111 0                 CA      DAPBOOLS
 0085    REF    6  LAST  753   30,3124  7 4737 1                 MASK    CSMDOCKD        CSMDOCKD MUST NOT BE BIT15
 0086    REF  271  LAST  907   30,3125  10 000 0                 CCS     A
 0087    REF  102  LAST  905   30,3126  3 4753 1                 CA      ONE             INDEX IF CSM DOCKED
 0088    REF    2  LAST  136   30,3127  55'650 1                 TS      NDXCDUW

 0089    REF    1              30,3130  3 4743 0                 CA      XOVINHIB        XOVINHIB MUST NOT BE BIT15
 0090    REF    2  LAST  136   30,3131  55'652 0                 TS      FLPAUTNO        SET TO POS-NON-ZERO FLAG PNGCS AUTO NOT

 0091    REF   34  LAST  910   30,3132  7 0111 1                 MASK    DAPBOOLS
 0092    REF    2  LAST  136   30,3133  55'651 0                 TS      FLAGOODW        FLAGOODW = ANY PNZ NUMBER IF XOV INHIBTD
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P0093   FETCH BASIC DATA

 0094                           30,3134  0 0004 0         INHINT                      RELINT AT PAUTNO (TC INTPRET)

 0095   REF  15  LAST  894      30,3135  3 0032 0         CA       CDUX               FETCH CDUX,CDUY,CDUZ IN ALL CASES, BUT
 0096   REF   2  LAST  872      30,3136  54 772 1         TS       CDUSPOTX                 REPLACE BELOW IF PNGCS AUTO
 0097   REF   6  LAST  870      30,3137  3 0033 1         CA       CDUY
 0098   REF   2  LAST  872      30,3140  54 766 1         TS       CDUSPOTY
 0099   REF   9  LAST  894      30,3141  3 0034 0         CA       CDUZ
 0100   REF   2  LAST  872      30,3142  54 770 0         TS       CDUSPOTZ

 0101   REF  32  LAST  899      30,3143  3 4742 1         CA       BIT10              PNGCS CONTROL BIT
 0102                           30,3144  0 0006 1         EXTEND
 0103   REF   8  LAST  900      30,3145  02 030 0         RAND     CHAN30
 0104   REF 272  LAST  910      30,3146  10 000 0         CCS      A
 0105   REF   1                 30,3147  1 3164 0         TCF      PAUTNO             NOT PNGCS (BITS INVERTED)

 0106   REF  57  LAST  785      30,3150  3 4736 1         CA       BIT14              AUTO MODE BIT
 0107                           30,3151  0 0006 1         EXTEND
 0108   REF   7  LAST  821      30,3152  02 031 1         RAND     CHAN31
 0109   REF 273  LAST  911      30,3153  10 000 0         CCS      A
 0110   REF   2  LAST  911      30,3154  1 3164 0         TCF      PAUTNO             NOT AUTO (BITS INVERTED)

 0111   REF   3  LAST  910      30,3155  55 652 0         TS       FLPAUTNO           RESET FLAG PNGCS AUTO NOT

 0112   REF  13  LAST  520      30,3156  3 1635 0         CA       CDUXD              PNGCS AUTO: FETCH CDUXD,CDUYD,CDUZD
 0113   REF   3  LAST  911      30,3157  54 772 1         TS       CDUSPOTX
 0114   REF   3  LAST  520      30,3160  3 1636 0         CA       CDUYD
 0115   REF   3  LAST  911      30,3161  54 766 1         TS       CDUSPOTY
 0116   REF   3  LAST  518      30,3162  3 1637 1         CA       CDUZD
 0117   REF   3  LAST  911      30,3163  54 770 0         TS       CDUSPOTZ
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L        FINDCDUW - GUIDAP INTERFACE                                                               USER'S PAGE NO.   5       E6 S3

P0118    FETCH INPUTS

 0119    REF 165  LAST  896   30,3164  0 6037 0  PAUTNO     TC       INTPRET          ENTERING THRUST CMD STILL IN MPAC
 0120                         30,3165   77634 0              RTB
 0121    REF   9  LAST  812   30,3166   21726 1                       NORMUNIT
 0122    REF   1              30,3167   24001 0              STOVL    UNX/2            SEMI-UNIT THRUST CMD AS INITIAL UNX/2
 0123    REF  10  LAST  910   30,3170   03262 1                       UNWC/2
 0124                         30,3171   47034 0              RTB      RTB
 0125    REF  10  LAST  912   30,3172   21726 1                       NORMUNIT
 0126    REF   4  LAST  886   30,3173   47615 0                       QUICTRIG         ALWAYS RQD TO OBTAIN TRIGS OF CDUD'S
 0127    REF   1              30,3174   24015 0              STOVL    UNZ/2            SEMI-UNIT WINDOW CMD AS INITIAL UNZ/2
 0128    REF   8  LAST  882   30,3175   00325 0                       DELV
 0129                         30,3176   53404 1              BOVB     UNIT
 0130    REF   1              30,3177   61750 1                       NOATTCNT         AT LEAST ONE ENTERING CMD VCT ZERO
 0131                         30,3200   45000 0              BOV      CALL
 0132    REF   1              30,3201   41215 0                       AFTRFLTR         IF UNIT DELV OVERFLOWS, SKIP FILTER
 0133    REF   6  LAST  896   30,3202   47671 1                       *SMNB*           YIELDS UNIT(DELV) IN VEH COORDS FOR FLTR

R0134    THRUST DIRECTION FILTER

 0135                         30,3203   77776 1              EXIT

 0136    REF   1              30,3204  3 1671 0              CA       UNFVY/2          FOR RESTARTS, UNFV/2 ALWAYS INTACT, MPAC
 0137    REF 353  LAST  889   30,3205  22 157 1              LXCH     MPAC      +3          RENEWED AFTER RETURN FROM CALLER,
 0138    REF   1              30,3206  0 3503 1              TC       FLTRSUB               TWO FILTER UPDATES MAY BE DONE.
 0139    REF   2  LAST  912   30,3207  55'671 1              TS       UNFVY/2          UNFV/2 NEED NOT BE EXACTLY SEMI-UNIT.

 0140    REF   1              30,3210  3 1673 1              CA       UNFVZ/2
 0141    REF 354  LAST  912   30,3211  22 161 1              LXCH     MPAC      +5
 0142    REF   2  LAST  912   30,3212  0 3503 1              TC       FLTRSUB
 0143    REF   2  LAST  912   30,3213  55'673 0              TS       UNFVZ/2

 0144    REF 166  LAST  912   30,3214  0 6037 0              TC       INTPRET          COMPLETES FILTER
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P0145    FIND A SUITABLE WINDOW POINTING VECTOR

 0146                         30,3215   46135 1  AFTRFLTE SLOAD  BHIZ              IF XOV NOT INHIBITED, GO FETCH ZNB
 0147   REF   3  LAST  910    30,3216   03252 1                  FLAGOODW
 0148   REF   1               30,3217   61223 0                  FETCHZNB
 0149                         30,3220   45175 0           VLOAD  CALL
 0150   REF   2  LAST  912    30,3221   00015 0                  UNZ/2
 0151   REF   1               30,3222   61523 1                  UNWCTEST

 0152                         30,3223   77775 1  FETCHZNB VLOAD
 0153   REF   1               30,3224   02162 0                  ZNBPIP
 0154   REF   3  LAST  913    30,3225   34015 1           STCALL UNZ/2
 0155   REF   2  LAST  913    30,3226   61523 1                  UNWCTEST

 0156                         30,3227   57575 1           VLOAD  VCOMP             Z AND -X CAN'T BOTH PARALLEL UNFC/2
 0157   REF  11  LAST  884    30,3230   02146 0                  XNBPIP
 0158   REF   4  LAST  913    30,3231   00015 0           STORE  UNZ/2

R0159    COMPUTE THE REQUIRED DIRECTION COSINE MATRIX

 0160                         30,3232   47375 0  DCMCL    VLOAD  VXV
 0161   REF   5  LAST  913    30,3233   00015 0                  UNZ/2
 0162   REF   2  LAST  912    30,3234   00001 0                  UNX/2
 0163                         30,3235   41456 0           UNIT   PUSH              UNY/2 FIRST ITERATION
 0164                         30,3236   76435 1           VXV    VSL1
 0165   REF   3  LAST  913    30,3237   00001 0                  UNX/2
 0166   REF   6  LAST  913    30,3240   00015 0           STORE  UNZ/2             -UNZ/2 FIRST ITERATION
 0167                         30,3241   63361 0           VXSC   PDVL              EXCHANGE -UNFVZ/2 UNZ/2 FOR UNY/2
 0168   REF   3  LAST  912    30,3242   03274 0                  UNFVZ/2           MUST BE SMALL
 0169                         30,3243   51361 1           VXSC   BVSU              YIELDS -UNFVY/2 UNY/2-UNFVZ/2 UNZ/2
 0170   REF   3  LAST  912    30,3244   03272 0                  UNFVY/2           MUST BE SMALL
 0171                         30,3245   53372 1           VSL1   VAD
 0172   REF   4  LAST  913    30,3246   00001 0                  UNX/2
 0173                         30,3247   77656 1           UNIT                     TOTALLY ELIMINATES THRUST POINTING ERROR
 0174   REF   5  LAST  913    30,3250   00001 0           STORE  UNX/2             UNX/2
 0175                         30,3251   76435 1           VXV    VSL1
 0176   REF   7  LAST  913    30,3252   00015 0                  UNZ/2             -UNZ/2 WAS STORED HERE REMEMBER
 0177   REF   1               30,3253   00007 0           STORE  UNY/2             UNY/2
 0178                         30,3254   47276 1           VCOMP  VXV
 0179   REF   6  LAST  913    30,3255   00001 0                  UNX/2
 0180                         30,3256   77772 0           VSL1
 0181   REF   8  LAST  913    30,3257   00015 0           STORE  UNZ/2             UNZ/2
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P0182   COMPUTE THE REQUIRED GIMBAL ANGLES

 0183                          30,3260   77624 1           CALL
 0184   REF   1                30,3261   61533 0                   NB2CDUSP       YIELDS THE RQD GIMBAL ANGLES, 2'S, PI
 0185                          30,3262   77776 1           EXIT

R0186   LIMIT THE MIDDLE GIMBAL ANGLE & COMPUTE THE UNLIMITED GIMBAL ANGLE CHGS

 0187   REF 355  LAST  912     30,3263  3 0156 0           CA      MPAC      +2   LIMIT THE MGA
 0188   REF 144  LAST  907     30,3264  54 001 1           TS      L              CAN'T LXCH: NEED UNLIMITED MGA FOR ALARM
 0189   REF   1                30,3265  3 3773 1           CA      CDUZDLIM
 0190   REF   1                30,3266  0 3727 0           TC      LIMITSUB       YIELDS LIMITED MGA. 1 BIT ERROR POSSIBLE
 0191   REF 356  LAST  914     30,3267  56 156 0           XCH     MPAC      +2        BECAUSE USING 2'S COMP. WHO CARES?
 0192                          30,3270  0 0006 1           EXTEND
 0193   REF 357  LAST  914     30,3271  20 156 1           MSU     MPAC      +2   THIS BETTER YIELD ZERO
 0194                          30,3272  0 0006 1           EXTEND
 0195                          30,3273  1 3275 0           BZF     +2
 0196   REF   1                30,3274  1 3756 1           TCF     ALARMMGA

 0197                          30,3275  0 0004 0  MGARET   INHINT                 RELINT AT TC INTPRET AFTER TCQCDUW

 0198                          30,3276  22 007 0           ZL
 0199   REF  61  LAST  896     30,3277  3 4752 0           CA      TWO
 0200   REF   4  LAST   98     30,3300  54 142 1  DELGMBLP TS      TEM2

 0201   REF 145  LAST  914     30,3301  3 0001 0           CA      L              TO PREVENT FALSE STARTS ABOUT X, ZERO
 0202                          30,3302  0 0006 1           EXTEND                      FLAGOODW IF DELGMBZ OR Y TOO BIG.
 0203                          30,3303  7 0000 0           SQUARE
 0204   REF   5  LAST  416     30,3304  6 4350 0           AD      HI5            WITHIN 1 BIT OF -(45 DEG SQUARED)
 0205                          30,3305  0 0006 1           EXTEND
 0206                          30,3306  6 3311 1           BZMF    +3
 0207   REF 173  LAST  907     30,3307  3 4755 1           CA      ZERO
 0208   REF   4  LAST  913     30,3310  55'651 0           TS      FLAGOODW

 0209   REF   5  LAST  914     30,3311  50 142 0           INDEX   TEM2
 0210   REF 358  LAST  914     30,3312  3 0154 1           CA      MPAC
 0211   REF   6  LAST  914     30,3313  50 142 0           INDEX   TEM2
 0212   REF  10  LAST  518     30,3314  54 321 0           TS      CPHI           OUTPUTS TO NOUN22
 0213                          30,3315  0 0006 1           EXTEND
 0214   REF   7  LAST  914     30,3316  5 0142 0           INDEX   TEM2
 0215   REF  14  LAST  911     30,3317  21'635 1           MSU     CDUXD          NO MATTER THAT THESE SLIGHTLY DIFFERENT
 0216                          30,3320  4 0000 0           COM                         FROM WHEN WE INITIALLY FETCHED THEM
 0217   REF   8  LAST  914     30,3321  50 142 0           INDEX   TEM2
 0218   REF   1                30,3322  55'675 0           TS      -DELGMB        -UNLIMITED GIMBAL ANGLE CHGS, 1'S, PI
 0219   REF 146  LAST  914     30,3323  54 001 1           TS      L              FOR PRECEDING TEST ON NEXT LOOP PASS
 0220   REF   9  LAST  914     30,3324  10 142 1           CCS     TEM2
 0221   REF   1                30,3325  1 3300 0           TCF     DELGMBLP
```

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P0222    BRANCHES TO NOATTCNT

 0223    REF   4  LAST  911    30,3326  1 1652 0            CCS     FLPAUTNC
 0224    REF   2  LAST  912    30,3327  1 3752 0            TCF     NOATTCNT +2      NOT PNGCS AUTO

 0225    REF  27  LAST  804    30,3330  3 0101 1            CA      FLAGWRD5
 0226    REF   6  LAST  831    30,3331  7 4745 1            MASK    ENGONBIT
 0227                          30,3332  0 0006 1            EXTEND
 0228    REF   3  LAST  915    30,3333  1 3752 0            BZF     NOATTCNT +2      ENGINE NOT ON
```

```
R0229    LIMIT THE ATTITUDE ANGLE CHANGES

R0230    THIS SECTION LIMITS THE ATTITUDE ANGLE CHANGES ABOUT A SET OF ORTHOGONAL VEHICLE AXES X,YPRIME,ZPRIME.
R0232    THESE AXES COINCIDE WITH THE COMMANDED VEHICLE AXES IF AND ONLY IF CDUXD IS ZERO.  THE PRIME SYSTEM IS
R0234    THE COMMANDED VEHICLE SYSTEM ROTATED ABOUT THE X AXIS TO BRING THE Z AXIS INTO ALINEMENT WITH THE MIDDLE GIMBAL
R0236    AXIS.  ATTITUDE ANGLE CHANGES IN THE PRIME SYSTEM ARE RELATED TO SMALL GIMBAL ANGLE CHANGES BY:

R0238    * -DELATTX        *   * 1  SIN(CDUZD)  0 * * -DELGMBX *
R0239    *                 *   *                  * *          *
R0240    * -DELATTYPRIME * = * 0  COS(CDUZD)  0 * * -DELGMBY *
R0241    *                 *   *                  * *          *
R0242    * -DELATTZPRIME *   * 0  0           1 * * -DELGMBZ *

 0243    REF   2  LAST  914   30,3334  23'677 0            IXCH    -DELGMB  +2      SAME AS -DELATTZPRIME UNLIMITED
 0244    REF   3  LAST  910   30,3335  51'650 0            INDEX   NDXCDUW
 0245    REF   1              30,3336  3 3767 1            CA      DAZMAX
 0246    REF   2  LAST  914   30,3337  0 3727 0            TC      LIMITSUB
 0247    REF   3  LAST  916   30,3340  55'677 1            TS      -DELGMB  +2      -DELGMBZ

 0248    REF   4  LAST  916   30,3341  3 1676 1            CA      -DELGMB  +1
 0249                         30,3342  0 0006 1            EXTEND
 0250    REF   3  LAST  478   30,3343  7 0746 0            MP      COSCDUZ          YIELDS -DELATTYPRIME/2 UNLIMITED
 0251    REF 147  LAST  916   30,3344  54 001 1            TS      L
 0252    REF   4  LAST  916   30,3345  51'650 0            INDEX   NDXCDUW
 0253    REF   1              30,3346  3 3771 0            CA      DAY/2MAX
 0254    REF   3  LAST  916   30,3347  0 3727 0            TC      LIMITSUB
 0255                         30,3350  0 0006 1            EXTEND
 0256    REF   4  LAST  916   30,3351  10 746 0            DV      COSCDUZ
 0257    REF   5  LAST  916   30,3352  57'676 1            XCH     -DELGMB  +1      -DELGMBY, FETCHING UNLIMITED VALUE

 0258                         30,3353  0 0006 1            EXTEND
 0259    REF   3  LAST  478   30,3354  7 0740 0            MP      SINCDUZ
 0260                         30,3355  20 001 1            DDOUBL
 0261                         30,3356  4 0000 0            COM
 0262                         30,3357  0 0006 1            EXTEND                   YIELDS +DELATTX UNLIMITD, MAG < 180 DEG,
 0263    REF   6  LAST  916   30,3360  21'675 0            MSU     -DELGMB               BASED ON UNLIMITED DELGMBY.
 0264    REF 148  LAST  916   30,3361  54 001 1            TS      L                     ONE BIT ERROR IF OPERANDS IN MSU
 0265    REF   5  LAST  916   30,3362  51'650 0            INDEX   NDXCDUW               OF MIXED SIGNS.  WHO CARES?
 0266    REF   1              30,3363  3 3767 1            CA      DAXMAX
 0267    REF   4  LAST  916   30,3364  0 3727 0            TC      LIMITSUB
 0268    REF   7  LAST  916   30,3365  55'675 0            TS      -DELGMB          SAVE LIMITED +DELATTX
 0269    REF   5  LAST  914   30,3366  11'651 0            CCS     FLAGOODW
 0270    REF   8  LAST  916   30,3367  4 1675 0            CS      -DELGMB          FETCH IT BACK CHGING SIGN IF WINDOW GOOD
 0271    REF   9  LAST  916   30,3370  55'675 0            TS      -DELGMB          OTHERWISE USE ZERO FOR -DELATTX
 0272    REF  10  LAST  916   30,3371  4 1676 0            CS      -DELGMB  +1
 0273                         30,3372  0 0006 1            EXTEND
 0274    REF   4  LAST  916   30,3373  7 0740 0            MP      SINCDUZ
 0275                         30,3374  20 001 1            DDOUBL                   YIELDS -CNTRIB TO -DELATTX FROM -DELGMBY
 0276    REF  11  LAST  916   30,3375  27'675 0            ADS     -DELGMB          -DELGMBX.  NO OVERFLOW SINCE LIMITED TO
A0277                                                                               20DEG(1+SIN(70DEG)/COS(70DEG)) < 180DEG
```

```
L        FINDCDUW - GUIDAP INTERFACE                                                  USER'S PAGE NO.  10       E6 S3

P0278    COMPUTE COMMANDED ATTITUDE RATES

R0279    * OMEGAPD *    * -2  -4 SINCDUZ                +0                 * * -DELGMBX *
R0280    *         *    *                                                  * *          *
R0281    * OMEGAQD * =  * +0  -8 COSCDUZ COSCDUX  -4 SINCDUX * * -DELGMBY *
R0282    *         *    *                                                  * *          *
R0283    * OMEGARD *    * +0  +8 COSCDUZ SINCDUX  -4 COSCDUX * * -DELGMBZ *

R0284    ATTITUDE ANGLE RATES IN UNITS OF PI/4 RAD/SEC = K TRIG FCNS IN UNITS OF 2 X GIMBAL ANGLE RATES IN UNITS OF
R0286    PI/2 RAD/SEC.  THE CONSTANTS ARE BASED ON DELGMB BEING THE GIMBAL ANGLE CHANGES IN UNITS OF PI RADIANS,
R0288    AND 2 SECONDS BEING THE COMPUTATION PERIOD (THE PERIOD BETWEEN SUCCESSIVE PASSES THRU FINDCDUW).

 0290    REF  12  LAST  916    30,3376  4 1675 0             CS      -DELGMB
 0291    REF   6  LAST  369    30,3377  55'643 0             TS      OMEGAPD
 0292    REF  13  LAST  917    30,3400  4 1676 0             CS      -DELGMB   +1
 0293                          30,3401  0 0006 1             EXTEND
 0294    REF   5  LAST  916    30,3402  7 0740 0             MP      SINCDUZ
 0295                          30,3403  20 001 1             DDOUBL
 0296    REF   7  LAST  917    30,3404  27'643 0             ADS     OMEGAPD
 0297    REF   8  LAST  917    30,3405  27'643 0             ADS     OMEGAPD

 0298    REF  14  LAST  917    30,3406  4 1676 0             CS      -DELGMB   +1
 0299                          30,3407  0 0006 1             EXTEND
 0300    REF   4  LAST  478    30,3410  7 0750 1             MP      COSCDUX
 0301                          30,3411  20 001 1             DDOUBL
 0302                          30,3412  0 0006 1             EXTEND
 0303    REF   5  LAST  916    30,3413  7 0746 0             MP      COSCDUZ
 0304    REF   2  LAST  369    30,3414  55'644 1             TS      OMEGAQD
 0305    REF  15  LAST  917    30,3415  4 1677 1             CS      -DELGMB   +2
 0306                          30,3416  0 0006 1             EXTEND
 0307    REF   3  LAST  478    30,3417  7 0742 1             MP      SINCDUX
 0308    REF   3  LAST  917    30,3420  27'644 1             ADS     OMEGAQD
 0309    REF   4  LAST  917    30,3421  27'644 1             ADS     OMEGAQD
 0310    REF   5  LAST  917    30,3422  27'644 1             ADS     OMEGAQD

 0311    REF  16  LAST  917    30,3423  3 1676 1             CA      -DELGMB   +1
 0312                          30,3424  0 0006 1             EXTEND
 0313    REF   4  LAST  917    30,3425  7 0742 1             MP      SINCDUX
 0314                          30,3426  20 001 1             DDOUBL
 0315                          30,3427  0 0006 1             EXTEND
 0316    REF   6  LAST  917    30,3430  7 0746 0             MP      COSCDUZ
 0317    REF   2  LAST  369    30,3431  55'645 0             TS      OMEGARD
 0318    REF  17  LAST  917    30,3432  4 1677 1             CS      -DELGMB   +2
 0319                          30,3433  0 0006 1             EXTEND
 0320    REF   5  LAST  917    30,3434  7 0750 1             MP      COSCDUX
 0321    REF   3  LAST  917    30,3435  27'645 0             ADS     OMEGARD
 0322    REF   4  LAST  917    30,3436  27'645 0             ADS     OMEGARD
 0323    REF   5  LAST  917    30,3437  27'645 0             ADS     OMEGARD
```

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P0324   FINAL TRANSFER

 0325   REF  62  LAST  914   30,3440   3 4752 0             CA      TWO
 0326   REF  10  LAST  914   30,3441  54 142 1   CDUWXFR   TS      TEM2
 0327   REF  11  LAST  918   30,3442  50 142 0             INDEX   TEM2
 0328   REF  18  LAST  917   30,3443   3 1675 1             CA      -DELGMB
 0329                        30,3444   0 0006 1             EXTEND
 0330   REF   1              30,3445   7 3774 1             MP      DT/DELT        RATIO OF DAP INTERVAL TO CDUW INTERVAL
 0331   REF   1              30,3446   0 3743 1             TC      ONESTO2S
 0332   REF  12  LAST  918   30,3447  50 142 0             INDEX   TEM2
 0333   REF   4  LAST  136   30,3450  55'640 0             TS      DELCDUX        ANGLE INTERFACE

 0334   REF  13  LAST  918   30,3451  50 142 0             INDEX   TEM2
 0335   REF   9  LAST  917   30,3452  11'643 0             CCS     OMEGAPD
 0336   REF 103  LAST  910   30,3453   6 4753 1             AD      ONE
 0337                        30,3454   1 3456 1             TCF     +2
 0338   REF 104  LAST  918   30,3455   6 4753 1             AD      ONE
 0339                        30,3456   0 0006 1             EXTEND                 WE NOW HAVE ABS(OMEGAPD,QD,RD)
 0340   REF  14  LAST  918   30,3457   5 0142 0             INDEX   TEM2
 0341   REF  10  LAST  918   30,3460   7 1643 0             MP      OMEGAPD
 0342                        30,3461   0 0006 1             EXTEND
 0343   REF  22  LAST  751   30,3462   7 4741 0             MP      BIT11          1/16
 0344                        30,3463   0 0006 1             EXTEND
 0345   REF  15  LAST  918   30,3464   5 0142 0             INDEX   TEM2                                  2
 0346   REF   6  LAST  367   30,3465  11'530 1             DV      1JACC          UNITS PI/4 RAD/SEC
 0347   REF 149  LAST  916   30,3466  54 001 1             TS      L
 0348   REF   1              30,3467   3 3771 0             CA      DELERLIM
 0349   REF   5  LAST  916   30,3470   0 3727 0             TC      LIMITSUB
 0350   REF  16  LAST  918   30,3471  50 142 0             INDEX   TEM2
 0351   REF   3  LAST  369   30,3472  55'277 0             TS      DELPEROR       LAG ANGLE = OMEGA ABS(OMEGA)/2 ACCEL
 0352   REF  17  LAST  918   30,3473  10 142 1             CCS     TEM2
 0353   REF   1              30,3474   1 3441 1             TCF     CDUWXFR

R0354   HAUSKEEPING AND RETURN

 0355   REF   3  LAST  910   30,3475   3 1646 1   TCQCDUW   CA      ECDUWUSR
 0356   REF  48  LAST  910   30,3476  54 003 0             TS      EBANK          RETURN USER'S EBANK

 0357   REF 167  LAST  912   30,3477   0 6037 0             TC      INTPRET
 0358                        30,3500    52001 1             SETPD   GOTO
 0359                        30,3501    00001 0                     0
 0360   REF   3  LAST  910   30,3502    03247 0                     QCDUWUSR       NORMAL AND ABNORMAL RETURN TO USER
```

```
P0361   THRUST VECTOR FILTER SUBROUTINE

 0362                         30,3503  0 0006 1  FLTRSUB  EXTEND
 0363   REF  18  LAST  918    30,3504  22 142 0           QXCH    TEM2
 0364   REF   3  LAST   98    30,3505  54 143 0           TS      TEM3               SAVE ORIGINAL OFFSET
 0365                         30,3506  4 0000 0           COM                        ONE MCT, NO WDS, CAN BE SAVED IF NEG OF
 0366   REF 150  LAST  918    30,3507  6 0001 0           AD      L                       ORIG OFFSET ARRIVES IN A, BUT IT'S
 0367                         30,3510  0 0006 1           EXTEND                          NOT WORTH THE INCREASED OBSCURITY.
 0368   REF   6  LAST  916    30,3511  5 1650 0           INDEX   NDXCDUW
 0369   REF   1               30,3512  7 3762 0           MP      GAINFLTR
 0370   REF 151  LAST  919    30,3513  54 001 1           TS      L                  INCR TO OFFSET, UNLIMITED
 0371   REF   1               30,3514  3 3764 1           CA      DUNFVLIM           SAME LIMIT FOR Y AND Z
 0372   REF   6  LAST  918    30,3515  0 3727 0           TC      LIMITSUB           YIELDS INCR TO OFFSET, LIMITED
 0373   REF   4  LAST  919    30,3516  6 0143 1           AD      TEM3               ORIGINAL OFFSET
 0374   REF 152  LAST  919    30,3517  54 001 1           TS      L                  TOTAL OFFSET, UNLIMITED
 0375   REF   1               30,3520  3 3765 0           CA      UNFVLIM            SAME LIMIT FOR Y AND Z
 0376   REF   7  LAST  919    30,3521  0 3727 0           TC      LIMITSUB           YIELDS TOTAL OFFSET, LIMITED
 0377   REF  19  LAST  919    30,3522  0 0142 0           TC      TEM2

R0378   SUBR TO TEST THE ANGLE BETWEEN THE PROPOSED WINDOW AND THRUST CMD VCTS

 0379                         30,3523   63441 0  UNWCTEST DOT     DSQ
 0380   REF   7  LAST  913    30,3524   00001 0                   UNX/2
 0381                         30,3525   50025 0           DSU     BMN
 0382   REF   1               30,3526   21767 1                   DOTSWFMX
 0383   REF   1               30,3527   61232 0                   DCMCL
 0384                         30,3530   43531 1           SSP     RVQ                RVQ FOR ALT CHOICE IF DOT MAGN TOO LARGE
 0385   REF   6  LAST  914    30,3531   03252 1                   FLAGOODW                ZEROING WINDOW GOOD FLAG
 0386                         30,3532   00000 1                   0
```

```
P0387    NB2CDUSP RETURNS THE 2'S COMPLEMENT, PI, SP CDU ANGLES X,Y,Z IN MPAC,+1,+2 GIVEN THE MATRIX WHOSE ROW VECTORS
R0389    ARE THE SEMI-UNIT NAV BASE VECTORS X,Y,Z EXPRESSED IN STABLE MEMBER COORDINATES, LOCATED AT 0 IN THE PUSH LIST.

R0391    NB2CDUSP USES ARCTRGSP WHICH HAS A MAXIMUM ERROR OF +-4 BITS.

 0392                          30,3533   63545 0  NB2CDUSP DLOAD  DSQ
 0393                          30,3534   00003 1                  2
 0394                          30,3535   51021 0           BDSU   BPL
 0395    REF   5  LAST  647    30,3536   06512 1                  DP1/4TH
 0396                          30,3537   61542 0                  +3
 0397                          30,3540   77745 1           DLOAD
 0398    REF  16  LAST  809    30,3541   06522 1                  ZEROVECS            IN CASE SIN WAS SLIGHTLY > 1/2
 0399                          30,3542   77566 1           SQRT   EXIT                YIELDS COS(CDUZ) IN UNITS OF 2

 0400                          30,3543  0 0006 1           EXTEND
 0401    REF 359  LAST  914    30,3544  3 0155 0           DCA    MPAC
 0402                          30,3545  20 001 1           DDOUBL
 0403    REF   3  LAST   98    30,3546  54 145 0           TS     TEM5
 0404                          30,3547  1 3552 1           TCF    +3
 0405    REF  22  LAST  900    30,3550  3 4733 1           CA     POSMAX              OVERFLOW. FETCH POSMAX, MPAC ALWAYS POS
 0406    REF   4  LAST  920    30,3551  54 145 0           TS     TEM5                COS(CDUZ) IN TEM5, UNITS 1

 0407    REF  29  LAST  886    30,3552  50 120 1           INDEX  FIXLOC
 0408                          30,3553  3 0002 0           CA     2
 0409    REF 360  LAST  920    30,3554  22 154 1           LXCH   MPAC
 0410    REF   1               30,3555  0 3622 1           TC     ARCTRGSP
 0411    REF 361  LAST  920    30,3556  54 156 1           TS     MPAC      +2        CDUZ

 0412    REF 174  LAST  914    30,3557  3 4755 1           CA     ZERO
 0413    REF   1               30,3560  0 3600 1           TC     DVBYCOSM
 0414    REF  20  LAST  859    30,3561  3 4751 0           CA     FOUR
 0415    REF   2  LAST  920    30,3562  0 3600 1           TC     DVBYCOSM
 0416    REF   9  LAST  336    30,3563  4 0141 1           CS     TEM1
 0417    REF   2  LAST  920    30,3564  0 3622 1           TC     ARCTRGSP
 0418    REF 362  LAST  920    30,3565  54 155 1           TS     MPAC      +1        CDUY

 0419    REF  37  LAST  900    30,3566  3 4750 1           CA     BIT4
 0420    REF   3  LAST  920    30,3567  0 3600 1           TC     DVBYCOSM
 0421    REF   1               30,3570  3 3577 1           CA     16OCT
 0422    REF   4  LAST  920    30,3571  0 3600 1           TC     DVBYCOSM
 0423    REF  10  LAST  920    30,3572  4 0141 1           CS     TEM1
 0424    REF   3  LAST  920    30,3573  0 3622 1           TC     ARCTRGSP
 0425    REF 363  LAST  920    30,3574  54 154 0           TS     MPAC                CDUX

 0426    REF 168  LAST  918    30,3575  0 6037 0           TC     INTPRET
 0427                          30,3576   77616 0           RVQ

 0428                          30,3577   00016 0  16OCT    OCT    16
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R0429    THE ELEMENTS OF THE NAV BASE MATRIX WHICH WE MUST DIVIDE BY COS(MGA)
R0430    ALREADY CONTAIN COS(MGA)/2 AS A FACTOR.  THEREFORE THE QUOTIENT SHOULD
R0431    ORDINARILY NEVER EXCEED 1/2 IN MAGNITUDE.  BUT IF THE MGA IS NEAR PI/2
R0432    THEN COS(MGA) IS NEAR ZERO, AND THERE MAY BE SOME CHAFF IN THE OTHER
R0433    ELEMENTS OF THE MATRIX WHICH WOULD PRODUCE CHAOS UNDER DIVISION.
R0434    BEFORE DIVIDING WE MAKE SURE COS(MGA) IS AT LEAST ONE BIT LARGER
R0435    THAN THE MAGNITUDE OF THE HIGH ORDER PART OF THE OPERAND.

R0436    IF ONE OR MORE DIVIDES CANNOT BE PERFORMED, THIS MEANS THAT THE
R0437    REQUIRED MGA IS VERY NEARLY +-PI/2 AND THEREFORE THE OTHER GIMBAL
R0438    ANGLES ARE INDETERMINATE.  THE INNER AND OUTER GIMBAL ANGLES RETURNED
R0439    IN THIS CASE WILL BE RANDOM MULTIPLES OF PI/2.

 0440    REF  30  LAST  920    30,3600  6 0120 1  DVBYCOSM AD      FIXLOC
 0441    REF   1               30,3601  54 116 0           TS      ADDRWD          ADRES OF OPERAND

 0442    REF   2  LAST  921    30,3602  50 116 1           INDEX   ADDRWD          FETCH NEG ABS OF OPERAND, AD TEM5, AND
 0443                          30,3603  3 0000 1           CA      0                   SKIP DIVIDE IF RESULT NEG OR ZERO
 0444                          30,3604  0 0006 1           EXTEND
 0445                          30,3605  6 3607 0           BZMF    +2
 0446                          30,3606  4 0000 0           COM
 0447    REF   5  LAST  920    30,3607  5 0145 1           AD      TEM5            C(A) ZERO OR NEG, C(TEM5) ZERO OR POS
 0448                          30,3610  0 0006 1           EXTEND
 0449    REF   1               30,3611  6 3617 1           BZMF    TSL&TCQ         DIFFERENCE ALWAYS SMALL IF BRANCH

 0450                          30,3612  0 0006 1           EXTEND                  TEM5 EXCEEDS ABS HIGH ORDER PART OF
 0451    REF   3  LAST  921    30,3613  5 0116 1           INDEX   ADDRWD               OPERAND BY AT LEAST ONE BIT.
 0452                          30,3614  3 0001 0           DCA     0                    THEREFORE IT EXCEEDS THE DP OPERAND
 0453                          30,3615  0 0006 1           EXTEND                       AND DIVISION WILL ALWAYS SUCCEED.
 0454    REF   6  LAST  921    30,3616  10 145 0           DV      TEM5
 0455    REF 153  LAST  919    30,3617  54 001 1  TSL&TCQ  TS      L
 0456    REF  11  LAST  920    30,3620  22 141 0           LXCH    TEM1
 0457    REF 220  LAST  899    30,3621  0 0002 0           TC      Q
```

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P0458    ARCTRGSP RETURNS THE 2'S COMPLEMENT, PI, SP ANGLE IN THE A REGISTER GIVEN ITS SINE IN A AND ITS COSINE IN L IN
R0460    UNITS OF 2.  THE RESULT IS AN UNAMBIGUOUS ANGLE ANYWHERE IN THE CIRCLE, WITH A MAXIMUM ERROR OF +-4 BITS.
R0462    THE ERROR IS PRODUCED BY THE SUBROUTINE SPARCSIN WHICH IS USED ONLY IN THE REGION +-45 DEGREES.

 0464                           30,3622  0 0006 1  ARCTRGSP EXTEND
 0465    REF   1                30,3623  1 3665 0           BZF     SINZERO             TO AVOID DIVIDING BY ZERO

 0466                           30,3624  0 0006 1           EXTEND
 0467    REF  10  LAST  420     30,3625  22 144 0           QXCH    TEM4
 0468    REF  20  LAST  919     30,3626  54 142 1           TS      TEM2
 0469    REF 154  LAST  921     30,3627  3 0001 0           CA      L
 0470    REF   5  LAST  919     30,3630  54 143 0           TS      TEM3
 0471    REF 175  LAST  920     30,3631  3 4755 1           CA      ZERO
 0472                           30,3632  0 0006 1           EXTEND
 0473    REF  21  LAST  922     30,3633  10 142 1           DV      TEM2
 0474                           30,3634  0 0006 1           EXTEND
 0475    REF   1                30,3635  1 3654 1           BZF     USECOS

 0476    REF   6  LAST  922     30,3636  10 143 0           CCS     TEM3                SIN IS SMALLER OR EQUAL
 0477    REF 176  LAST  922     30,3637  3 4755 1           CA      ZERO
 0478                           30,3640  1 3644 0           TCF     +4
 0479    REF  22  LAST  922     30,3641  4 0142 1           CS      TEM2                IF COS NEG, REVERSE SIGN OF SIN,
 0480    REF  23  LAST  922     30,3642  54 142 1           TS      TEM2                     ANGLE = PI-ARCSIN(SIN)
 0481    REF   4  LAST  826     30,3643  3 4735 1           CA      NEGMAX              PICK UP PI, 2'S COMPLEMENT
 0482    REF   7  LAST  922     30,3644  54 143 0           TS      TEM3                WE NO LONGER NEED COS
 0483    REF  24  LAST  922     30,3645  3 0142 0           CA      TEM2
 0484    REF   2  LAST  807     30,3646  0 3672 1           TC      SPARCSIN -1
 0485    REF   2  LAST  918     30,3647  0 3743 1           TC      ONESTO2S
 0486                           30,3650  0 0006 1           EXTEND
 0487    REF   8  LAST  922     30,3651  20 143 0           MSU     TEM3
 0488    REF   3  LAST  922     30,3652  0 3743 1  1TO2&TCQ TC      ONESTO2S
 0489    REF  11  LAST  922     30,3653  0 0144 0           TC      TEM4

 0490    REF   9  LAST  922     30,3654  4 0143 0  USECOS   CS      TEM3                COS IS SMALLER
 0491    REF   3  LAST  922     30,3655  0 3672 1           TC      SPARCSIN -1         ANGLE = SIGN(SIN)(PI/2-ARCSIN(COS))
 0492    REF   9  LAST  901     30,3656  6 4736 1           AD      HALF
 0493    REF  10  LAST  922     30,3657  54 143 0           TS      TEM3                WE NO LONGER NEED COS
 0494    REF  25  LAST  922     30,3660  10 142 1           CCS     TEM2
 0495    REF  11  LAST  922     30,3661  3 0143 1           CA      TEM3
 0496    REF   1                30,3662  1 3652 1           TCF     1TO2&TCQ
 0497    REF  12  LAST  922     30,3663  4 0143 0           CS      TEM3
 0498    REF   2  LAST  922     30,3664  1 3652 1           TCF     1TO2&TCQ

 0499    REF 155  LAST  922     30,3665  10 001 1  SINZERO  CCS     L
 0500    REF 177  LAST  922     30,3666  3 4755 1           CA      ZERO
 0501    REF 221  LAST  921     30,3667  0 0002 0           TC      Q
 0502    REF   5  LAST  922     30,3670  3 4735 1           CA      NEGMAX              PI, 2'S COMP
 0503    REF 222  LAST  922     30,3671  0 0002 0           TC      Q
```

```
R0504    SPARCSIN TAKES AN ARGUMENT SCALED UNITY IN A AND RETURNS AN ANGLE SCALED
R0505    180 DEGREES IN A.  IT HAS BEEN UNIT TESTED IN THE REGION +-.94 (+- 70
R0506    DEGREES) AND THE MAXIMUM ERROR IS +-5 BITS WITH AN AVERAGE TIME OF
R0507    45  MICROSECONDS.  SPARCSIN -1 TAKES THE ARGUMENT SCALED TWO.(BOB CRISP)

 0508                          30,3672  6 0000 1             DOUBLE
 0509    REF   8  LAST  444    30,3673  54 021 0  SPARCSIN TS       SR
 0510                          30,3674  1 3700 1             TCF      +4
 0511    REF 274  LAST  911    30,3675  50 000 1             INDEX    A
 0512    REF   1               30,3676  4 4734 1             CS       LIMITS
 0513    REF   9  LAST  923    30,3677  54 021 0             TS       SR
 0514                          30,3700  0 0006 1             EXTEND
 0515    REF 275  LAST  923    30,3701  7 0000 0             MP       A
 0516    REF  12  LAST  921    30,3702  54 141 1             TS       TEM1
 0517                          30,3703  0 0006 1             EXTEND
 0518    REF   1               30,3704  7 3726 0             MP       DPL9
 0519    REF   1               30,3705  6 3725 1             AD       DPL7
 0520                          30,3706  0 0006 1             EXTEND
 0521    REF  13  LAST  923    30,3707  7 0141 1             MP       TEM1
 0522    REF   1               30,3710  6 3724 0             AD       DPL5
 0523                          30,3711  0 0006 1             EXTEND
 0524    REF  14  LAST  923    30,3712  7 0141 1             MP       TEM1
 0525    REF   1               30,3713  6 3723 1             AD       DPL3
 0526                          30,3714  0 0006 1             EXTEND
 0527    REF  15  LAST  923    30,3715  7 0141 1             MP       TEM1
 0528    REF   1               30,3716  6 3722 0             AD       DPL1
 0529                          30,3717  0 0006 1             EXTEND
 0530    REF  10  LAST  923    30,3720  7 0021 0             MP       SR
 0531    REF 223  LAST  922    30,3721  0 0002 0             TC       Q
 0532                          30,3722   24406 0  DPL1       DEC      10502
 0533                          30,3723   00660 1  DPL3       DEC      432
 0534                          30,3724   16204 0  DPL5       DEC      7300
 0535                          30,3725   50744 0  DPL7       DEC      -11803
 0536                          30,3726   20315 1  DPL9       DEC      8397
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R0537    LIMITSUB LIMITS THE MAGNITUDE OF THE POSITIVE OR NEGATIVE VARIABLE
R0538    ARRIVING IN L TO THE POSITIVE LIMIT ARRIVING IN A.
R0539    THE SIGNED LIMITED VARIABLE IS RETURNED IN A.

R0540    VERSION COURTESY HUGH BLAIR-SMITH

 0541    REF  16  LAST  923    30,3727  54 141 1  LIMITSUB TS      TEM1
 0542    REF 178  LAST  922    30,3730  3 4755 1           CA      ZERO
 0543                          30,3731  0 0006 1           EXTEND
 0544    REF  17  LAST  924    30,3732  10 141 1           DV      TEM1
 0545    REF 276  LAST  923    30,3733  10 000 0           CCS     A
 0546    REF  18  LAST  924    30,3734  22 141 0           LXCH    TEM1
 0547                          30,3735  1 3737 0           TCF     +2
 0548                          30,3736  1 3741 1           TCF     +3
 0549    REF 156  LAST  922    30,3737  3 0001 0           CA      L
 0550    REF 224  LAST  923    30,3740  0 0002 0           TC      Q
 0551    REF  19  LAST  924    30,3741  4 0141 1           CS      TEM1
 0552    REF 225  LAST  924    30,3742  0 0002 0           TC      Q

R0553    SUBROUTINE TO CONVERT 1'S COMP SP TO 2'S COMP

 0554    REF 277  LAST  924    30,3743  10 000 0  ONESTO2S CCS     A
 0555    REF 105  LAST  918    30,3744  6 4753 1           AD      ONE
 0556    REF 226  LAST  924    30,3745  0 0002 0           TC      Q
 0557    REF 278  LAST  924    30,3746  4 0000 0           CS      A
 0558    REF 227  LAST  924    30,3747  0 0002 0           TC      Q

R0559    NO ATTITUDE CONTROL

 0560    REF  35  LAST  875    30,3750  0 5567 0  NOATTCNT TC      ALARM  827
 0561                          30,3751   00402 1           OCT     00402            NO ATTITUDE CONTROL

 0562                          30,3752  0 0004 0  +2       INHINT                   COME HERE FOR NOATTCNT WITHOUT ALARM
 0563    REF  45  LAST  875    30,3753  0 4674 0           TC      IBNKCALL         RELINT AT TC INTPRET AFTER TCQCDUW
 0564    REF   7  LAST  863    30,3754   40165 1           FCADR   STOPRATE
 0565    REF   1               30,3755  1 3475 0           TCF     TCQCDUW          RETURN TO USER SKIPPING AUTOPILOT CMDS

R0566    MIDDLE GIMBAL ANGLE ALARM

 0567    REF  36  LAST  924    30,3756  0 5567 0  ALARMMGA TC      ALARM
 0568                          30,3757   00401 1           OCT     00401
 0569    REF   1               30,3760  1 3275 0           TCF     MGARET
```

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R0570   ***********************************************************************
R0571   CONSTANTS
R0572   ***********************************************************************

R0573   ADDRESS CONSTANTS

 0574   REF   3  LAST  910   30,3761   03246 1  ECDUWL    ECADR   ECDUW
R0575
R0576   THRUST DIRECTION FILTER CONSTANTS

 0577                        30,3762   06315 0  GAINFLTR  DEC     .2                     GAIN FILTER SANS CSM
 0578                        30,3763   03146 1            DEC     .1                     GAIN FILTER WITH CSM

 0579                        30,3764   00071 1  DUNFVLIM  DEC     .007          B-1      7 MR MAX CHG IN F DIR IN VEH IN 2 SECS.
A0580                                                                                    THIS DOES NOT ALLOW FOR S/C ROT RATE.

 0581                        30,3765   02041 0  UNFVLIM   DEC     .129          B-1      129 MR MAX THRUST OFFSET. 105 MR TRAVEL
A0582                                                                                    +10MR DEFL+5MR MECH MOUNT+9MR ABLATION.
R0583
R0584   CONSTANTS RELATED TO GIMBAL ANGLE COMPUTATIONS

 0585                        30,3766   01673 1  DOTSWFMX  DEC     .93302        B-4      LIM COLNRTY OF UNWC/2 & UNFC/2 TO 85 DEG
A0586                                                                                    LOWER PART COMES FROM NEXT CONSTANT

 0587                        30,3767   03434 1  DAXMAX    DEC     .11111111111           DELATTX LIM TO 20 DEG IN 2 SECS, 1'S, PI
 0588                        30,3770   00266 0            DEC     .0111111111            2 DEG WHEN CSM DOCKED

 0589                        30,3771   01616 1  DAY/2MAX  DEC     .05555555555           LIKEWISE FOR DELATTY
 0590                        30,3772   00133 0            DEC     .0055555555

 0591   REF   2  LAST  916   30,3767            DAZMAX    =       DAXMAX                 LIKEWISE FOR DELATTZ

 0592                        30,3773   14344 1  CDUZDLIM  DEC     .3888888888            70 DEG LIMIT FOR MGA, 1'S, PI
R0593
R0594   CONSTANTS FOR DATA TRANSFER

 0595                        30,3774   01463 1  DT/DELT   DEC     .05                    .1 SEC/2 SEC WHICH IS THE AUTOPILOT
A0596                                                                                    CONTROL SAMPLE PERIOD/COMPUTATION PERIOD

 0597   REF   2  LAST  916   30,3771            DELERLIM  =       DAY/2MAX               10 DEG LIMIT FOR LAG ANGLES, 1'S, PI
R0598


*** END OF FLY     .132 ***
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R0001    PROGRAM NAME- PROG52                                                              DATE- JAN 9, 1967
R0003    MOD NO- 0                                                                         LOG SECTION- P51-P53
R0005    MODIFICATION BY- LONSKE                                                           ASSEMBLY- SUNDANCE REV 46

R0007    FUNCTIONAL DESCRIPTION-

R0008          ALIGNS THE IMU TO ONE OF THREE ORIENTATIONS SELECTED BY THE ASTRONAUT. THE PRESENT IMU ORIENTATION IS KNOWN
R0010    AND IS STORED IN REFSMMAT. THE THREE POSSIBLE ORIENTATIONS MAY BE_

R0011          (A) PREFERRED ORIENTATION

R0012           AN OPTIMUM ORIENTATION FOR A PREVIOUSLY CALCULATED MANUEVER. THIS ORIENTATION MUST BE CALCULATED AND
R0014          STORED BY A PREVIOUSLY SELECTED PROGRAM.

R0015          (B) NOMINAL ORIENTATION

R0016              X    =  UNIT ( R )
R0017              -SM

R0018              Y   =  UNIT (V X R)
R0019               SM

R0020              Z    =  UNIT (X    X   Y   )
R0021               SM            SM      SM

R0022              WHERE_
R0023               R = THE GEOCENTRIC RADIUS VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0025               -

R0026               V = THE INERTIAL VELOCITY VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0028               -

R0029          (C) REFSMMAT ORIENTATION

R00291             (D)  LANDING SITE - THIS IS NOT AVAILIBLE IN SUNDANCE

R0030           THIS SELECTION CORRECTS THE PRESENT IMU ORIENTATION. THE PRESENT ORIENTATION DIFFERS FROM THAT TO WHICH IT
R0032          WAS LAST ALIGNED ONLY DUE TO GYRO DRIFT(I.E. NEITHER GIMBAL LOCK NOR IMU POWER INTERRUPTION HAS OCCURED
R0034          SINCE THE LAST ALIGNMENT).

R0035          AFTER A IMU ORIENTATION HAS BEEN SELECTED ROUTINE S52.2 IS OPERATED TO COMPUTE THE GIMBAL ANGLES USING THE
R0037    NEW ORIENTATION AND THE PRESENT VEHICLE ATTITUDE. CAL52A THEN USES THESE ANGLES, STORED IN THETAD,+1,+2, TO
R0039    COARSE ALIGN THE IMU. THE STAR SELECTION ROUTINE, R56, IS THEN OPERATED. IF 2 STARS ARE NOT AVAILABLE AN ALARM
R0041    IS FLASHED TO NOTIFY THE ASTRONAUT. AT THIS POINT THE ASTRONAUT WILL MANUEVER THE VEHICLE AND SELECT 2 STARS
R0043    EITHER MANUALLY OR AUTOMATICALLY. AFTER 2 STARS HAVE BEEN SELECTED THE IMU IS FINE ALIGNED USING ROUTINE R51. IF
R0045    THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING(INDICATED BY RNDVZFLG) P20 IS DISPLAYED. OTHERWISE P00 IS
R0047    REQUESTED.

R0048    CALLING SEQUENCE-
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R0049         THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R0050   SUBROUTINES CALLED-

R0051        1. FLAGDOWN        7. S52.2           13. NEWMODEX
R0052        2. R02BOTH         8. CAL53A          14. PRIOLARM
R0053        3. GOPERF4         9. FLAGUP
R0054        4. MATMOVE        10. R56
R0055        5. GOFLASH        11. R51
R0056        6. S52.3          12. GOPERF3

R0057   NORMAL EXIT MODES-

R0058        EXITS TO ENDOFJOB

R0059   ALARM OR ABORT EXIT MODES-

R0060        NONE

R0061   OUTPUT-

R0062        THE FOLLOWING MAY BE FLASHED ON THE DSKY
R0063           1. IMU ORIENTATION CODE
R0064           2. ALARM CODE 215 -PREFERRED IMU ORIENTATION NOT SPECIFIED
R0065           3. TIME OF NEXT IGNITION
R0066           4. GIMBAL ANGLES
R0067           5. ALARM CODE 405 -TWO STARS NOT AVAILABLE
R0068           6. PLEASE PERFORM P00
R0069        THE MODE DISPLAY MAY BE CHANGED TO 20

R0070   ERASABLE INITIALIZATION REQUIRED-

R0071        PFRATFLG SHOULD BE SET IF A PREFERRED ORIENTATION HAS BEEN COMPUTED.IF IT HAS BEEN COMPUTED IT IS STORED IN
R0073        XSMD,YSMD,ZSMD.
R0074        RNDVZFLG INDICATES WHETHER THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING.

R0076   DEBRIS-

R0077        WORK AREA
 0078                       33,3777                          BANK    33
 0079   REF   2  LAST  250  15,2000                          SETLOC  P50S
 0080                       15,2050                          BANK

 0081   REF   3  LAST  196  E5,1755                          EBANK=  BESTI
 0082   REF   1                                              COUNT*  $$/P52
 0085   REF 252  LAST  895  15,2050  0 4616 1  PROG52        TC      BANKCALL
 0086   REF  11  LAST  838  15,2051   11254 1                CADR    R02BOTH         IMU STATUS CHECK
 0087   REF   1             15,2052  3 4750 1                CAF     PFRATBIT
 0088   REF  27  LAST  861  15,2053  7 0076 1                MASK    FLAGWRD2        IS PFRATFLG SET?
 0089   REF 279  LAST  924  15,2054  10 000 0                CCS     A
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0090   REF   1               15,2055   0 2060 0            TC      P52A          YES
0091   REF  43  LAST  907    15,2056   3 4752 0            CAF     BIT2          NO
0092   REF   2  LAST  928    15,2057   0 2061 1            TC      P52A +1
0093   REF  42  LAST  852    15,2060   3 4753 1  P52A      CAF     BIT1
0094   REF   8  LAST  725    15,2061  55'145 1             TS      OPTION2
0095   REF  43  LAST  928    15,2062   3 4753 1  P52B      CAF     BIT1
0096   REF 253  LAST  927    15,2063   0 4616 1            TC      BANKCALL      FLASH OPTION CODE AND ORIENTATION CODE
0097   REF   1               15,2064    20713 0            CADR    GOPERF4R      FLASH V04N06
0098   REF  38  LAST  895    15,2065   0 6001 0            TC      GOTOPOOH
0099                         15,2066   1 2073 0            TCF     +5            V33-PROCEED
0100   REF   1               15,2067   0 2062 1            TC      P52B          NEW CODE - NEW ORIENTATION CODE INPUT
0101   REF  77  LAST  866    15,2070   0 5353 1            TC      PHASCHNG      DISPLAY RETURN
0102                         15,2071    00014 1            OCT     00014
0103   REF 141  LAST  895    15,2072   0 5155 0            TC      ENDOFJOB

0104   REF   9  LAST  928    15,2073   3 1145 0            CA      OPTION2
0105   REF  26  LAST  832    15,2074   7 6245 0            MASK    THREE
0106   REF 280  LAST  927    15,2075  50 000 1             INDEX   A
0107                         15,2076   0 2077 0            TC      +1
0108   REF   1               15,2077   1 2105 0            TCF     OPT4          OPTION 4 LANDING SITE
0109   REF   1               15,2100   1 2153 0            TCF     P52H          OPTION 1 PREFERRED
0110   REF   1               15,2101   1 2110 1            TCF     P52T          OPTION 2 NOMINAL
0111   REF 169  LAST  920    15,2102   0 6037 0  P52E      TC      INTPRET       OPTION 3 REFSMMAT
0112                         15,2103    77650 1            GOTO
0113   REF   1               15,2104    32164 0                    P52F          GO DO R51

01131                        15,2105   0 0006 1  OPT4      EXTEND
01132  REF   5  LAST  786    15,2106   3 1401 0            DCA     TLAND         IF OPTION 4 DISPLAY TLAND
01133  REF   2  LAST  928    15,2107   1 2112 0            TCF     P52T +2

0114                         15,2110   0 0006 1  P52T      EXTEND
0115   REF  25  LAST  906    15,2111   3 4755 1            DCA     NEGO
0116   REF  26  LAST  725    15,2112  53'046 0             DXCH    DSPTEM1
0117   REF   1               15,2113   3 2170 0            CAF     V06N34*
01171  REF 254  LAST  928    15,2114   0 4616 1            TC      BANKCALL
01172  REF  27  LAST  854    15,2115    20476 0            CADR    GOFLASH
0118   REF  39  LAST  928    15,2116   0 6001 0            TC      GOTOPOOH
0119                         15,2117   0 2121 1            TC      +2
0120                         15,2120   0 2113 0            TC      -5
0121   REF  27  LAST  928    15,2121  53'046 0             DXCH    DSPTEM1
0122                         15,2122   0 0006 1            EXTEND
0123                         15,2123   6 2125 0            BZMF    +2            IF TIME ZERO OR NEG USE TIME2
0124                         15,2124   1 2127 0            TCF     +3
0125                         15,2125   0 0006 1            EXTEND
0126   REF  28  LAST  894    15,2126   3 0025 0            DCA     TIME2
0127   REF   4  LAST  202    15,2127  53'775 1             DXCH    TALIGN
0128   REF  10  LAST  928    15,2130   3 1145 0  P52V      CA      OPTION2
0130   REF  44  LAST  928    15,2131   7 4752 1            MASK    BIT2
0131   REF 281  LAST  928    15,2132  10 000 0             CCS     A
0132   REF   1               15,2133   0 2137 0            TC      P52W
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0133   REF 170  LAST  928   15,2134  0 6037 0          TC      INTPRET          OPTION 4 - GET LS ORIENTATION
0134                        15,2135    77650 1          GOTO
0135   REF   1              15,2136    32220 0                  P52LS
```

```
P0151    START ALIGNMENT

 0152    REF 171  LAST  929   15,2137  0 6037 0  P52W      TC      INTPRET
 0153                         15,2140   45145 0            DLOAD   CALL                PICK UP ALIGN TIME
 0154    REF   5  LAST  928   15,2141   02775 0                    TALIGN              COMPUTE NOMINAL IMU
 0156    REF   1              15,2142   31650 0                    S52.3                ORIENTATION
 0157                         15,2143   77624 1  P52D      CALL                        READ VEHICLE ATTITUDE AND
 0158    REF   1              15,2144   31617 0                    S52.2                COMPUTE GIMBAL ANGLES
 0162                         15,2145   77776 1            EXIT
 0163    REF   2  LAST  485   15,2146  3 5010 0            CAF     V06N22
 0164    REF 255  LAST  928   15,2147  0 4616 1            TC      BANKCALL            DISPLAY GIMBAL ANGLES
 0165    REF  28  LAST  928   15,2150   20476 0            CADR    GOFLASH
 0166    REF  40  LAST  928   15,2151  0 6001 0            TC      GOTOPOOH
 0167    REF   1              15,2152  1 2171 0            TCF     COARSTYP            V33-PROCEED, SEE IF GYRO TORQUE COARSE
 0168    REF 172  LAST  930   15,2153  0 6037 0  P52H      TC      INTPRET
 0169                         15,2154   77650 1            GOTO
 0170    REF   1              15,2155   32143 0                    P52D
 0171    REF 173  LAST  930   15,2156  0 6037 0  REGCOARS TC       INTPRET
 0172                         15,2157   77624 1            CALL                        DO COARSE ALIGN
 0173    REF   1              15,2160   31327 0                    CAL53A               ROUTINE
 0174                         15,2161   43014 0  COARSRET SET      CLEAR
 0175    REF   2  LAST  680   15,2162   01462 0                    REFSMFLG
 0176    REF   2  LAST  769   15,2163   01273 0                    PFRATFLG
 0177                         15,2164   77624 1  P52F      CALL
 0178    REF   1              15,2165   31015 1                    R51
 0179                         15,2166   77776 1  P52OUT    EXIT
 0180    REF  41  LAST  930   15,2167  0 6001 0            TC      GOTOPOOH
 0196    REF   5  LAST  748      5006            VB05N09   =       V05N09
 0198                         15,2170   01442 1  V06N34*   VN      634
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```
P0200   CHECK FOR GYRO TORQUE COARSE ALIGNMENT
 0201   REF   1                 15,2171  3 2217 1  COARSTYP CAF     OCT13
 0202   REF 256  LAST  930      15,2172  0 4616 1           TC      BANKCALL      DISPLAY V 50N25 WITH COARSE ALIGN OPTION
 0203   REF   5  LAST  789      15,2173   20623 1           CADR    GOPERF1
 0204   REF  42  LAST  930      15,2174  1 6001 1           TCF     GOTOPOOH      V34-TERMINATE
 0205   REF   1                 15,2175  1 2156 0           TCF     PEGCOARS      V33-NORMAL COARSE
 0206   REF 174  LAST  930      15,2176  0 6037 0           TC      INTPRET       V32-GYRO TORQUE COARSE
 0207                           15,2177   64375 1           VLOAD   MXV
 0208   REF   4  LAST  149      15,2200   03607 0                   XSMD          GET SM(DESIRED) WRT SM(PRESENT)
 0209   REF  37  LAST  880      15,2201   01734 0                   REFSMMAT
 0210                           15,2202   77656 1           UNIT
 0211   REF   3  LAST  123      15,2203   26665 0           STOVL   XDC
 0212   REF   3  LAST  147      15,2204   03615 0                   YSMD
 0213                           15,2205   53521 1           MXV     UNIT
 0214   REF  38  LAST  931      15,2206   01734 0                   REFSMMAT
 0215   REF   3  LAST  123      15,2207   26673 1           STOVL   YDC
 0216   REF   3  LAST  148      15,2210   03623 0                   ZSMD
 0217                           15,2211   53521 1           MXV     UNIT
 0218   REF  39  LAST  931      15,2212   01734 0                   REFSMMAT
 0219   REF   3  LAST  123      15,2213   36701 1           STCALL  ZDC
 0220   REF   1                 15,2214   31164 0                   GYCOARS
 02201                          15,2215   77650 1           GOTO
 02202  REF   1                 15,2216   32166 1                   P52OUT
 0221                           15,2217   00013 0  OCT13    OCT     13
```

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P0222   COMPUTE LANDING ORIENTATION FOR OPTION 4
 0223                        15,2220   43014 0  P52LS    SET     CLEAR        GET LANDING SITE ORIENTATION
 0224   REF   4  LAST  791   15,2221   01463 1                   LUNAFLAG
 0225   REF   2  LAST  657   15,2222   00662 0                   ERADFLAG     TO PICK UP RLS
 0226                        15,2223   77201 1           SETPD   VLOAD
 0227                        15,2224   00001 0                   0
 0228   REF   9  LAST  842   15,2225   02023 1                   RLS          PICK UP LANDING SITE VEC IN MF
 0229                        15,2226   41525 0           PDDL    PUSH         RLS PD 0-5
 0230   REF   6  LAST  930   15,2227   02775 0                   TALIGN
 0231   REF   6  LAST  928   15,2230   36401 1           STCALL  TLAND        JAM ALIGN TIME IN TLAND FOR OPTION 4

 0232   REF   3  LAST  841   15,2231   55716 1                   RP-TO-R      TRANS RLS TO REF
 0233                        15,2232   77742 0           VSR2
 0234   REF   4  LAST  791   15,2233   16032 1           STODL   ALPHAV       INPUT TO LAT-LONG
 0235   REF   7  LAST  932   15,2234   02775 0                   TALIGN
 0236                        15,2235   77624 1           CALL
 02361  REF   1              15,2236   30446 1                   N89DISP
 02362                       15,2237   53575 0           VLOAD   UNIT         COMPUTE LANDING SITE ORIENT (XSMD)
 02363  REF   5  LAST  932   15,2240   02032 1                   ALPHAV
 02364  REF   5  LAST  931   15,2241   37607 1           STCALL  XSMD
 02365  REF   1              15,2242   11013 0                   LSORIENT
 02366                       15,2243   77650 1           GOTO
 02367  REF   2  LAST  930   15,2244   32143 0                   P52D         NOW GO COMPUTE GIMBAL ANGLES
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P0237    SUBROUTINE TO CALCULATE AND DISPLAY THE LUNAR LANDING SITE

 02371  REF   2  LAST  45   14,2000                          SETLOC P50S1
 02372                      14,2446                          BANK
 02373  REF  16  LAST 388   E5,1642                          EBANK= XSM

 0238                       14,2446   77620 0  N89DISP   STQ
 0239   REF   3  LAST 798   14,2447   02746 0                     QMAJ
 0240  *REF  14  LAST 902   14,2450   35243 1            STCALL GDT/2 +4        TEMP STORE TIME
 0241   REF   3  LAST 791   14,2451   26351 1                   LAT-LONG
 0242                       14,2452   70545 1            DLOAD  SR1
 0243   REF   3  LAST 314   14,2453   01123 0                   LONG
 0244   REF   3  LAST 317   14,2454   16711 1            STODL  LANDLONG
 0245   REF   3  LAST 314   14,2455   01125 0                   ALT
 0246   REF   2  LAST 317   14,2456   16713 0            STODL  LANDALT
 0247   REF   3  LAST 314   14,2457   01121 1                   LAT
 0248   REF   3  LAST 317   14,2460   16707 0            STODL  LANDLAT
 0249                       14,2461   77776 1            EXIT

 0250   REF   1             14,2462 3 2505 0  LSDISP     CAF    V06N89*         DISPLAY LAT,LONG/2,ALT
 0251   REF 257  LAST 931   14,2463 0 4616 1             TC     BANKCALL
 0252   REF  29  LAST 930   14,2464  20476 0             CADR   GOFLASH
 0253   REF  43  LAST 931   14,2465 1 6001 1             TCF    GOTOPOOH        V34-TERMINATE-EXIT P57
 0254                       14,2466 1 2470 1             TCF    +2              V33-PROCEED- ACCEPT LS DATA
 0255   REF   1             14,2467 1 2462 1             TCF    LSDISP          V32 OR E- LOOK AGAIN AND/OR LOAD NEW LS

 0256   REF 175  LAST 931   14,2470 0 6037 0             TC     INTPRET
 0257                       14,2471  72545 0             DLOAD  SL1
 0258   REF   4  LAST 933   14,2472  02711 1                    LANDLONG
 0259   REF   4  LAST 933   14,2473  15123 0             STODL  LONG
 0260   REF   3  LAST 933   14,2474  02713 0                    LANDALT
 0261   REF   4  LAST 933   14,2475  15125 0             STODL  ALT
 0262   REF   4  LAST 933   14,2476  02707 0                    LANDLAT
 0263   REF   4  LAST 933   14,2477  15121 1             STODL  LAT
 0264  *REF  15  LAST 933   14,2500  01243 0                    GDT/2 +4        PICK UP TIME
 0265                       14,2501  77624 1             CALL                   GET RLS BACK FROM LAT,LONG, ALT.
 0266   REF   1             14,2502  26422 1                    LALOTORV        RLS B-29 IN MPAC AND ALPHAV
 0267                       14,2503  77650 1             GOTO
 0268   REF   4  LAST 933   14,2504  02746 0                    QMAJ
 02681                      14,2505  01531 1  V06N89*    VN     689
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R0269   NAME -S50 ALIAS  LOCSAM
R0270   BY
R0271   VINCENT
R0272   FUNCTION - COMPUTE INPUTS FOR PICAPAR  AND PLANET

R0273            DEFINE

R0274
R0275            U    = UNIT( SUN WRT EARTH)
R0276             ES

R0277            U    =UNIT( MOON WRT EARTH)
R0278             EM

R0279            R    =POSITION VECTOR OF LEM
R0280             L

R0281            R    =MEAN DISTANCE (384402KM) BETWEEN EARTH AND MOON
R0282             EM

R0283            P    =RATIO    R   /(DISTANCE SUN TO EARTH)    >.00257125
R0284                             EM

R0285            R    =EQUATORIAL RADIUSS (6378.166KM) OF EARTH
R0286             E

R0287            LOCSAM  COMPUTES IN EARTH INFLUENCE
R0288

R0289        VSUN    =   U
R0290                     ES

R0291       VEARTH   =   -UNIT( R   )
R0292                            L

R0293       VMOON    =    UNIT(R   .U   - R   )
R0294                           EM  EM     L

R0295       CSUN     =   COS 90

R0296       CEARTH   =    COS(5 +ARCSIN(R /MAG(R )))
R0297                                    E      L

R0298       CMOON    =    COS 5

R0299
R0300   INPUT -  TIME IN MPAC
R0301   OUTPUT - LISTED ABOVE
R0302   SUBROUTINES -LSPOS,LEMPREC
R0303   DEBRIS - VAC AREA ,TSIGHT
```

```
 0307   REF   2 LAST   45 TC   45:      8       8*           COUNT* $$/LOSAM

 0308   REF   1                14,2506              S50      =      LOCSAM
 0309                          14,2506   77620 0    LOCSAM   STQ
 0310   REF   2  LAST   123    14,2507   02745 0                    QMIN
 0311   REF   2  LAST   258    14,2510   37562 1             STCALL TSIGHT
 0312   REF   1                14,2511   33664 0                    LSPOS
 0313                          14,2512   77745 1             DLOAD
 0314   REF   3  LAST   935    14,2513   03562 0                    TSIGHT
 0315   REF  52  LAST   839    14,2514   34041 0             STCALL TDEC1
 0316   REF  12  LAST   839    14,2515   27057 0                    LEMPREC
 0317                          14,2516   61131 0             SSP    TIX,2
 0318   REF   9  LAST   721    14,2517   00052 0                    S2
 0319                          14,2520   00000 1                    0
 0320   REF   1                14,2521   30543 0                    MOONCNTR
 0321                          14,2522   74375 0    EARTCNTR VLOAD  VXSC
 0322   REF   3  LAST   487    14,2523   02723 0                    VMOON
 0323   REF   1                14,2524   30001 0                    RSUBEM
 0324                          14,2525   52372 0             VSL1   VSU
 0325   REF  29  LAST   839    14,2526   00001 0                    RATT
 0326                          14,2527   77656 1             UNIT
 0327   REF   4  LAST   935    14,2530   26723 0             STOVL  VMOON
 0328   REF  30  LAST   935    14,2531   00001 0                    RATT
 0329                          14,2532   57456 1             UNIT   VCOMP
 0330   REF   3  LAST   124    14,2533   16707 0             STODL  VEARTH
 0331   REF   1                14,2534   30005 1                    RSUBE
 0332                          14,2535   77624 1             CALL
 0333   REF   1                14,2536   30575 0                    OCCOS
 0334   REF   1                14,2537   14017 1             STODL  CEARTH
 0335   REF   1                14,2540   30604 0                    CSS5
 0336   REF   1                14,2541   34023 1             STCALL CMOON
 0337   REF   1                14,2542   30570 0                    ENDSAM
 0338                          14,2543   74375 0    MOONCNTR VLOAD  VXSC
 0339   REF   5  LAST   935    14,2544   02723 0                    VMOON
 0340   REF   1                14,2545   30007 0                    ROE
 0341                          14,2546   53445 1             BVSU   UNIT
 0342   REF   2  LAST   123    14,2547   02715 0                    VSUN
 0343   REF   3  LAST   935    14,2550   26715 0             STOVL  VSUN
 0344   REF   6  LAST   935    14,2551   02723 0                    VMOON
 0345                          14,2552   53361 0             VXSC   VAD
 0346   REF   2  LAST   935    14,2553   30001 0                    RSUBEM
 0347   REF  31  LAST   935    14,2554   00001 0                    RATT
 0348                          14,2555   57456 1             UNIT   VCOMP
 0349   REF   4  LAST   935    14,2556   26707 0             STOVL  VEARTH
 0350   REF  32  LAST   935    14,2557   00001 0                    RATT
 0351                          14,2560   57456 1             UNIT   VCOMP
 0352   REF   7  LAST   935    14,2561   16723 0             STODL  VMOON
 0353   REF   1                14,2562   30003 1                    RSUBM
 0354                          14,2563   77624 1             CALL
 0355   REF   2  LAST   935    14,2564   30575 0                    OCCOS
 0356   REF    2  LAST  935   14,2565   14023 0            STODL  CMOON
 0357   REF    2  LAST  935   14,2566   30604 0                   CSS5
 0358   REF    2  LAST  935   14,2567   00017 1            STORE  CEARTH
 0359                         14,2570   77745 1  ENDSAM    DLOAD
 0360   REF    1              14,2571   30606 1                   CSSUN
 0361   REF    1              14,2572   00021 1            STORE  CSUN
 0362                         14,2573   77650 1            GOTO
 0363   REF    3  LAST  935   14,2574   02745 0                   QMIN
 0364                         14,2575   70471 1  OCCOS     DDV    SR1
 0365                         14,2576   00045 0                   36D
 0366                         14,2577   43336 0            ASIN   DAD
 0367   REF    1              14,2600   30610 0                   5DEGREES
 0368                         14,2601   70546 1            COS    SR1
 0369                         14,2602   77616 0            RVQ
 0370                            0016            CEARTH    =      14D
 0371                            0020            CSUN      =      16D
 0372                            0022            CMOON     =      18D
 0373                         14,2603   07760 1  CSS5      2DEC   .2490475           (COS 5)/4
 0373                         14,2604   14473 1
 0374                         14,2605   04000 0  CSSUN     2DEC   .125               (COS60)/4
 0374                         14,2606   00000 1
 0375                         14,2607   00343 0  5DEGREES 2DEC    .013888889            SCALED IN REVS
 0375                         14,2610   21616 0
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R0380    PROGRAM NAME - R56                    DATE  DEC 20 66
R0381    MOD 1                                 LOG SECTION P51-P53
R0382                                          ASSEMBLY  SUNDISK  REV40
R0383    BY KEN VINCENT
R0384
R0385    FUNCTION
R0386      THIS PROGRAM READ THE IMU-CDUS AND COMPUTES THE VEHICLE ORIENTATION
R0387    WITH RESPECT TO INERTIAL SPACE. IT THEN COMPUTES THE SHAFT AXIS (SAX)
R0388    WITH RESPECT TO REFERENCE INERTIAL. EACH STAR IN THE CATALOG IS TESTED
R0389    TO DETERMINE IF IT IS OCCULTED BY EITHER THE EARTH,SUN OR MOON. IF A
R0390    STAR IS NOT OCCULTED  THEN IT IS PAIRED WITH ALL STAR OF LOWER INDEX.
R0391    THE PAIRED STAR  IS TESTED FOR OCCULTATION. PAIRS OF STARS THAT PASS
R0392    THE OCCULTATION TESTS ARE TESTED FOR GOOD SEPARATION.A PAIR OF STARS
R0393    HAVE GOOD SEPERATION IF THE ANGLE BETWEEN THEM IS LESS THAN 100 DEGREES
R0394    AND MORE THAN 50 DEGREES. THOSE PAIRS WITH GOOD SEPARATION
R0395    ARE THEN TESTED TO SEE IF THEY LIE IN CURRENT FIELD OF VIEW.(WITHIN
R0396    50 DEGREESOF SAX).THE PAIR WITH MAX SEPARATION IS CHOSEN FROM
R0397    THOSE WITH GOOD SEPARATION,AND      IN FIELD OF VIEW.
R0398
R0399    CALLING SEQUENCE
R0400    L          TC      BANKCALL
R0401    L+1        CADR    R56
R0402    L+2        ERROR RETURN - NO STARS IN FIELD OF VIEW
R0403    L+3        NORMAL RETURN
R0404
R0405    OUTPUT
R0406    BESTI,BESTJ -SINGLE PREC,INTEGERS,STAR NUMBERS TIMES 6
R0407    VFLAG - FLAG BIT  SET IMPLIES NO STARS IN FIELD OF VIEW
R0408
R0409    INITIALIZATION
R0410    1)A CALL TO LOCSAM MUST BE MADE
R0411
R0412    DEBRIS
R0413    WORK AREA
R0414    X,Y,ZNB
R0415    SINCDU,COSCDU
R0416    STARAD - STAR +5
 0417    REF   1              14,2611                R56       =        PICAPAR
 0418    REF   1                                               COUNT*   $$/R56
 0419    REF  12  LAST  895   14,2611  0 4645 1      PICAPAR   TC       MAKECADR
 0420    REF   4  LAST  936   14,2612  55745 1                 TS       QMIN
 0421    REF 176  LAST  933   14,2613  0 6037 0                TC       INTPRET
 0422                         14,2614   77624 1                CALL
 0423    REF   4  LAST  548   14,2615   47537 0                         CDUTRIG
 0424                         14,2616   77624 1                CALL
 0425    REF   1              14,2617   20030 0                         CALCSMSC
 0426                         14,2620   77601 0                SETPD
 0427                         14,2621   00001 0                         0
 0428                         14,2622   71214 0                SET      DLOAD          VFLAG = 1
 0429    REF   1              14,2623   01465 1                         VFLAG
 0430    REF   1             14,2624    24007 0                       DPZERO
 0431    REF   4  LAST  927  14,2625    26756 1             STOVL     BESTI
 0432    REF   3  LAST  381  14,2626    02665 0                       XNB
 0433                        14,2627    63361 0             VXSC      PDVL
 0434    REF   1             14,2630    24005 1                       HALFDP
 0435    REF   3  LAST  374  14,2631    02701 0                       ZNB
 0436                        14,2632    74370 0             AXT,1     VXSC
 0437                        14,2633    00344 1                       228D              X1 = 37 X 6 +6
 0438    REF   2  LAST  938  14,2634    24005 1                       HALFDP
 0439                        14,2635    77655 1             VAD
 0440                        14,2636    53505 1             VXM       UNIT
 0441    REF  40  LAST  931  14,2637    01734 0                       REFSMMAT
 0442    REF   1             14,2640    02731 0             STORE     SAX               SAX = SHAFT AXIS
 0443                        14,2641    66331 0             SSP       SSP               S1=S2=6
 0444    REF   7  LAST  609  14,2642    00051 0                       S1
 0445                        14,2643    00006 1                       6
 0446    REF  10  LAST  935  14,2644    00052 0                       S2
 0447                        14,2645    00006 1                       6
 0448                        14,2646    52100 1   PIC1      TIX,1     GOTO              MAJOR STAR
 0449    REF   1             14,2647    30651 0                       PIC2
 0450    REF   1             14,2650    30766 0                       PICEND
 0451                        14,2651    50373 0   PIC2      VLOAD*    DOT
 0452    REF   1             14,2652    30347 1                       CATLOG,1
 0453    REF   2  LAST  938  14,2653    02731 0                       SAX
 0454                        14,2654    50025 0             DSU       BMN
 0455    REF   1             14,2655    30765 0                       CSS33
 0456    REF   1             14,2656    30646 0                       PIC1
 0457                        14,2657    77754 1             LXA,2
 0458    REF  25  LAST  886  14,2660    00046 0                       X1
 0459                        14,2661    52104 0   PIC3      TIX,2     GOTO
 0460    REF   1             14,2662    30664 0                       PIC4
 0461    REF   2  LAST  938  14,2663    30646 0                       PIC1
 0462                        14,2664    50373 0   PIC4      VLOAD*    DOT
 0463    REF   2  LAST  938  14,2665    47430 0                       CATLOG,2
 0464    REF   3  LAST  938  14,2666    02731 0                       SAX
 0465                        14,2667    50025 0             DSU       BMN
 0466    REF   2  LAST  938  14,2670    30765 0                       CSS33
 0467    REF   1             14,2671    30661 0                       PIC3
 0468                        14,2672    47773 1             VLOAD*    DOT*
 0469    REF   3  LAST  938  14,2673    30347 1                       CATLOG,1
 0470    REF   4  LAST  938  14,2674    47430 0                       CATLOG,2
 0471                        14,2675    51025 1             DSU       BPL
 0472    REF   1             14,2676    30763 0                       CSS40
 0473    REF   2  LAST  938  14,2677    30661 0                       PIC3
 0474                        14,2700    45173 0             VLOAD*    CALL
 0475    REF   5  LAST  938  14,2701    30347 1                       CATLOG,1
 0476    REF   1             14,2702    30740 1                       OCCULT
 0477                        14,2703    77614 1             BON
 0478    REF   1             14,2704    01710 0                       CULTFLAG
 0479    REF   3  LAST  938  14,2705    30646 0                       PIC1
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0480                        14,2706   45173 0           VLOAD* CALL
0481  REF   6  LAST   938   14,2707   47430 0                  CATLOG,2
0482  REF   2  LAST   938   14,2710   30740 1                  OCCULT
0483                        14,2711   77614 1           BON
0484  REF   2  LAST   938   14,2712   01710 0                  CULTFLAG
0485  REF   3  LAST   938   14,2713   30661 0                  PIC3
0486                        14,2714   77614 1  STRATGY  BONCLR
0487  REF   2  LAST   937   14,2715   01605 0                  VFLAG
0488  REF   1               14,2716   30733 0                  NEWPAR
0489                        14,2717   65120 1           XCHX,1 XCHX,2
0490  REF   5  LAST   938   14,2720   02755 1                  BESTI
0491  REF   2  LAST   124   14,2721   02756 1                  BESTJ
0492                        14,2722   47773 1  STRAT    VLOAD* DOT*
0493  REF   7  LAST   939   14,2723   30347 1                  CATLOG,1
0494  REF   8  LAST   939   14,2724   47430 0                  CATLOG,2
0495                        14,2725   43006 0           PUSH   BOFINV
0496  REF   3  LAST   939   14,2726   01545 1                  VFLAG
0497  REF   1               14,2727   30717 0                  STRAT -3
0498                        14,2730   45345 1           DLOAD  DSU
0499                        14,2731   77644 1           BPL
0500  REF   4  LAST   939   14,2732   30661 0                  PIC3
0501                        14,2733   67130 1  NEWPAR   SXA,1  SXA,2
0502  REF   6  LAST   939   14,2734   02755 1                  BESTI
0503  REF   3  LAST   939   14,2735   02756 1                  BESTJ
0504                        14,2736   77650 1           GOTO
0505  REF   5  LAST   939   14,2737   30661 0                  PIC3
0506                        14,2740   51321 0  OCCULT   MXV    BVSU
0507  REF   1               14,2741   02707 0                  CULTFIX
0508  REF   1               14,2742   00017 1                  CSS
0509                        14,2743   77654 0           BZE
0510  REF   1               14,2744   30757 1                  CULTED
0511                        14,2745   75240 0           BMN    SIGN
0512  REF   2  LAST   939   14,2746   30757 1                  CULTED
0513  REF 364  LAST   920   14,2747   00160 0                  MPAC +3
0514                        14,2750   75240 0           BMN    SIGN
0515  REF   3  LAST   939   14,2751   30757 1                  CULTED
0516  REF 365  LAST   939   14,2752   00162 1                  MPAC +5
0517                        14,2753   43040 1           BMN    CLRGO
0518  REF   4  LAST   939   14,2754   30757 1                  CULTED
0519  REF   3  LAST   939   14,2755   01630 0                  CULTFLAG
0520  REF   8  LAST   835   14,2756   00052 0                  QPRET
0521                        14,2757   77614 1  CULTED   SETGO
0522  REF   4  LAST   939   14,2760   01430 1                  CULTFLAG
0523  REF   9  LAST   939   14,2761   00052 0                  QPRET
0524  REF   3  LAST   936      0016            CSS      =      CEARTH
0525                        14,2762   05110 1  CSS40    2DEC   .16070          COS 50 /4
0525                        14,2763   35052 0
0526                        14,2764   05110 1  CSS33    2DEC   .16070           COS 50 /4
0526                        14,2765   35052 0
0527                        14,2766   77414 0  PICEND   BOFF   EXIT
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0528  REF   4  LAST  939   14,2767   01745 0                       VFLAG
0529  REF   1              14,2770   30772 0                       PICGXT
0530  REF   1              14,2771  0 3013 0             TC        PICBXT
0531                       14,2772   73150 1  PICGXT     LXA,1     LXA,2
0532  REF   7  LAST  939   14,2773   02755 1                       BESTI
0533  REF   4  LAST  939   14,2774   02756 1                       BESTJ
0534                       14,2775   47775 1             VLOAD     DOT*
0535  REF   4  LAST  938   14,2776   02731 0                       SAX
0536  REF   9  LAST  939   14,2777   30347 1                       CATLOG,1
0537                       14,3000   47715 1             PDVL      DOT*
0538  REF   5  LAST  940   14,3001   02731 0                       SAX
0539  REF  10  LAST  940   14,3002   47430 0                       CATLOG,2
0540                       14,3003   77625 0             DSU
0541                       14,3004   66044 1             BPL       SXA,1
0542  REF   1              14,3005   31011 0                       PICNSWP
0543  REF   5  LAST  940   14,3006   02756 1                       BESTJ
0544                       14,3007   77734 1             SXA,2
0545  REF   8  LAST  940   14,3010   02755 1                       BESTI
0546                       14,3011   77776 1  PICNSWP    EXIT
0547  REF   5  LAST  937   14,3012   25745 0             INCR      QMIN
0548  REF   6  LAST  940   14,3013  3 1745 0  PICBXT     CA        QMIN
0549  REF   4  LAST  491   14,3014  0 4622 0             TC        SWCALL
0550                          0000            VPD        =         0D
0551                          0006            V0         =         6D
0552                          0014            V1         =         12D
0553                          0022            V2         =         18D
0554                          0030            V3         =         24D
0555                          0036            DP0        =         30D
0556                          0040            DP1        =         32D
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R0557   NAME-P51  FINE ALIGN
R0558   FUNCTION-TO ALIGN THE STABLE MEMBER TO REFSMMAT
R0559   CALLING SEQ- CALL  R51
R0560   INPUT -  REFSMMAT
R0561   OUTPUT- GYRO TORQUE PULSES
R0562   SUBROUTINES -LOCSAM,PICAPAR,P52,P53,P54,P55
 0563   REF   1                                         COUNT* $$/R51
 0564                       14,3015   77620 0  R51      STQ
 0565   REF   5  LAST  933  14,3016   02746 0                  QMAJ
 0566                       14,3017   77776 1  R51.1    EXIT
 05661  REF  78  LAST  928  14,3020  0 5353 1           TC     PHASCHNG
 05662                      14,3021   04024 0           OCT    04024

 0567   REF   2  LAST  179  14,3022  3 4761 0  R51C     CAF    OCT15
 0568   REF 258  LAST  933  14,3023  0 4616 1           TC     BANKCALL
 0569   REF   6  LAST  931  14,3024   20623 1           CADR   GOPERF1
 0570   REF  44  LAST  933  14,3025  0 6001 0           TC     GOTOPOOH
 0571                       14,3026  0 3030 1           TC     +2                 V33E
 0572   REF   1             14,3027  0 3053 1           TC     R51E               ENTER
 0573   REF 177  LAST  937  14,3030  0 6037 0           TC     INTPRET
 0574                       14,3031   43234 0           RTB    DAD
 0575   REF  25  LAST  852  14,3032   21573 0                  LOADTIME
 0576   REF   1             14,3033   31163 1                  TSIGHT1
 0577                       14,3034   77624 1           CALL
 0578   REF   2  LAST  935  14,3035   30506 1                  LOCSAM
 0579                       14,3036   77776 1           EXIT
 0580   REF 259  LAST  941  14,3037  0 4616 1           TC     BANKCALL
 0581   REF   1             14,3040   30611 1           CADR   R56
 0582   REF   1             14,3041  0 3043 0           TC     R51I
 0583   REF   2  LAST  941  14,3042  0 3053 1  R51F     TC     R51E
 0584   REF  37  LAST  924  14,3043  0 5567 0  R51I     TC     ALARM
 0585                       14,3044   00405 0           OCT    405    261
 0586   REF   1             14,3045  3 5006 1           CAF    VB05N09
 0587   REF 260  LAST  941  14,3046  0 4616 1           TC     BANKCALL
 0588   REF  30  LAST  933  14,3047   20476 0           CADR   GOFLASH
 0589   REF  45  LAST  941  14,3050  0 6001 0           TC     GOTOPOOH
 0590   REF   3  LAST  941  14,3051  0 3053 1           TC     R51E
 0591   REF   1             14,3052  0 3022 1           TC     R51C
 0592   REF 179  LAST  924  14,3053  3 4755 1  R51E     CAF    ZERO
 0593   REF   3  LAST  746  14,3054  55757 1            TS     STARIND
 0594   REF 178  LAST  941  14,3055  0 6037 0  R51.2    TC     INTPRET
 0595                       14,3056   77776 1  R51.3    EXIT
 0596   REF  79  LAST  941  14,3057  0 5353 1           TC     PHASCHNG
 0597                       14,3060   04024 0           OCT    04024

 0598   REF 179  LAST  941  14,3061  0 6037 0           TC     INTPRET
 0600                       14,3062   77624 1           CALL
 0601   REF   1             14,3063   31670 1                  R52                AOP WILL MAKE CALLS TO SIGHTING
 0602                       14,3064   77776 1           EXIT
 0603   REF 261  LAST  941  14,3065  0 4616 1           TC     BANKCALL
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0604  REF   1              14,3066   16000 0                CADR    ACTMARK
0605  REF 262  LAST  941   14,3067  0 4616 1                TC      BANKCALL
0606  REF   1              14,3070   17712 0                CADR    OPTSTALL
0607  REF   1              14,3071  0 5711 0                TC      CURTAINS
0608  REF   4  LAST  941   14,3072  11'757 1                CCS     STARIND
0609                       14,3073  1 3075 1                TCF     +2
0610  REF   1              14,3074  0 3145 1                TC      R51.4
0611  REF 180  LAST  941   14,3075  0 6037 0                TC      INTPRET
0612                       14,3076   77775 1                VLOAD
0613  REF  14  LAST  317   14,3077   02715 0                        STARAD +6
0614  REF   5  LAST  253   14,3100   02767 0                STORE    STARSAV2
0615                       14,3101   77776 1                EXIT
0616  REF  80  LAST  941   14,3102  0 5353 1                TC      PHASCHNG
0617                       14,3103   04024 0                OCT     04024

0619  REF 181  LAST  942   14,3104  0 6037 0                TC      INTPRET
0620                       14,3105   45145 0                DLOAD   CALL
0621  REF   4  LAST  935   14,3106   03562 0                        TSIGHT
0622  REF   1              14,3107   32472 1                        PLANET
0623                       14,3110   53521 1                MXV     UNIT
0624  REF  41  LAST  938   14,3111   01734 0                        REFSMMAT
0625  REF  15  LAST  942   14,3112   26715 0                STOVL   STARAD +6
0626  REF   2  LAST  145   14,3113   03554 0                        PLANVEC
0627                       14,3114   53521 1                MXV     UNIT
0628  REF  42  LAST  942   14,3115   01734 0                        REFSMMAT
0629  REF  16  LAST  942   14,3116   26707 0                STOVL   STARAD
0630  REF   3  LAST  196   14,3117   02761 0                        STARSAV1
0631                       14,3120   24007 0                STOVL   6D
0632  REF   6  LAST  942   14,3121   02767 0                        STARSAV2
0633                       14,3122   34015 1                STCALL  12D
0634  REF   1              14,3123   31256 1                        R54           STAR DATA TEST
0635                       14,3124   45014 0                BOFF    CALL
0636  REF   1              14,3125   00354 0                        FREEFLAG
0637  REF   1              14,3126   31134 0                        R51K
0638  REF   1              14,3127   47441 0                        AXISGEN
0639                       14,3130   77624 1                CALL
0640  REF   1              14,3131   31224 1                        R55           GYRO TORQUE
0641                       14,3132   77614 1                CLEAR
0642  REF   3  LAST  930   14,3133   01273 0                        PFRATFLG
0643                       14,3134   77776 1  R51K          EXIT
0644  REF   2  LAST  181   14,3135  3 5751 1  R51P63        CAF     OCT14
0645  REF 263  LAST  942   14,3136  0 4616 1                TC      BANKCALL
0646  REF   7  LAST  941   14,3137   20623 1                CADR    GOPERF1
0647  REF  46  LAST  941   14,3140  0 6001 0                TC      GOTOPOOH
0648  REF   2  LAST  941   14,3141  0 3022 1                TC      R51C
0649  REF 182  LAST  942   14,3142  0 6037 0                TC      INTPRET
0650                       14,3143   77650 1                GOTO
0651  REF   6  LAST  941   14,3144   02746 0                        QMAJ
0652  REF 183  LAST  942   14,3145  0 6037 0  R51.4         TC      INTPRET
0653                       14,3146   77775 1                VLOAD
```

```
 0654   REF  17  LAST  942   14,3147   02715 0                      STARAD +6
 0655   REF   4  LAST  942   14,3150   02761 0           STORE      STARSAV1
 0656                        14,3151   45145 0           DLOAD      CALL
 0657   REF   5  LAST  942   14,3152   03562 0                      TSIGHT
 0658   REF   2  LAST  942   14,3153   32472 1                      PLANET
 0659   REF   3  LAST  942   14,3154   03554 0           STORE      PLANVEC
 0660                        14,3155   77731 1           SSP
 0661   REF   5  LAST  942   14,3156   02760 1                      STARIND
 0662                        14,3157   00001 0                      1
 0663                        14,3160   77650 1           GOTO
 0664   REF   1              14,3161   31055 0                      R51.3
 0665                        14,3162   00002 0  TSIGHT1  2DEC       36000          6  MIN  TO  MARKING
 0665                        14,3163   06240 1
```

```
P0666   GYRO TORQUE COARSE ALIGNMENT
 0667                           14,3164   45020 1  GYCOARS  STQ     CALL
 06671  REF    7  LAST  942     14,3165   02746 0                   QMAJ
 0668   REF    1                14,3166   47247 0                   CALCGTA
 0669                           14,3167   43014 0           CLEAR   CLEAR
 0670   REF    2  LAST  863     14,3170   01260 1                   DRIFTFLG
 0671   REF    3  LAST  930     14,3171   01662 1                   REFSMFLG
 0672                           14,3172   77776 1           EXIT
 0673   REF    1                14,3173  3 3223 1           CAF     V16N20             MONITOR GIMBALS
 0674   REF  264  LAST  942     14,3174  0 4616 1           TC      BANKCALL
 0675   REF    3  LAST  850     14,3175   20451 0           CADR    GODSPR
 0676   REF    1                14,3176  3 3255 0           CA      R55CDR
 0677   REF  265  LAST  944     14,3177  0 4616 1           TC      BANKCALL
 0678   REF    4  LAST  388     14,3200   17323 0           CADR    IMUPULSE
 0679   REF  266  LAST  944     14,3201  0 4616 1           TC      BANKCALL
 0680   REF    3  LAST  378     14,3202   17716 1           CADR    IMUSTALL
 0681   REF    2  LAST  942     14,3203  0 5711 0           TC      CURTAINS
 0682   REF [illegible]1  LAST  942     14,3204  0 5353 1           TC      PHASCHNG
 0683                           14,3205   04024 0           OCT     04024

 0685   REF  184  LAST  942     14,3206  0 6037 0           TC      INTPRET
 0686                           14,3207   75160 1           AXC,1   AXC,2
 0687   REF    6  LAST  932     14,3210   03606 1                   XSMD
 0688   REF   43  LAST  942     14,3211   01733 1                   REFSMMAT
 0689                           14,3212   77624 1           CALL                       STORE DESIRED REFSMMAT
 0690   REF    1                14,3213   31377 0                   MATMOVE
 0691                           14,3214   43014 0           CLEAR   SET
 0692   REF    4  LAST  942     14,3215   01273 0                   PFRATFLG
 0693   REF    4  LAST  944     14,3216   01462 0                   REFSMFLG
 0694                           14,3217   77624 1           CALL
 0695   REF    1                14,3220   31602 1                   NCOARSE            SET DRIFT AND INITIALIZE 1/PIPADT
 06951                          14,3221   77650 1           GOTO
 0696   REF    2  LAST  942     14,3222   31134 0                   R51K
 0697                           14,3223   04024 0  V16N20   VN      1620
```

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R0698    R55  GYRO TORQUE
R0699    FUNCTION-COMPUTE AND SEND GYRO PULSES
R0700    CALLING SEQ- CALL R55
R0701    INPUT- X,Y,ZDC- REFSMMAT WRT PRESENT STABLE MEMBER
R0702    OUTPUT- GYRO PULSES
R0703    SUBROUTINES- CALCGTA,GOFLASH,GODSPR,IMUFINE,IMUPULSE,GOPERF1
 0704    REF   1                                          COUNT* $$/R55
 0705                        14,3224   77620 0  R55       STQ
 0706    REF   7  LAST  940  14,3225   02745 0                   QMIN
 0707                        14,3226   77624 1            CALL
 0708    REF   2  LAST  944  14,3227   47247 0                   CALCGTA
 0709                        14,3230   77776 1  PULSEM    EXIT
 0710    REF   1             14,3231  3 3254 1  R55.1     CAF    V06N93
 0711    REF 267  LAST  944  14,3232  0 4616 1            TC     BANKCALL
 0712    REF  31  LAST  941  14,3233   20476 0            CADR   GOFLASH
 0713    REF  47  LAST  942  14,3234  0 6001 0            TC     GOTOPOOH
 0714    REF   1             14,3235  0 3237 1            TC     R55.2
 0715    REF   1             14,3236  0 3251 1            TC     R55RET
 0716    REF  82  LAST  944  14,3237  0 5353 1  R55.2     TC     PHASCHNG
 0717                        14,3240   00214 0            OCT    00214
 0718    REF   2  LAST  944  14,3241  3 3255 0            CA     R55CDR
 0719    REF 268  LAST  945  14,3242  0 4616 1            TC     BANKCALL
 0720    REF   5  LAST  944  14,3243   17323 0            CADR   IMUPULSE
 0721    REF 269  LAST  945  14,3244  0 4616 1            TC     BANKCALL
 0722    REF   9  LAST  944  14,3245   17716 1            CADR   IMUSTALL
 0723    REF   3  LAST  944  14,3246  0 5711 0            TC     CURTAINS
 0724    REF  83  LAST  945  14,3247  0 5353 1            TC     PHASCHNG
 0725                        14,3250   04024 0            OCT    04024

 0727    REF 185  LAST  944  14,3251  0 6037 0  R55RET    TC     INTPRET
 0728                        14,3252   77650 1            GOTO
 0729    REF   8  LAST  945  14,3253   02745 0                   QMIN
 0730                        14,3254   01535 0  V06N93    VN     0693
 0731    REF  11  LAST  388  14,3255   02737 0  R55CDR    ECADR  OGC
 0732    REF   1             14,3256            R54       =      CHKSDATA
R0733    ROUTINE NAME- CHKSDATA                                                                DATE- JAN 9, 1967
R0735    MOD NO- 0                                                                             LOG SECTION- P51-P53
R0737    MODIFICATION BY- LONSKE                                                               ASSEMBLY-

R0739    FUNCTIONAL DESCRIPTION - CHECKS THE VALIDITY OF A PAIR OF STAR SIGHTINGS. WHEN A PAIR OF STAR SIGHTINGS ARE MADE
R0741    BY THE ASTRONAUT THIS ROUTINE OPERATES AND CHECKS THE OBSERVED SIGHTINGS AGAINST STORED STAR VECTORS IN THE
R0743    COMPUTER TO INSURE A PROPER SIGHTING WAS MADE. THE FOLLOWING COMPUTATIONS ARE PERFORMED_

R0745                    OS1 = OBSERVED STAR 1 VECTOR
R0746                    OS2 = OBSERVED STAR 2 VECTOR
R0747                    SS1 = STORED STAR 1 VECTOR
R0748                    SS2 = STORED STAR 2 VECTOR
R0749                     A1 = ARCCOS(OS1 - OS2)
R0750                     A2 = ARCCOS(SS1 - SS2)
R0751                      A = ABS(2(A1 - A2))
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R0752   THE ANGULAR DIFFERENCE IS DISPLAYED FOR ASTRONAUT ACCEPTENCE
R0753   EXIT MODE 1. FREEFLAG SET  IMPLIES  ASTRONAUT WANTS TO PROCEED
R0754             2. FREEFLAG RESET IMPLIES ASTRONAUT WANTS TO RECYCLE          ERANCE)
R0756   OUTPUT - 1.VERB 6,NOUN 3- DISPLAYS ANGULAR DIFFERENCE BETWEEN 2 SETS OF STARS.
R0758            2.STAR VECTORS FROM STAR CATALOG ARE LEFT IN 6D AND 12D.

R0759   ERASABLE INITIALIZATION REQUIRED -
R0760            1.MARK VECTORS ARE STORED IN STARAD AND STARAD +6.
R0761            2.CATALOG VECTORS ARE STORED IN 6D AND 12D.
R0762   DEBRIS -
 0763   REF   1                                          COUNT* $$/P54
 0764                        14,3256   43020 1  CHKSDATA STQ     SET
 0765   REF   9  LAST  945   14,3257   02745 0                   QMIN
 0766   REF   2  LAST  942   14,3260   00074 1                   FREEFLAG
 0767                        14,3261   77760 0  CHKSAB   AXC,1                      SET X1 TO STORE  EPHEMERIS DATA
 0768   REF  13  LAST  943   14,3262   02706 1                   STARAD
R0769
 0770                        14,3263   47773 1  CHKSB    VLOAD*  DOT*               CAL. ANGLE THETA
 0771                        14,3264   00001 0                   0,1
 0772                        14,3265   00007 0                   6,1
 0773                        14,3266   65552 0           SL1     ACOS
 0774   REF   1              14,3267   00025 0           STORE   THETA
 0775                        14,3270   43014 0           BOFF    INVERT             BRANCH TO CHKSD IF THIS IS 2ND PASS
 0776   REF   3  LAST  946   14,3271   00354 0                   FREEFLAG
 0777   REF   1              14,3272   31302 1                   CHKSD
 0778   REF   4  LAST  946   14,3273   00174 0                   FREEFLAG           CLEAR FREEFLAG
 0779                        14,3274   71360 1           AXC,1   DLOAD              SET X1 TO MARK ANGLES
 0780                        14,3275   00006 1                   6D
 0781   REF   2  LAST  946   14,3276   00025 0                   THETA
 0782                        14,3277   00023 0           STORE   18D
 0783                        14,3300   77650 1           GOTO
 0784   REF   1              14,3301   31263 1                   CHKSB              RETURN TO CAL. 2ND ANGLE
 0785                        14,3302   45345 1  CHKSD    DLOAD   DSU
 0786   REF   3  LAST  946   14,3303   00025 0                   THETA
 0787                        14,3304   00023 0                   18D                COMPUTE POS DIFF
 0788                        14,3305   47046 0           ABS     RTB
 0789   REF   5  LAST  877   14,3306   21612 1                   SGNAGREE
 0790   REF   1              14,3307   01046 1           STORE   NORMTEM1
 0791                        14,3310   77414 0           SET     EXIT
 0792   REF   5  LAST  946   14,3311   00074 1                   FREEFLAG
 0793   REF   1              14,3312  3 3326 0           CAF     VB6N5
 0794   REF 270  LAST  945   14,3313  0 4616 1           TC      BANKCALL
 0795   REF  32  LAST  945   14,3314   20476 0           CADR    GOFLASH
 0796   REF  48  LAST  945   14,3315  1 6001 1           TCF     GOTOPOOH
 0797   REF   1              14,3316  0 3323 0           TC      CHKSDA             PROCEED
 0798   REF 186  LAST  945   14,3317  0 6037 0           TC      INTPRET
 0799                        14,3320   52014 0           CLEAR   GOTO
 0800   REF   6  LAST  946   14,3321   00274 0                   FREEFLAG
 0801   REF  10  LAST  946   14,3322   02745 0                   QMIN
 0802   REF 187  LAST  946   14,3323  0 6037 0  CHKSDA   TC      INTPRET
 0803                        14,3324   77650 1            GOTO
 0804   REF  11  LAST  946   14,3325   02745 0                    QMIN
 0805                        14,3326   01405 1  VB6N5     VN      605
R0806   NAME - CAL53A
R0807   FUNCTION -COMPUTE DESIRED GIMBAL ANGLES AND COARSE ALIGN IF NECESSARY
R0808   CALLING SEQUENCE - CALL CAL53A
R0809   INPUT - X,Y,ZSMD ,CDUX,Y,Z
R0810           DESIRED GIMBAL ANGLES - THETAD,+1,+2
R0811   OUTPUT - THE IMU COORDINATES ARE STORED IN REFSMMAT
R0812   SUBROUTINES - S52.2, IMUCOARSE , IMUFINE
 0813   REF   1                                           COUNT* $$/P50
 0814                        14,3327   77624 1  CAL53A    CALL
 0815   REF   2  LAST  930   14,3330   31617 0                    S52.2          MAKE ONE FINAL COMP OF GIMBALE ANGLES
 0817                        14,3331   66234 1            RTB     SSP
 0818   REF   1              14,3332   31413 0                    RDCDUS         READ CDUS
 0819   REF   8  LAST  938   14,3333   00051 0                    S1
 0820                        14,3334   00001 0                    1
 0821                        14,3335   40370 1            AXT,1   SETPD
 0822                        14,3336   00003 1                    3
 0823                        14,3337   00005 1                    4
 0824                        14,3340   70543 1  CALOOP    DLOAD*  SR1
 0825   REF  10  LAST  375   14,3341   00325 0                    THETAD +3D,1
 0826                        14,3342   70523 1            PDDL*   SR1
 0827                        14,3343   00005 1                    4,1
 0828                        14,3344   51425 0            DSU     ABS
 0829                        14,3345   45206 1            PUSH    DSU
 0830   REF   1              14,3346   31412 1                    DEGREE1
 0831                        14,3347   71240 1            BMN     DLOAD
 0832   REF   1              14,3350   31366 0                    CALOOP1
 0833                        14,3351   51025 1            DSU     BPL
 0834   REF   1              14,3352   31413 0                    DEG359
 0835   REF   2  LAST  947   14,3353   31366 0                    CALOOP1
08351                        14,3354   77776 1            EXIT
08352   REF  84  LAST  945   14,3355   0 5353 1           TC      PHASCHNG
08353                        14,3356   04024 0            OCT     04024

08354   REF 188  LAST  946   14,3357   0 6037 0           TC      INTPRET
0836                         14,3360   77624 1  COARFINE  CALL
0837    REF   1              14,3361   31565 0                    COARSE
0838                         14,3362   77624 1            CALL
0839    REF   2  LAST  944   14,3363   31602 1                    NCOARSE
0840                         14,3364   77650 1            GOTO
0841    REF   1              14,3365   31370 1                    FINEONLY
0842                         14,3366   77700 0  CALOOP1   TIX,1
0843    REF   1              14,3367   31340 1                    CALOOP
0844                         14,3370   75160 1  FINEONLY  AXC,1   AXC,2
0845    REF  17  LAST  933   14,3371   02642 0                    XSM
0846    REF  44  LAST  944   14,3372   01733 1                    REFSMMAT
0847                         14,3373   77624 1            CALL
0848    REF   2  LAST  944   14,3374   31377 0                    MATMOVE
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 0849                            14,3375   77650 1             GOTO
 0850   REF   1                  14,3376   32161 0                     COARSRET
 0851                            14,3377   77773 1  MATMOVE    VLOAD*                      TRANSFER MATRIX
 0852                            14,3400   00001 0                     0,1
 0853                            14,3401   10001 1             STORE   0,2
 0854                            14,3402   77773 1             VLOAD*
 0855                            14,3403   00007 0                     6D,1
 0856                            14,3404   10007 1             STORE   6D,2
 0857                            14,3405   77773 1             VLOAD*
 0858                            14,3406   00015 0                     12D,1
 0859                            14,3407   10015 1             STORE   12D,2
 0860                            14,3410   77616 0             RVQ
 0861                            14,3411   00056 1  DEGREE1    DEC     46                  1 DEG SCALED CDU/2
 0862                            14,3412   37722 1  DEG359     DEC     16338               359 DEG SCALED CDU/2
 0863                            14,3413  0 0004 0  RDCDUS     INHINT                      READ CDUS
 0864   REF  16  LAST  911       14,3414  3 0032 0             CA      CDUX
 0865   REF  31  LAST  921       14,3415  50 120 1             INDEX   FIXLOC
 0866                            14,3416  54 001 1             TS      1
 0867   REF   7  LAST  911       14,3417  3 0033 1             CA      CDUY
 0868   REF  32  LAST  948       14,3420  50 120 1             INDEX   FIXLOC
 0869                            14,3421  54 002 1             TS      2
 0870   REF  10  LAST  911       14,3422  3 0034 0             CA      CDUZ
 0871   REF  33  LAST  948       14,3423  50 120 1             INDEX   FIXLOC
 0872                            14,3424  54 003 0             TS      3
 0873                            14,3425  0 0003 1             RELINT
 0874   REF   1                  14,3426  0 6061 0             TC      DANZIG                                                +
 0875   REF   1                                                COUNT*  $$/INFLT
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P0917    NAME - P51 - IMU ORIENTATION DETERMINATION
R0918             MOD.NO.1  23 JAN 67                                                              LOG SECTION - P51-P53
R0920    MOD BY STURLAUGSON                                                                        ASSEMBLY SUNDANCE REV56

R0922    FUNCTIONAL DESCRIPTION

R0923          DETERMINES THE INERTIAL ORIENTATION OF THE IMU. THE PROGRAM IS SELECTED BY DSKY ENTRY. THE SIGHTING
R0925    (AOTMARK)ROUTINE IS CALLED TO COLLECT AND PROCESS MARKED-STAR DATA. AOTMARK(R53) RETURNS THE STAR NUMBER AND THE
R0927    STAR LOS VECTOR IN STARAD+6. TWO STARS ARE THUS SIGHTED. THE ANGLE BETWEEN THE TWO STARS IS THEN CHECKED AT
R0929    CHKSDATA(R54). REFSMMAT IS THEN COMPUTED AT AXISGEN.

R0930    CALLING SEQUENCE

R0931      THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R0932    SUBROUTINES CALLED.

R0933          GOPERF3
R0934          GOPERF1
R0935          GODSPR
R0936          IMUCOARS
R0937          IMUFIN20
R0938          AOTMARK(R53)
R0939          CHKSDATA(R54)
R0940          MKRELEAS
R0941          AXISGEN
R0942          MATMOVE

R0943    ALARMS

R0944          NONE.

R0945    ERASABLE INITIALIZATION

R0946          IMU ZERO FLAG SHOULD BE SET.

R0947    OUTPUT

R0948          REFSMMAT
R0949          REFSMFLG

R0950    DEBRIS

R0951          WORK AREA
R0952          STARAD
R0953          STARIND
R0954          BESTI
R0955          BESTJ

 0956    REF    1                                    COUNT* $$/P51
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0957   REF 271  LAST  946   14,3427  0 4616 1  P51     TC    BANKCALL      IS ISS ON - IF NOT, IMUCHK WILL SEND
0958   REF   1              14,3430   33652 0          CADR  IMUCHK        ALARM CODE 210 AND EXIT VIA GOTOPOOH.

0959   REF   3  LAST  941   14,3431  3 4761 0          CAF   OCT15
0960   REF 272  LAST  950   14,3432  0 4616 1          TC    BANKCALL
0961   REF   8  LAST  942   14,3433   20623 1          CADR  GOPERF1
0962   REF  49  LAST  946   14,3434  0 6001 0          TC    GOTOPOOH      TERM.
0963   REF   1              14,3435  1 3461 0          TCF   P51B          V33
0964   REF  85  LAST  947   14,3436  0 5353 1          TC    PHASCHNG
0965                        14,3437   04024 0          OCT   04024

0967   REF 180  LAST  941   14,3440  3 4755 1          CAF   ZERO
0968   REF  11  LAST  947   14,3441  54 321 0          TS    THETAD        ZERO THE GIMBALS
0969   REF  12  LAST  950   14,3442  54 322 0          TS    THETAD +1
0970   REF  13  LAST  950   14,3443  54 323 1          TS    THETAD +2
0971   REF   3  LAST  930   14,3444  3 5010 0          CAF   V06N22
0972   REF 273  LAST  950   14,3445  0 4616 1          TC    BANKCALL
0973   REF   3  LAST  757   14,3446   20446 0          CADR  GODSPRET
0974   REF   1              14,3447  3 3564 0          CAF   V41K          NOW DISPLAY COARSE ALIGN VERB 41
0975   REF 274  LAST  950   14,3450  0 4616 1          TC    BANKCALL
0976   REF   4  LAST  950   14,3451   20446 0          CADR  GODSPRET
0977   REF 184  LAST  947   14,3452  0 6037 0          TC    INTPRET
0978                        14,3453   77624 1          CALL
0979   REF   2  LAST  947   14,3454   31565 0                COARSE
0980                        14,3455   77776 1          EXIT
0981   REF  86  LAST  950   14,3456  0 5353 1          TC    PHASCHNG
0982                        14,3457   04024 0          OCT   04024
0984   REF   2  LAST  233   14,3460  1 3431 0          TCF   P51 +2

0985   REF  87  LAST  950   14,3461  0 5353 1  P51B    TC    PHASCHNG
0986                        14,3462   00014 1          OCT   00014
0987   REF 190  LAST  950   14,3463  0 6037 0          TC    INTPRET
0988                        14,3464   77624 1          CALL
0989   REF   3  LAST  947   14,3465   31602 1                NCOARSE
0990                        14,3466   40331 1          SSP   SETPD
0991   REF   6  LAST  943   14,3467   02760 1                STARIND       INDEX-STAR 1 OR 2
0992                        14,3470   00000 1                0
0993                        14,3471   00001 0                0
0994                        14,3472   77776 1  P51C    EXIT
0995   REF  88  LAST  950   14,3473  0 5353 1          TC    PHASCHNG
0996                        14,3474   04024 0          OCT   04024

0998   REF 275  LAST  950   14,3475  0 4616 1          TC    BANKCALL
0999   REF   2  LAST  942   14,3476   16000 0          CADR  AOTMARK       R53
1000   REF 276  LAST  950   14,3477  0 4616 1          TC    BANKCALL
1001   REF   1              14,3500   17712 0          CADR  AOTSTALL
1002   REF   4  LAST  945   14,3501  0 5711 0          TC    CURTAINS
1003   REF   7  LAST  950   14,3502   11757 1          CCS   STARIND
1004   REF   1              14,3503  1 3511 0          TCF   P51D +1
1005   REF 191  LAST  950   14,3504  0 6037 0          TC    INTPRET
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1006                         14,3505   77775 1              VLOAD
1007   REF  13   LAST  946   14,3506   02715 0                       STARAD +6
1008   REF   5   LAST  943   14,3507   02761 0              STORE    STARSAV1
1009                         14,3510   77776 1   P51D       EXIT
1010   REF  89   LAST  950   14,3511  0 5353 1              TC       PHASCHNG
1011                         14,3512   04024 0              OCT      04024

1013   REF   3   LAST  950   14,3513  11'757 1              CCS      STARIND
1014   REF   1               14,3514  1 3530 0              TCF      P51E
1015   REF  90   LAST  951   14,3515  0 5353 1              TC       PHASCHNG
1016                         14,3516   04024 0              OCT      04024

1018   REF 192   LAST  950   14,3517  0 6037 0              TC       INTPRET
1019                         14,3520   45145 0              DLOAD    CALL
1020   REF   6   LAST  943   14,3521   03562 0                       TSIGHT
1021   REF   3   LAST  943   14,3522   32472 1                       PLANET
1022   REF   4   LAST  943   14,3523   03554 0              STORE    PLANVEC
1023                         14,3524   77776 1              EXIT
1024   REF  44   LAST  928   14,3525  3 4753 1              CAF      BIT1
1025   REF   9   LAST  951   14,3526  55'757 1              TS       STARIND
1026   REF   1               14,3527  1 3473 0              TCF      P51C +1             DO SECOND STAR
1027   REF  91   LAST  951   14,3530  0 5353 1   P51E       TC       PHASCHNG
1028                         14,3531   04024 0              OCT      04024

1030   REF 193   LAST  951   14,3532  0 6037 0              TC       INTPRET
1031                         14,3533   45145 0              DLOAD    CALL
1032   REF   7   LAST  951   14,3534   03562 0                       TSIGHT
1033   REF   4   LAST  951   14,3535   32472 1                       PLANET
1034                         14,3536   24015 0              STOVL    12D
1035   REF   5   LAST  951   14,3537   03554 0                       PLANVEC
1036                         14,3540   24007 0              STOVL    6D
1037   REF   6   LAST  951   14,3541   02761 0                       STARSAV1
1038   REF  20   LAST  951   14,3542   26707 0              STOVL    STARAD
1039   REF   7   LAST  942   14,3543   02767 0                       STARSAV2
1040   REF  21   LAST  951   14,3544   36715 1              STCALL   STARAD +6
1041   REF   2   LAST  945   14,3545   31256 1                       CHKSDATA            CHECK STAR ANGLES IN STARAD AND
1042                         14,3546   77414 0              BON      EXIT
1043   REF   7   LAST  946   14,3547   00314 1                       FREEFLAG
1044   REF   1               14,3550   31552 1                       P51G
1045   REF   3   LAST  950   14,3551  0 3431 1              TC       P51 +2
1046                         14,3552   77624 1   P51G       CALL
1047   REF   2   LAST  942   14,3553   47441 0                       AXISGEN             COME BACK WITH REFSMMAT IN XDC
1048                         14,3554   75160 1              AXC,1    AXC,2
1049   REF   4   LAST  931   14,3555   02664 1                       XDC
1050   REF  45   LAST  947   14,3556   01733 1                       REFSMMAT
1051                         14,3557   77624 1              CALL
1052   REF   3   LAST  947   14,3560   31377 0                       MATMOVE
1053                         14,3561   77414 0              SET      EXIT
1054   REF   5   LAST  944   14,3562   01462 0                       REFSMFLG
1056   REF  50   LAST  950   14,3563  0 6001 0              TC       GOTOPOOH            FINIS
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 1061                            14,3564   12200 0  V41K      VN      4100
 1062                            14,3565   77776 1  COARSE    EXIT
 1063   REF 277  LAST  950       14,3566  0 4616 1            TC      BANKCALL
 1064   REF   4  LAST  378       14,3567   17000 1            CADR    IMUCOARS
 1065   REF 278  LAST  952       14,3570  0 4616 1            TC      BANKCALL
 1066   REF  10  LAST  945       14,3571   17716 1            CADR    IMUSTALL
 1067   REF   5  LAST  950       14,3572  0 5711 0            TC      CURTAINS
 1068   REF 279  LAST  952       14,3573  0 4616 1            TC      BANKCALL
 1069   REF   3  LAST  378       14,3574   17210 1            CADR    IMUFINE
 1070   REF 280  LAST  952       14,3575  0 4616 1            TC      BANKCALL
 1071   REF  11  LAST  952       14,3576   17716 1            CADR    IMUSTALL
 1072   REF   6  LAST  952       14,3577  0 5711 0            TC      CURTAINS
 1073   REF 194  LAST  951       14,3600  0 6037 0            TC      INTPRET
 1074                            14,3601   77616 0            RVQ
 1075                            14,3602   77776 1  NCCARSE   EXIT
 1076   REF  15  LAST  901       14,3603  3 0025 0            CA      TIME1
 1077   REF   9  LAST  863       14,3604  55 075 0            TS      1/PIPADT
 10771  REF 181  LAST  950       14,3605  4 4755 0            CS      ZERO
 10772  REF  14  LAST  901       14,3606  54 037 1            TS      PIPAX
 10773  REF   5  LAST  901       14,3607  54 040 1            TS      PIPAY
 10774  REF   8  LAST  902       14,3610  54 041 0            TS      PIPAZ
 1078   REF 195  LAST  952       14,3611  0 6037 0            TC      INTPRET
 1079                            14,3612   77775 1            VLOAD
 1080   REF   3  LAST  687       14,3613   24007 0                    ZEROVEC
 1081   REF  24  LAST  383       14,3614   01472 1            STORE   GCOMP
 1082                            14,3615   43414 1            SET     RVQ
 1083   REF   3  LAST  944       14,3616   01060 0                    DRIFTFLG
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P1084    NAME-S52.2
R1085    FUNCTION-COMPUTE GIMBAL ANGLES FOR DESIRED SM AND PRESENT VEHICLE
R1086    CALL-  CALL  S52.2
R1087    INPUT- X,Y,ZSMD
R1088    OUTPUT- OGC,IGC,MGC,THETAD,+1,+2
R1089    SUBROUTINES-CDUTRIG,CALCSMSC,MATMOVE,CALCGA
 1090    REF    1                                                   COUNT*  $$/S52.1
 1091                                14,3617    45020 1   S52.2     STQ     CALL
 1092    REF    8  LAST   944        14,3620    02746 0                     QMAJ
 1094    REF    5  LAST   937        14,3621    47537 0                     CDUTRIG
 1095                                14,3622    77624 1             CALL
 1096    REF    2  LAST   937        14,3623    20030 0                     CALCSMSC
 1097                                14,3624    66370 0             AXT,1   SSP
 1098                                14,3625    00022 1                     18D
 1099    REF    9  LAST   947        14,3626    00051 0                     S1
 1100                                14,3627    00006 1                     6D
 1101                                14,3630    61373 1   S52.2A    VLOAD*  VXM
 1102    REF    4  LAST   938        14,3631    02707 0                     XNB +18D,1
 1103    REF   46  LAST   951        14,3632    01734 0                     REFSMMAT
 1104                                14,3633    77656 1             UNIT
 1105    REF    5  LAST   953        14,3634    06707 1             STORE   XNB +18D,1
 1106                                14,3635    77700 0             TIX,1
 1107    REF    1                    14,3636    31630 0                     S52.2A
 1108                                14,3637    75160 1   S52.2.1   AXC,1   AXC,2
 1109    REF    7  LAST   944        14,3640    03606 1                     XSMD
 1110    REF   18  LAST   947        14,3641    02642 0                     XSM
 1111                                14,3642    77624 1             CALL
 1112    REF    4  LAST   951        14,3643    31377 0                     MATMOVE
 1113                                14,3644    77624 1             CALL
 1114    REF    2  LAST   374        14,3645    47353 1                     CALCGA
 1115                                14,3646    77650 1             GOTO
 1116    REF    9  LAST   953        14,3647    02746 0                     QMAJ
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P1117   NAME-S52.3
R1118   FUNCTION  XSMD= UNIT  R
R1119             YSMD= UNIT(V X R)
R1120             ZSMD= UNIT(XSMD X YSMD)
R1121   CALL      DLOAD  CALL
R1122                    TALIGN
R1123                    S52.3
R1124   INPUT-    TIME OF ALIGNMENT IN MPAC
R1125   OUTPUT-   X,Y,ZSMD
R1126   SUBROUTINES- CSMCONIC
 1127   REF   1                                            COUNT* $$/S52.3
 1128                          14,3650   77620 0  S52.3    STQ
 1129   REF  10  LAST  953     14,3651   02746 0                  QMAJ
 1130   REF  53  LAST  935     14,3652   34041 0           STCALL TDEC1
 1131   REF   5  LAST  589     14,3653   27100 0                  LEMCONIC
 1134                          14,3654   53575 0           VLOAD  UNIT
 1135   REF  33  LAST  935     14,3655   00001 0                  RATT
 1136   REF   8  LAST  953     14,3656   27607 0           STOVL  XSMD
 1137   REF  24  LAST  839     14,3657   00007 0                  VATT
 1138                          14,3660   53435 0           VXV    UNIT
 1139   REF  34  LAST  954     14,3661   00001 0                  RATT
 1140   REF   4  LAST  931     14,3662   27615 0           STOVL  YSMD
 1141   REF   9  LAST  954     14,3663   03607 0                  XSMD
 1142                          14,3664   53435 0           VXV    UNIT
 1143   REF   5  LAST  954     14,3665   03615 0                  YSMD
 1144   REF   4  LAST  931     14,3666   37623 1           STCALL ZSMD
 1145   REF  11  LAST  954     14,3667   02746 0                  QMAJ
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R1146   NAME    -R52 (AUTOMATIC OPTICS POSITIONING ROUTINE)

R1147   FUNCTION-POINT THE AOT OPTIC AXIS BY MANEUVERING THE LEM TO A NAVIGATION
R1148                 STAR SELECTED BY ALIGNMENT PROGRAMS OR DSKY INPUT

R1149   CALLING -CALL R52

R1150   INPUT   -BESTI AND BESTJ (STAR CODES TIMES 6)
R1151   OUTPUT  -STAR CODE IN BITS1-6, DETENT CODE IN BITS 7-9
R1152                (NO CHECK IS MADE TO INSURE THE DETENT  CODE TO BE VALID)
R1153                POINTVSM-1/2 UNIT NAV STAR VEC IN SM
R1154                SCAXIS-AOT OPTIC AXIS VEC IN NB X-Z PLANE

R1155   SUBROUT -R60LEM

 1156   REF   1                                         COUNT*  $$/R52
 1157                        14,3670   77420 1  R52     STQ     EXIT
 1158   REF   1              14,3671   03665 1                  SAVQR52
 1159   REF  10  LAST  951   14,3672   51757 0          INDEX   STARIND
 1160   REF   9  LAST  940   14,3673  3 1755 1          CA      BESTI          PICK UP STARCODE DETERMINED BY R56
 1161                        14,3674  0 0006 1          EXTEND
 1162   REF   1              14,3675  7 3771 1          MP      1/6TH
 1163   REF  32  LAST  907   14,3676  6 4744 1          AD      BIT8           SET DETENT POSITION 2
 1164   REF   2  LAST  100   14,3677  54 735 1          TS      STARCODE       SCALE AND STORE IN STARCODE

 1165   REF   1              14,3700  3 3772 0  R52A    CAF     V01N70
 1166   REF 281  LAST  952   14,3701  0 4616 1          TC      BANKCALL
 1167   REF  33  LAST  946   14,3702   20476 0          CADR    GOFLASH        DISPLAY STARCODE AND WAIT FOR RESPONSE
 1168   REF  51  LAST  951   14,3703  0 6001 0          TC      GOTOPOOH       V34-TERMINATE
 1169   REF   1              14,3704  1 3706 1          TCF     R52B           V33-PROCEED TO ORIENT LEM
 1170   REF   1              14,3705  1 3700 1          TCF     R52A           ENTER-SELECT NEW STARCODE-RECYCLE

 1171   REF  87  LAST  895   14,3706  0 5516 0  R52B    TC      DOWNFLAG
 1172   REF   7  LAST  754   14,3707   00124 0          ADRES   3AXISFLG       BIT6 OF FLAGWRD5 ZERO TO ALLOW VECPOINT
 1173   REF   3  LAST  955   14,3710  3 0735 0          CA      STARCODE       GRAB DETENT CODE
 1174   REF   3  LAST  683   14,3711  7 7744 0          MASK    HIGH9
 1175                        14,3712  0 0006 1          EXTEND
 1176   REF  24  LAST  863   14,3713  7 4743 1          MP      BIT9
 1177   REF 157  LAST  924   14,3714  54 001 1          TS      L              TEMP STORE DETENT

 1178                        14,3715  0 0006 1          EXTEND
 1179   REF   1              14,3716  6 3734 1          BZMF    GETAZEL        CODE 0, COAS CALIBRATION

 1180   REF   2  LAST  246   14,3717  6 5660 1          AD      NEG7
 1181                        14,3720  0 0006 1          EXTEND
 1182   REF   2  LAST  955   14,3721  1 3734 0          BZF     GETAZEL        CODE 7, COAS SIGHTING

 1183   REF  17  LAST  260   E7,1551                    EBANK=  XYMARK
 1184   REF  14  LAST  903   14,3722  3 5016 0          CA      EBANK7
 1185   REF  49  LAST  918   14,3723  54 003 0          TS      EBANK
 1187   REF 158  LAST  955   14,3724  50 001 0             INDEX   L
 1188   REF   4  LAST  247   14,3725  3 1403 1             CA      AOTAZ -1        PICK UP AZ CORRESPONDING TO DETENT
 1189   REF 159  LAST  956   14,3726  54 001 1             TS      L
 1190   REF  19  LAST  953   E5,1642                       EBANK=  XSM
 1191   REF  11  LAST  896   14,3727  3 5014 1             CA      EBANK5          CHANGE TO EBANK5 BUT DONT DISTURB L
 1192   REF  50  LAST  955   14,3730  54 003 0             TS      EBANK
 1193   REF  36  LAST  874   14,3731  3 4737 0             CA      BIT13           SET ELV TO 45 DEG
 1194   REF 160  LAST  956   14,3732  56 001 0             XCH     L               SET C(A)=AZ, C(L)=45 DEG
 1195   REF   1              14,3733  1 3744 1             TCF     AZEL            GO COMP OPTIC AXIS

 1196   REF   1              14,3734  3 3773 1  GETAZEL    CAF     V06N87          CODE 0 OR 7, GET AZ AND EL KEY IN
 1197   REF 282  LAST  955   14,3735  0 4616 1             TC      BANKCALL
 1198   REF  34  LAST  955   14,3736   20476 0             CADR    GOFLASH
 1199   REF  52  LAST  955   14,3737  0 6001 0             TC      GOTOPOOH        V34-TERMINATE
 1200                        14,3740  1 3742 1             TCF     +2              PROCEED-CALC OPTIC AXIS
 1201   REF   3  LAST  955   14,3741  1 3734 0             TCF     GETAZEL         ENTER-RECYCLE

 1202                        14,3742  0 0006 1             EXTEND
 1203   REF   4  LAST  316   14,3743  3 1350 0             DCA     AZ              PICK UP AZ AND EL IN SP 2S COMP
 1204   REF  34  LAST  948   14,3744  50 120 1  AZEL       INDEX   FIXLOC          JAM AZ AND EL IN 8 AND 9 OF VAC
 1205                        14,3745  52 011 0             DXCH    8D
 1206   REF 196  LAST  952   14,3746  0 6037 0             TC      INTPRET
 1207                        14,3747   77624 1             CALL                    GO COMPUTE OPTIC AXIS AND STORE IN
 1208   REF   2  LAST  248   14,3750   10536 0                     OANB            SCAXIS IN NB COORDS
 1209                        14,3751   45034 1             RTB     CALL
 1210   REF  26  LAST  941   14,3752   21573 0                     LOADTIME
 1211   REF   5  LAST  951   14,3753   32472 1                     PLANET
 1212                        14,3754   53521 1             MXV     UNIT
 1213   REF  47  LAST  953   14,3755   01734 0                     REFSMMAT
 1214   REF   7  LAST  788   14,3756   03773 1             STORE   POINTVSM        STORE FOR VECPOINT

 1215                        14,3757   77776 1             EXIT
 1216   REF 283  LAST  956   14,3760  0 4616 1             TC      BANKCALL
 1217   REF   6  LAST  789   14,3761   54123 0             CADR    R60LEM          GO TORQUE LEM OPTIC AXIS TO STAR LOS

 12171  REF   4  LAST  955   14,3762  3 7744 1             CAF     HIGH9           IF COAS CALIBRATION CODE 0, RECYCLE
 12172  REF   4  LAST  955   14,3763  7 0735 1             MASK    STARCODE
 12173                       14,3764  0 0006 1             EXTEND
 12174  REF   2  LAST  955   14,3765  1 3700 1             BZF     R52A

 1218   REF 197  LAST  956   14,3766  0 6037 0             TC      INTPRET         RETURN FROM KALCMANU
 1219                        14,3767   77650 1             GOTO
 1220   REF   2  LAST  955   14,3770   03665 1                     SAVQR52         RETURN TO CALLER

 1221                        14,3771   05253 0  1/6TH      DEC     .1666667
 1222                        14,3772   00306 1  V01N70     VN      0170
 1223                        14,3773   01527 0  V06N87     VN      687
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P1224   LUNAR SURFACE STAR AQUISITION

 1225                            15,2245                           BANK    15
 1226   REF   3  LAST  927       15,2000                           SETLOC  P50S
 1227                            15,2245                           BANK
 1228   REF   2 LAST  250 TO  251:    40      40*                  COUNT*  $$/R59

 12281  REF  15  LAST  876       15,2245  4 0077 0  R59            CS      FLAGWRD3
 12282  REF   3  LAST  213       15,2246  7 4737 1                 MASK    REFSMBIT      IF REFSMMAT FLAG CLEAR BYPASS STAR AQUIR
 12283  REF 282  LAST  928       15,2247  10 000 0                 CCS     A
 12284  REF   1                  15,2250  1 2455 0                 TCF     R59OUT        NO REFSMMAT GO TO AOTMARK

 1229   REF   1                  15,2251  3 2463 1                 CAF     V01N70*       SELECT STAR CODE FOR ACQUISITION
 1230   REF 284  LAST  956       15,2252  0 4616 1                 TC      BANKCALL
 1231   REF  35  LAST  956       15,2253   20476 0                 CADR    GOFLASH
 1232   REF  53  LAST  956       15,2254  0 6001 0                 TC      GOTOPOOH      V34-TERMINATE
 1233   REF   1                  15,2255  1 2257 1                 TCF     R59A          V33-PROCEED
 1234   REF   1                  15,2256  1 2245 1                 TCF     R59           V32-RECYCLE

 1235   REF   5  LAST  956       15,2257  4 7744 0  R59A           CS      HIGH9         GRAB STARCODE FOR INDEX
 1236   REF   9  LAST  316       15,2260  7 0735 1                 MASK    AOTCODE
 1237                            15,2261  0 0006 1                 EXTEND
 1238   REF   2  LAST  292       15,2262  7 6242 1                 MP      REVCNT        JUST 6
 1239   REF 161  LAST  956       15,2263  56 001 0                 XCH     L
 1240   REF  11  LAST  955       15,2264  51'757 0                 INDEX   STARIND
 1241   REF  10  LAST  955       15,2265  55'755 0                 TS      BESTI
 1242   REF  35  LAST  956       15,2266  50 120 1                 INDEX   FIXLOC
 1243   REF  26  LAST  938       15,2267  54 046 1                 TS      X1            CODE X 6 FOR CATLOG STAR INDEX
 1244                            15,2270  0 0006 1                 EXTEND
 1245   REF   2  LAST  957       15,2271  1 2455 0                 BZF     R59OUT        BYPASS AQUISITION IF NOT CATLOG STAR
 1246                            15,2272  4 0000 0                 COM
 1247   REF   1                  15,2273  6 2561 1                 AD      DEC227
 1248                            15,2274  0 0006 1                 EXTEND
 1249   REF   3  LAST  957       15,2275  6 2455 1                 BZMF    R59OUT

 1250   REF 199  LAST  956       15,2276  0 6037 0                 TC      INTPRET
 1253                            15,2277   64373 1                 VLOAD*  MXV
 1254   REF  11  LAST  940       15,2300   30347 1                         CATLOG,1      GRAB STAR VECTOR
 1255   REF  48  LAST  956       15,2301   01734 0                         REFSMMAT      TRANSFORM TO SM
 1256                            15,2302   45056 0                 UNIT    CALL
 1257   REF   3  LAST  784       15,2303   47646 0                         CDU*SMNB
 1258   REF   4  LAST  241       15,2304   02731 0                 STORE   STAR          TEMP STORE STAR VEC(NB)
 1259                            15,2305   77776 1                 EXIT

 1260   REF  45  LAST  951       15,2306  3 4753 1                 CAF     BIT1          INITIALIZE AZ POSITION CODE TO 1 (-60)
 1261   REF   2  LAST  316       15,2307  55'242 0                 TS      POSCODE

 1262   REF  18  LAST  955       E7,1551                           EBANK=  XYMARK
 12621  REF  15  LAST  955       15,2310  3 5016 0  INCAZ          CA      EBANK7
 1263   REF  51  LAST  956       15,2311  54 003 0                 TS      EBANK
 12631  REF   3  LAST  957   15,2312  51'242 1      INDEX   POSCODE
 12632  REF   5  LAST  956   15,2313  3 1403 1      CA      AOTAZ -1      PICK UP AZ CORRESPONDING TO POSCODE
 12633  REF 162  LAST  957   15,2314  54 001 1      TS      L

 1264   REF  20  LAST  956   E5,1642                EBANK=  XSM
 1265   REF  12  LAST  956   15,2315  3 5014 1      CA      EBANK5
 1266   REF  52  LAST  957   15,2316  54 003 0      TS      EBANK

 12661  REF  37  LAST  956   15,2317  3 4737 0      CA      BIT13         SET ELV TO 45 DEG
 12662  REF 163  LAST  958   15,2320  56 001 0      XCH     L             SET C(A)=AZ, C(L)=45 DEG
 12663  REF  12  LAST  947   15,2321  55'745 1      TS      QMIN          STORE QMIN=AZ FOR LATER
 1267   REF  36  LAST  957   15,2322  50 120 1      INDEX   FIXLOC
 1268                        15,2323  52 011 0      DXCH    8D            JAM AZ IN 8D, 45 DEG IN 9D FOR OANB

 1269   REF 199  LAST  957   15,2324  0 6037 0      TC      INTPRET
 1270                        15,2325   77624 1      CALL
 1271   REF   3  LAST  956   15,2326   10536 0              OANB          GO CALC OPTIC AXIS WRT NB
 1272                        15,2327   50375 0      VLOAD   DOT
 1273   REF   5  LAST  957   15,2330   02731 0              STAR          DOT STAR WITH OA
 1274   REF  24  LAST  788   15,2331   03765 0              SCAXIS
 1275                        15,2332   65552 0      SL1     ARCCOS
 1276                        15,2333   00031 0      STORE   24D           TEMP STORE ARCCOS(STAR.OPTAXIS)

 1277                        15,2334   51025 1      DSU     BPL
 1278   REF   2  LAST  251   15,2335   32466 1              DEG30         SEE IF STAR IN AOT FIELD-OF-VIEW
 1279   REF   1              15,2336   32420 0              NXAX          NOT IN FIELD - TRY NEXT POSITION
 1280                        15,2337   45345 1      DLOAD   DSU           SEE IF STAR AT FIELD CENTER
 1281                        15,2340   00031 0              24D
 1282   REF   1              15,2341   32470 0              DEG.5
 1283                        15,2342   71240 1      BMN     DLOAD         CALC SPIRAL AND CURSOR
 1284   REF   1              15,2343   32413 0              ZSPCR         GO ZERO CURSOR AND SPIRAL
 1285                        15,2344   00031 0              24D           GET SPIRAL
 1286                        15,2345   42405 0      DMP     SL4
 1287   REF   1              15,2346   25764 0              3/4           12 SCALED AT 16
 1288                        15,2347   24031 0      STOVL   24D           12(ARCCOS(AO.STAR)) SCALED IN REVS

 1289   REF  25  LAST  958   15,2350   03765 0              SCAXIS        OA
 1290                        15,2351   53435 0      VXV     UNIT
 1291   REF   3  LAST   37   15,2352   24005 1              XUNIT
 1292                        15,2353   47206 0      PUSH    VXV            OA X UNITX   PD 0-5
 1293   REF  26  LAST  958   15,2354   03765 0              SCAXIS
 1294                        15,2355   77676 0      VCOMP
 1295                        15,2356   63256 0      UNIT    PDVL          UNIT(OA X(OA X UNITX))  PD 6-11
 1296   REF  27  LAST  958   15,2357   03765 0              SCAXIS
 1297                        15,2360   53435 0      VXV     UNIT
 1298   REF   6  LAST  958   15,2361   02731 0              STAR
 1299                        15,2362   50206 0      PUSH    DOT           1/2(OA X STAR)   PD 12-17
 1300                        15,2363   00001 0              0             DOT WITH 1/2(OA X UNITX)  FOR YROT
 1301                        15,2364   65552 0      SL1     ARCCOS
 1302                        15,2365   24033 1      STOVL   26D           STORE THET SCALED IN REVS
 1303                            15,2366   77641 1            DOT                 UP 12-17, UP 6-11 FOR C2
 1304                            15,2367   71244 0            BPL     DLOAD       IF THET NEG-GET 360-THET
 1305    REF   1                 15,2370   32375 1                    R59D
 1306    REF   2  LAST  250      15,2371   32047 0                    ABOUTONE
 1307                            15,2372   77625 0            DSU
 1308                            15,2373   00033 1                    26D
 1309                            15,2374   00033 1            STORE   26D         360-THET SCALED IN REVS

 1310                            15,2375   70535 0  R59D      SLOAD   SR1
 1311    REF  13  LAST  958      15,2376   02746 0                    QMIN        RESCALE AZ(N) TO REVS
 1312                            15,2377   41415 1            DAD     PUSH        PUSH YROT + AZ(N) REVS
 1313                            15,2400   00033 1                    26D
 1314                            15,2401   77634 0            RTB
 1315    REF   2  LAST  373      15,2402   21614 1                    1STO2S
 1316    REF   3  LAST  316      15,2403   15237 0            STODL   CURSOR      YROT IN 1/2 REVS
 1317                            15,2404   00031 0                    24D         LOAD SROT IN REVS
 1318                            15,2405   77615 0            DAD                 12(SEP) + YROT
 1319                            15,2406   77634 0            RTB
 1320    REF   3  LAST  959      15,2407   21614 1                    1STO2S
 1321    REF   3  LAST  316      15,2410   01241 1            STORE   SPIRAL      SROT IN 1/2 REVS
 1322                            15,2411   77776 1            EXIT
 1323    REF   1                 15,2412 1 2437 1             TCF     79DISP      GO DISPLAY CURSOR-SPIRAL-POS CODE

 1324                            15,2413   77776 1  ZSPCR     EXIT
 1325    REF 182  LAST  952      15,2414 3 4755 1             CAF     ZERO        STAR ALMOST OPTIC AXIS,ZERO CURSOR
 1326    REF   4  LAST  959      15,2415  55'236 0            TS      CURSOR      AND SPIRAL ANGLES
 1327    REF   4  LAST  959      15,2416  55'240 1            TS      SPIRAL
 1328    REF   2  LAST  959      15,2417 1 2437 1             TCF     79DISP

 1329                            15,2420   77776 1  NXAX      EXIT
 1330    REF   4  LAST  958      15,2421  25'242 1            INCR    POSCODE
 1331    REF   5  LAST  959      15,2422 4 1242 0             CS      POSCODE
 1332    REF  12  LAST  858      15,2423 6 4757 0             AD      SEVEN
 1333                            15,2424 0 0006 1             EXTEND
 1334    REF   1                 15,2425 6 2427 1             BZMF    R59ALM      THIS STAR NOT AT ANY POSITION
 1337    REF   1                 15,2426 1 2310 0             TCF     INCAZ

 1338    REF  38  LAST  941      15,2427 0 5567 0  R59ALM     TC      ALARM       THIS STAR CANT BE LOCATED IN AOT FIELD
 1339                            15,2430   00404 1            OCT     404   260
 1340    REF   2  LAST  941      15,2431 3 5006 1             CAF     VB05N09     DISPLAY ALARM
 1341    REF 285  LAST  957      15,2432 0 4616 1             TC      BANKCALL
 1342    REF  36  LAST  957      15,2433   20476 0            CADR    GOFLASH
 1343    REF  54  LAST  957      15,2434 1 6001 1             TCF     GOTOPOOH    VB34-TERMINATE
 1344    REF   4  LAST  957      15,2435 1 2455 0             TCF     R59OUT      VB33-PROCEED, GO WITHOUT AQUIRE
 1345    REF   2  LAST  957      15,2436 1 2245 1             TCF     R59         VB32-RECYCLE AND TRY ANOTHER STAR

 1346    REF   1                 15,2437 3 2464 0  79DISP     CAF     V06N79      DISPLAY CURSOR, SPIRAL AND POS CODE
 1347    REF 286  LAST  959      15,2440 0 4616 1             TC      BANKCALL
 1348    REF  37  LAST  959      15,2441   20476 0            CADR    GOFLASH
 1349    REF  55  LAST  959      15,2442 1 6001 1             TCF     GOTOPOOH    V34-TERMINATE
 1350   REF   1                15,2443  1 2445 1             TCF     R59E              V33-PROCEED TO MARK ROUTINE
 1351   REF   3  LAST  959     15,2444  1 2245 1             TCF     R59               V32-RECYCLE TO TOP OF R59 AGAIN

 1352   REF  13  LAST  959     15,2445  3 4757 0  R59E       CAF     SEVEN             GET DETENT CODE CORRESPONDING TO POSCODE
 1353   REF   6  LAST  959     15,2446  7 1242 0             MASK    POSCODE
 1354                          15,2447  0 0006 1             EXTEND
 1355   REF  34  LAST  900     15,2450  7 4745 1             MP      BIT7              DETENT CODE NOW IN L
 1356   REF   6  LAST  957     15,2451  4 7744 0             CS      HIGH9
 1357   REF  10  LAST  957     15,2452  7 0735 1             MASK    AOTCODE           ISOLATE STAR NO IN BIT 1-6
 1358   REF 164  LAST  958     15,2453  6 0001 0             AD      L
 1359   REF  11  LAST  960     15,2454  54 735 1             TS      AOTCODE           STORE DETENT 7-9

 1367   REF 287  LAST  959     15,2455  0 4616 1  R59OUT     TC      BANKCALL          GO TO AOTMARK FOR SIGHTING
 1368   REF   3  LAST  950     15,2456   16000 0             CADR    AOTMARK
 1369   REF 288  LAST  960     15,2457  0 4616 1             TC      BANKCALL
 1370   REF   2  LAST  950     15,2460   17712 0             CADR    AOTSTALL          SLEEP TILL SIGHTING DONE
 1371   REF   7  LAST  952     15,2461  0 5711 0             TC      CURTAINS          BADEND RETURN FROM AOTMARK
 1372   REF   1                15,2462  1 3054 1             TCF     R59RET            RETURN TO 1 STAR OR 2STAR

 1373                          15,2463   00306 1  V01N70*    VN      170
 1374                          15,2464   01517 0  V06N79     VN      679
 1375                          15,2465   02525 1  DEG30      2DEC    .083333333        30 DEGRESS
 1375                          15,2466   12525 0
 1376                          15,2467   00026 0  DEG.5      2DEC    .00138888         .5 DEGRESS SCALED IN REVS
 1376                          15,2470   30131 1
 1377                          15,2471   12525 0  DEG60      OCT     12525             60 DEG CDU SCALING
 1378   REF  16  LAST  933        1236            CURSOR     EQUALS GDT/2
 1379  *REF  17  LAST  960        1240            SPIRAL     EQUALS GDT/2 +2
 1380  *REF  18  LAST  960        1242            POSCODE    EQUALS GDT/2 +4
```

24

360000
7200
2400
369600

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R1381   NAME -    PLANET
R1382   FUNCTION -TO PROVIDE THE REFERENCE VECTOR FOR THE SIGHTED CELESTIAL
R1383             BODY. STARS ARE FETCHED FROM THE CATALOG,SUN,EARTH AND
R1384             MOON ARE COMPUTED BY LOCSAM,PLANET VECTORS ARE ENTERED
R1385             BY DSDY INPUT
R1386   CALL   -  CALL
R1387                       PLANET
R1388   INPUT -   TIME IN MPAC
R1389   OUTPUT -  VECTOR  IN MPAC
R1390   SUBROUTINES - LOCSAM
R1391   DEBRIS -  VAC ,STARAD - STARAD +17

 1392   REF      LAST  957   15,2000                              SETLOC P50S
 1393                        15,2472                              BANK
 1394   REF    1                                                  COUNT* $$/P51

 1395   REF    9  LAST  951   15,2472   27562 0   PLANET    STOVL   TSIGHT
 13951  REF    4  LAST  952   15,2473   24007 0                      ZEROVEC               ZERO N88 DISPLAY VEC
 13952  REF   22  LAST  951   15,2474   02707 0             STORE   STARAD
 1396                         15,2475   77420 1             STQ     EXIT
 1397   REF    4  LAST  249   15,2476   02736 1                     GCTR
 1398   REF    7  LAST  960   15,2477  4 7744 0             CS      HIGH9
 1399   REF   12  LAST  960   15,2500  7 0735 1             MASK    AOTCODE
 1400                         15,2501  0 0006 1             EXTEND
 1401   REF    3  LAST  957   15,2502  7 6242 1             MP      REVCNT
 1402   REF  1 5  LAST  960   15,2503  56 001 0             XCH     L
 1403   REF   12  LAST  957   15,2504  51'757 0             INDEX   STARIND
 1404   REF   11  LAST  957   15,2505  55'755 0             TS      BESTI
 1405   REF  283  LAST  957   15,2506  10 000 0             CCS     A
 1406   REF    1              15,2507  1 2523 0             TCF     NOTPLAN
 1407   REF    1              15,2510  3 2562 1             CAF     VNPLANV
 1408   REF  289  LAST  960   15,2511  0 4616 1             TC      BANKCALL
 1409   REF   38  LAST  959   15,2512   20476 0             CADR    GOFLASH
 1410                         15,2513  0 2510 1             TC      -3
 1411                         15,2514  0 2516 1             TC      +2
 1412                         15,2515  0 2510 1             TC      -5
 1413   REF  200  LAST  958   15,2516  0 6037 0             TC      INTPRET
 1414                         15,2517   53575 0             VLOAD   UNIT
 1415   REF   23  LAST  961   15,2520   02707 0                     STARAD
 1416                         15,2521   77650 1             GOTO
 1417   REF    5  LAST  961   15,2522   02736 1                     GCTR
 1418   REF  284  LAST  961   15,2523  4 0000 0   NOTPLAN   CS      A
 1419   REF    2  LAST  957   15,2524  6 2561 1             AD      DEC227
 1420                         15,2525  0 0006 1             EXTEND
 1421   REF    1              15,2526  6 2537 1             BZMF    CALSAM1
 1422   REF   13  LAST  961   15,2527  51'757 0             INDEX   STARIND
 1423   REF   12  LAST  961   15,2530  3 1755 1             CA      BESTI
 1424   REF   37  LAST  958   15,2531  50 120 1             INDEX   FIXLOC
 1425   REF   27  LAST  957   15,2532  54 046 1             TS      X1
 1426   REF  201  LAST  961   15,2533  0 6037 0             TC      INTPRET
 1427                            15,2534    52173 0                   VLOAD* GOTO
 1428   REF  12  LAST  957       15,2535    30347 1                          CATLOG,1
 1429   REF   6  LAST  961       15,2536    02736 1                          GCTR
 1430   REF 202  LAST  961       15,2537  0 6037 0   CALSAM1   TC      INTPRET
 1431                            15,2540    45145 0   CALSAM    DLOAD   CALL
 1432   REF   9  LAST  961       15,2541    03562 0                          TSIGHT
 1433   REF   3  LAST  941       15,2542    30506 1                          LOCSAM
 1434                            15,2543    77340 0             LXC,1   VLOAD
 1435   REF  14  LAST  961       15,2544    02757 0                          STARIND
 1436   REF   5  LAST  935       15,2545    02707 0                          VEARTH
 1437                            15,2546    24001 0             STOVL   0D
 1438   REF   4  LAST  935       15,2547    02715 0                          VSUN
 1439   REF   6  LAST  962       15,2550    26707 0             STOVL   VEARTH
 1440                            15,2551    00001 0                          0D
 1441   REF   5  LAST  962       15,2552    02715 0             STORE   VSUN
 1442                            15,2553    70143 0             DLOAD*  LXC,1
 1443   REF  13  LAST  961       15,2554    02756 1                          BESTI,1
 1444   REF 366  LAST  939       15,2555    00154 1                          MPAC
 1445                            15,2556    52173 0             VLOAD*  GOTO
 1446   REF  24  LAST  961       15,2557    02343 1                          STARAD -228D,1
 1447   REF   7  LAST  962       15,2560    02736 1                          GCTR
 1448                            15,2561    00343 0   DEC227    DEC     227
 1449                            15,2562    01530 0   VNPLANV   VN      0688
 1450   REF   4  LAST  858       37,3544              PIPSRINE =        PIPASR +3        EBANK NOT 4 SO DONT LOAD PIPTIME1
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P1451    GRAVITY VECTOR DETERMINATION ROUTINE
R1452    BY KEN VINCENT
R1453    FOR DETAILED DESCRIPTION SEE 504GSOP 5.6.3.2.5
R1454    THIS PROGRAM FINDS THE DIRECTION OF THE MOONS GRAVITY
R1455    WHILE THE LM IS ON THE MOONS SURFACE. IT WILL BE USED
R1456    FOR LUNAR SURFACE ALIGNMENT. THE GRAVITY VECTOR IS
R1457    DETERMINED BY READING THE PIPAS WITH THE IMU AT TWO
R1458    PARTICULAR ORIONTATIONS. THE TWO READINGS ARE AVERAGED
R1459    AND UNITIZED AND TRANSFORMED TO NB COORDINATES. THE TWO
R1460    ORIENTATION WERE CHOSEN TO REDUCE BIAS ERRORS IN THE
R1461    READINGS.
R1462
R1463    CALL-
R1464             TC       BANKCALL
R1465             CADR     GVDETER
R1466    INPUTS-
R1467             PIPAS,CDUS
R1468    OUTPUTS-
R1469             STARSAV1 = UNIT GRAVITY
R1470             GSAV       =   DITTO
R1471             GRAVBIT   = 1
R1472    SUBROUTINES-
R1473             PIPASR,IMUCOARS,IMUFINE,IMUSTALL,1/PIPA,DELAYJOB,CDUTRIG,
R1474             *NBSM* ,*SNMB*, CALCGA,FOFLASH
R1475    DEBRIS-
R1476             VAC,SAC,STARAD,XSM,XNB,THETAD,DELV,COSCDU,SINCDU
 1477   *REF    1                 15,2563   3 2772 1  GVDETER   CAF     42DEG
 1478   *REF   14  LAST   950     15,2564  54 321 0             TS      THETAD
 1479   *                         15,2565   4 0000 0             COM
 1480   *REF   15  LAST   963     15,2566  54 322 0             TS      THETAD +1
 1481   *REF    1                 15,2567   3 2773 0             CAF     35DEG
 14311  *REF   16  LAST   963     15,2570  54 323 1             TS      THETAD +2
 1482    REF  203  LAST   962     15,2571   0 6037 0             TC      INTPRET
 1483                             15,2572    45014 0             CLEAR   CALI
 1484    REF    6  LAST   951     15,2573    01662 1                     REFSMFLG
 1485    REF    1                 15,2574    32670 1                     LUNG
R1486    FIND  GIMBAL ANGLES WHICH ROTATE SM 180DEG  ABOUT  G VEC
R1487
R1488     DEFINE G COOR SYS
R1489                           -
R1490                           X     UNIT G
R1491                       *   -                  -
R1492                       M=  Y =   UNITEZSM * X  )
R1493                           -         -        -
R1494                           Z     UNIT(X    *  Y  )
R1495     THEN   ROTATED  SM WRT  PRESENT IS
R1496
R1497
R1498                          1,  0 , 0
R1499               *       *T             *          *         *
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R1500             XSM =    M  0, -1 , 0  M  = 2  (X X ) - 1/2 I  *
R1501                                              I J
R1502                         0,  0 ,-1
R1503
R1504   ALSO   NB WRT PRES SM  IS
R1505
R1506                    *       *    *
R1507                  XNB = NBSM   I
R1508                              *      *
R1509   GIMBAL ANGLES  = CALCGA( XSM , XNB )
R1510
 1511   REF   5  LAST  961   15,2000                       SETLOC P50S
 1512                        15,2575                       BANK
 1513   REF   1                                            COUNT* $$/P57
 1514                        15,2575   66370 0             AXT,1  SSP               X1=18
 1515                        15,2576   00022 1                    18D               S1= 6
 1516   REF  10  LAST  953   15,2577   00051 0                    S1                X2, -2
 1517                        15,2600   00006 1                    6D
 1518                        15,2601   77744 0             LXC,2
 1519   REF  11  LAST  964   15,2602   00050 1                    S1
 1520                        15,2603   45173 0   GRAVEL    VLOAD* CALL
 1521   REF   4  LAST  958   15,2604   54000 0                    XUNIT -6,2
 1522   REF   5  LAST  886   15,2605   47673 0                    *NBSM*           SIN AND COS COMPUTED IN LUNG
 1523   REF   6  LAST  953   15,2606   06707 1             STORE  XNB +18D,1
 1524                        15,2607   77775 1             VLOAD
 1525   REF   7  LAST  958   15,2610   02731 0                    STAR
 1526                        15,2611   73744 1             LXC,2  VXSC*            COMPLEMENT- UNITX  ARE BACKWARD -
 1527   REF  15  LAST  880   15,2612   00047 1                    X2
 1528   REF   8  LAST  964   15,2613   75040 1                    STAR +6,2        OUTER PRODUCT
 1529                        15,2614   71152 1             VSL2   LXC,2
 1530   REF  16  LAST  964   15,2615   00047 1                    X2
 1531                        15,2616   63047 1             VSU*   INCR,2
 1532   REF   5  LAST  964   15,2617   54000 0                    XUNIT -6,2
 1533                        15,2620   00002 0                    2D
 1534   REF  21  LAST  958   15,2621   06665 1             STORE  XSM +18D,1
 1535                        15,2622   45100 1             TIX,1  CALL
 1536   REF   1              15,2623   32603 0                    GRAVEL
 1537   REF   3  LAST  953   15,2624   47353 1                    CALCGA
 1538                        15,2625   74575 0             VLOAD  VSR1
 1539   REF   1              15,2626   02715 0                    GCUT
 1540   REF  25  LAST  962   15,2627   36723 1             STCALL STARAD +12D
 1541   REF   2  LAST  963   15,2630   32670 1                    LUNG
 1542                        15,2631   74575 0             VLOAD  VSR1
 1543   REF   2  LAST  964   15,2632   02715 0                    GCUT
 1544                        15,2633   53455 0             VAD    UNIT
 1545   REF  26  LAST  964   15,2634   02723 0                    STARAD +12D
 1546   REF   7  LAST  951   15,2635   02761 0             STORE  STARSAV1
 1547                        15,2636   77641 1             DOT
 1548   REF   6  LAST  792   15,2637   02231 0                    GSAV
 1549                        15,2640   55552 0             SL1    ACOS
 1550   REF  28  LAST  928   15,2641   01046 1             STORE   DSPTEM1
 1551                        15,2642   77776 1             EXIT
 1552   REF  88  LAST  965   15,2643  0 5516 0             TC      DOWNFLAG        CLEAR FREEFLAG IN CASE OF RECYCLE
 1553   REF   8  LAST  951   15,2644   00014 1             ADRES   FREEFLAG

 1554   REF   1              15,2645  3 2771 1             CA      DISGRVER
 1555   REF 290  LAST  961   15,2646  0 4616 1             TC      BANKCALL
 1556   REF  39  LAST  961   15,2647   20476 0             CADR    GOFLASH
 1557   REF  56  LAST  959   15,2650  0 6001 0             TC      GOTOPOOH
 1558   REF   1              15,2651  1 2654 0             TCF     PROGRAV         VB33-PROCEED
 1559   REF  63  LAST  891   15,2652  0 5504 0             TC      UPFLAG          VB32-RECYCLE-STORE GRAV AND DO IT AGAIN
 1560   REF   9  LAST  965   15,2653   00014 1             ADRES   FREEFLAG        AND SET FREEFLAG TO SHOW RECYCLE

 1561   REF  92  LAST  951   15,2654  0 5353 1  PROGRAV    TC      PHASCHNG
 1562                        15,2655   04024 0             OCT     04024

 1564   REF 204  LAST  963   15,2656  0 6037 0             TC      INTPRET
 1565                        15,2657   77775 1             VLOAD
 1566   REF   8  LAST  964   15,2660   02761 0                     STARSAV1
 1567   REF   7  LAST  964   15,2661   02231 0             STORE   GSAV
 1568                        15,2662   77776 1             EXIT
 1569   REF   1              15,2663  3 4751 0             CAF     FREEFBIT        IF FREEFLAG SET, RE-COMPUTE GRAVITY.
 1570   REF  30  LAST  907   15,2664  7 0074 0             MASK    FLAGWRD0
 1571   REF 285  LAST  961   15,2665  10 000 0             CCS     A
 1572   REF   1              15,2666  1 2563 1             TCF     GVDETER         SET
 1573   REF   1              15,2667  1 3553 0             TCF     ATTCHK          EXIT FROM GVDETER

 1574                        15,2670   77220 1  LUNG       STQ     VLOAD
 1575   REF  14  LAST  959   15,2671   02745 0                     QMIN
 1576   REF   5  LAST  961   15,2672   24007 0                     ZEROVEC
 1577   REF   1              15,2673   02707 0             STORE   GACC
 1578                        15,2674   77776 1             EXIT
 1579   REF  93  LAST  965   15,2675  0 5353 1             TC      PHASCHNG
 1580                        15,2676   04024 0             OCT     04024

 1582   REF 291  LAST  965   15,2677  0 4616 1             TC      BANKCALL
 1583   REF   5  LAST  952   15,2700   17000 1             CADR    IMUCOARS
 1584   REF 292  LAST  965   15,2701  0 4616 1             TC      BANKCALL
 1585   REF  12  LAST  952   15,2702   17716 1             CADR    IMUSTALL
 1586   REF   8  LAST  960   15,2703  0 5711 0             TC      CURTAINS
 1587   REF 293  LAST  965   15,2704  0 4616 1             TC      BANKCALL
 1588   REF   4  LAST  952   15,2705   17210 1             CADR    IMUFINE
 1589   REF 294  LAST  965   15,2706  0 4616 1             TC      BANKCALL
 1590   REF  13  LAST  965   15,2707   17716 1             CADR    IMUSTALL
 1591   REF   9  LAST  965   15,2710  0 5711 0             TC      CURTAINS
 1592   REF   1              15,2711  3 2770 0             CA      T/2SEC
 1593   REF   8  LAST  962   15,2712  55'736 0             TS      GCTR
 1594   REF   3  LAST  860   15,2713  3 7716 0             CA      PRIO31
 1595   REF  10  LAST  952   15,2714  55'075 0             TS      1/PIPADT
 1596   REF 295  LAST  965   15,2715  0 4616 1             TC      BANKCALL
 1597    REF   1                15,2716   15701 0            CADR     GCOMPZER        INITIALIZE  COMPENSATION
 1598    REF  94   LAST  965    15,2717  0 5353 1            TC       PHASCHNG
 1599                            15,2720   04024 0            OCT      04024

 1601    REF 296   LAST  965    15,2721  0 4616 1            TC       BANKCALL         DONT NEED TO INHINY  THIS USED TO
 1602    REF   1                15,2722   77544 1            CADR     PIPSRINE        INITIALIZE PIPAS  DONT USE DATA
 1603    REF 205   LAST  965    15,2723  0 6037 0            TC       INTPRET
 1604                            15,2724   77776 1  GREED     EXIT                     = MASK 7776 IN BASIC SO DONT CARE
 1605    REF   7   LAST  857    15,2725  3 5000 1            CAF      2SECS
 1606    REF  26   LAST  900    15,2726  0 5173 1            TC       TWIDDLE         SET UP 2 SEC TASK TO READ PIPAS
 1607    REF   1                15,2727   02731 0            ADRES    GRABGRAV

 1609    REF 142   LAST  928    15,2730  0 5155 0            TC       ENDOFJOB

 1610    REF  46   LAST  924    15,2731  0 4674 0  GRABGRAV  TC       IBNKCALL
 1611    REF   2   LAST  966    15,2732   77544 1            CADR     PIPSRINE
 16141   REF   2   LAST  746    15,2733  3 5023 0            CAF      PRIO13          RE-ESTABLISH MAINLINE JOB
 16142   REF  40   LAST  873    15,2734  0 5105 0            TC       FINDVAC
 16143   REF  27   LAST  964    E5,1706                      EBANK=   STARAD
 16144   REF   1                15,2735   02740 0            2CADR    ADDGRAV
 16144   REF   1                15,2736   32065 0

 16145   REF  66   LAST  907    15,2737  0 5261 1            TC       TASKOVER

 16146   REF 297   LAST  966    15,2740  0 4616 1  ADDGRAV   TC       BANKCALL
 16147   REF   3   LAST  860    15,2741   15263 1            CADR     1/PIPA
 16148   REF   9   LAST  965    15,2742  25'736 1            INCR     GCTR
 1615    REF 206   LAST  966    15,2743  0 6037 0            TC       INTPRET
 1616                            15,2744   53375 0            VLOAD    VAD
 1617    REF   9   LAST  912    15,2745   00325 0                     DELV
 1618    REF   2   LAST  965    15,2746   02707 0                     GACC
 1619    REF   3   LAST  966    15,2747   02707 0            STORE    GACC            ACCUMULATE G VECTOR
 1620                            15,2750   00135 0            SLOAD    BMN
 1621    REF  10   LAST  966    15,2751   02737 0                     GCTR
 1622    REF   1                15,2752   32724 1                     GREED
 1623                            15,2753   53575 0            VLOAD    UNIT
 1624    REF   4   LAST  966    15,2754   02707 0                     GACC
 1625    REF   9   LAST  964    15,2755   36731 1            STCALL   STAR
 1626    REF   6   LAST  953    15,2756   47537 0                     CDUTRIG          TRANSFORM  IN NB COOR  AND  STORE
 1627                            15,2757   77624 1            CALL                       IN OUTPUT
 1628    REF   7   LAST  912    15,2760   47671 1                     *SMNB*
 1629    REF   3   LAST  964    15,2761   02715 0            STORE    GOUT
 1630                            15,2762   77776 1            EXIT
 1631    REF  95   LAST  966    15,2763  0 5353 1            TC       PHASCHNG
 1632                            15,2764   04024 0            OCT      04024

 1634   *REF 207   LAST  966    15,2765  0 6037 0  QMINEXIT  TC       INTPRET
 1635                            15,2766   77650 1            GOTO
 1636    REF  15   LAST  965    15,2767   02745 0                     QMIN
 1637                            15,2770   77753 0  T/2SEC    DEC      -20
 1638                        15,2771   01404 0  DISGRVER  VN      0604
 16381 *                     15,2772   07357 1  42DEG      OCT     07357
 16382 *                     15,2773   06211 0  35DEG      OCT     06211
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R1639   NAME  GYROTRIM
R1640
R1641   THIS PROGRAM COMPUTES AND SENDS GYRO COMMANDS WHICH CAUSE THE CDUS
R1642     TO ATTAIN A PRESCRIBED SET OF ANGLES. THIS ROUTINE ASSUMES THE
R1643     VEHICLES ATTITUDE REMAINS STATIONARY DURING ITS OPERATION.
R1644
R1645   CALL      CALL
R1646                     GYROTRIM
R1647
R1648   INPUT     THETAD,+1,+2 = DESIRED CDU ANGLES
R1649             CDUX,CDUY,CDUZ
R1650
R1651   OUTPUT - GYRO TORQUE PULSES
R1652
R1653   SUBROUTINES- TRG*NBSM,*NBSM*,CDUTRIG,AXISGEN,CALCGTA,IMUFINE
R1654                  IMPULSE,IMUSTALL
R1655                 -           -         -          *           *      -
R1656   DEBRIS -  CDUSPOT ,SINCDU ,COSCDU , STARAD ,VAC , XDC , OGC
 1657   REF   2 LAST  964 TC  968:    127    127*              COUNT* $$/P57
 1658                         15,2774   71220 1  GYROTRIM STQ    DLOAD
 1659   REF  16  LAST  966    15,2775   02745 0                  QMIN
 1660   REF  17  LAST  963    15,2776   00322 1                  THETAD
 1661                         15,2777   65325 0           PDDL   PDDL
 1662   REF  18  LAST  968    15,3000   00324 1                  THETAD +2
 1663   REF  19  LAST  968    15,3001   00323 0                  THETAD +1
 1664                         15,3002   77666 1           VDEF
 1665   REF  25  LAST  896    15,3003   24767 1           STOVL  CDUSPOT
 1666   REF   6  LAST  964    15,3004   24005 1                  XUNIT
 1667                         15,3005   77624 1           CALL
 1668   REF   5  LAST  580    15,3006   47664 0                  TRG*NBSM
 1669   REF  28  LAST  966    15,3007   26707 0           STOVL  STARAD
 1670   REF   2  LAST   37    15,3010   24003 1                  YUNIT
 1671                         15,3011   77624 1           CALL
 1672   REF   6  LAST  964    15,3012   47673 0                  *NBSM*
 1673   REF  29  LAST  968    15,3013   36715 1           STCALL STARAD +6
 1674   REF   7  LAST  966    15,3014   47537 0                  CDUTRIG
 1675                         15,3015   77624 1           CALL
 1676   REF   3  LAST  953    15,3016   20030 0                  CALCSMSC
 1677                         15,3017   77775 1           VLOAD
 1678   REF   7  LAST  964    15,3020   02665 0                  XNB
 1679                         15,3021   24007 0           STOVL  6D
 1680   REF   3  LAST  374    15,3022   02673 1                  YNB
 1681                         15,3023   34015 1           STCALL 12D
 1682   REF   3  LAST  951    15,3024   47441 0                  AXISGEN
 1683                         15,3025   77624 1           CALL
 1684   REF   3  LAST  945    15,3026   47247 0                  CALCGTA
 1685                         15,3027   77776 1  JUSTTRIM EXIT
 1686   REF 298  LAST  966    15,3030 0 4616 1           TC     BANKCALL
 1687   REF   5  LAST  965    15,3031   17210 1           CADR   IMUFINE
 1688   REF 299  LAST  968    15,3032 0 4616 1           TC     BANKCALL
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  1689    REF  14  LAST  965   15,3033   17716 1                 CADR    IMUSTALL
  1690    REF  10  LAST  965   15,3034  0 5711 0                 TC      CURTAINS
  1691    REF   1              15,3035  3 3044 1                 CA      GYRCDR
  1692    REF 300  LAST  968   15,3036  0 4616 1                 TC      BANKCALL
  1693    REF   6  LAST  945   15,3037   17323 0                 CADR    IMUPULSE
  1694    REF 301  LAST  969   15,3040  0 4616 1                 TC      BANKCALL
  1695    REF  15  LAST  969   15,3041   17716 1                 CADR    IMUSTALL
  1696    REF  11  LAST  969   15,3042  0 5711 0                 TC      CURTAINS
  1697   *REF   1              15,3043  1 2765 0                 TCF     QMINEXIT

  1700    REF  12  LAST  945   15,3044   02737 0   GYRCDR        ECADR   OGC
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P1701    PERFORM STAR AQUISITION AND STAR SIGHTINGS

 1702    REF 183  LAST  959    15,3045  3 4755 1  2STARS   CAF     ZERO          INITIALIZE STARIND
 1703                          15,3046  1 3050 0           TCF     +2            ZERO FOR 1ST STAR, ONE FOR 2ND STAR
 1704    REF  46  LAST  957    15,3047  3 4753 1  1STAR    CAF     BIT1
 1705    REF  15  LAST  962    15,3050  55'757 1           TS      STARIND

 17051   REF  96  LAST  966    15,3051  0 5353 1           TC      PHASCHNG
 17052                         15,3052   04024 0           OCT     04024

 1706    REF   4  LAST  960    15,3053  1 2245 1           TCF     R59           GO DO STAR AQUIRE AND AOTMARK

 1707    REF  16  LAST  970    15,3054  3 1757 0  R59RET   CA      STARIND       BACK FROM SURFACE MARKING
 1708                          15,3055  0 0006 1           EXTEND
 1709    REF   1               15,3056  1 3067 1           BZF     ASTAR         1ST STAR MARKED

 1715    REF  97  LAST  970    15,3057  0 5353 1           TC      PHASCHNG
 1716                          15,3060   04024 0           OCT     04024

 1718    REF 208  LAST  966    15,3061  0 6037 0           TC      INTPRET
 1719                          15,3062   45145 0           DLOAD   CALL
 1720    REF  10  LAST  962    15,3063   03562 0                   TSIGHT        TIME OF 2ND MARK
 1721    REF   6  LAST  956    15,3064   32472 1                   PLANET
 1722    REF   1               15,3065   36731 1           STCALL  VEC2          STORE 2ND CATALOG VEC (REF)
 1723    REF   1               15,3066   33101 1                   SURFLINE

 1724    REF 209  LAST  970    15,3067  0 6037 0  ASTAR    TC      INTPRET
 1725                          15,3070   77775 1           VLOAD
 1726    REF  30  LAST  968    15,3071   02715 0                   STARAD +6
 1727    REF   9  LAST  965    15,3072   02761 0           STORE   STARSAV1      1ST OBSERVED STAR (SM)
 1728                          15,3073   45145 0           DLOAD   CALL
 1729    REF  11  LAST  970    15,3074   03562 0                   TSIGHT        TIME OF 1ST MARK
 1730    REF   7  LAST  970    15,3075   32472 1                   PLANET
 1731    REF   1               15,3076   02723 0           STORE   VEC1          STORE 1ST CATALOG VEC (REF)
 1732                          15,3077   77776 1           EXIT
 1733    REF   1               15,3100  1 3047 0           TCF     1STAR         GO GET 2ND STAR SIGHTING
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P1734   DO FINE OR COARSE ALIGNMENT OF IMU

 1735                            15,3101    77131 1  SURFLINE SSP     AXT,2
 1736   REF  11  LAST  938       15,3102    00052 0                   S2
 1737                            15,3103    00006 1                   6
 1738                            15,3104    00014 1                   12D
 1739                            15,3105    64373 1  WRTDESIF VLOAD*  MXV
 1740   REF   2  LAST  970       15,3106    75040 1                   VEC1 +12D,2      PICK UP VEC IN REF, TRANS TO DESIRED SM
 1741   REF  10  LAST  954       15,3107    03607 0                   XSMD
 1742                            15,3110    77656 1           UNIT
 1743   REF  31  LAST  970       15,3111    12723 1           STORE   STARAD +12D,2    VEC IN SM
 1744                            15,3112    77773 1           VLOAD*
 1745   REF  10  LAST  970       15,3113    75002 1                   STARSAV1 +12D,2  PICK UP VEC IN PRESENT SM
 1746                            15,3114    10023 1           STORE   18D,2
 1747                            15,3115    43104 0           TIX,2   BCN
 1748   REF   1                  15,3116    33105 0                   WRTDESIF
 17481  REF   1                  15,3117    04315 1                   INITALGN         IF INITIAL PASS (OPTION 0) BYPASS R54
 17482  REF   1                  15,3120    33126 1                   INITBY
 1749                            15,3121    77624 1  DOALIGN  CALL
 1750   REF   2  LAST  942       15,3122    31256 1                   R54              DO CHKSDATA
 1751                            15,3123    77614 1           BOFF
 1752   REF  10  LAST  965       15,3124    00354 0                   FREEFLAG
 1753   REF   1                  15,3125    33206 0                   P57POST          ASTRO DOES NOT LIKE DATA TEST RESULTS
 17531                           15,3126    77624 1  INITBY   CALL
 1754   REF   4  LAST  [illegible] 15,3127  47441 0                   AXISGEN          GET DESIRED ORIENT WRT PRES.XDC,YDC,ZDC
 1755                            15,3130    77624 1           CALL
 1756   REF   4  LAST  968       15,3131    47247 0                   CALCGTA          GET GYRO TORQ ANGLES, OGC,IGC,MGC
 1757                            15,3132    77776 1           EXIT
 17571  REF   1                  15,3133  3 4752 0            CAF     INITABIT         IF INITIAL PASS BYPASS NOUN 93 DISPLAY
 17572  REF  14  LAST  860       15,3134  7 0104 0            MASK    FLAGWRD8
 17573  REF 286  LAST  965       15,3135 10 000 0             CCS     A
 17574  REF   1                  15,3136  1 3145 0            TCF     5DEGTEST
 1758   REF   1                  15,3137  3 3313 0            CAF     DISPGYRO         DISPLAY GYRO TORQ ANGLES V 06N93
 1759   REF 302  LAST  969       15,3140  0 4616 1            TC      BANKCALL
 1760   REF  40  LAST  965       15,3141    20476 0           CADR    GOFLASH
 1761   REF  57  LAST  965       15,3142  0 6001 0            TC      GOTOPOOH         V34-TERMINATE
 1762   REF   2  LAST  971       15,3143  1 3145 0            TCF     5DEGTEST         VB33-PROCEED TO COARSE OR FINE
 1763   REF   2  LAST  971       15,3144  1 3207 0            TCF     P57POST +1       VB32-RECYCLE, MAYBE RE-ALIGN

 1764   REF 210  LAST  970       15,3145  0 6037 0   5DEGTEST TC      INTPRET          IF ANGLES GREATER THAN 5 DEGS, DO COARSE
 1765                            15,3146    40175 0           VLOAD   BOV
 1766   REF  13  LAST  969       15,3147    02740 0                   OGC
 1767   REF   1                  15,3150    33151 1                   SURFSUP
 1768   REF   2  LAST  124       15,3151    02750 1  SURFSUP  STORE   OGCT
 1769                            15,3152    40141 1           V/SC    BOV
 1770   REF   2  LAST  936       15,3153    30610 0                   5DEGREES
 1771   REF   1                  15,3154    33254 1                   COATRIM
 1772                            15,3155    52131 0           SSP     GOTO
 1773   REF  17  LAST  968       15,3156    02746 0                   QMIN
 1774   REF   1                  15,3157    33161 1                   SURFDISP
 1775   REF    1              15,3160   33027 1                     JUSTTRIM      ANGLES LESS THAN 5DEG, DO GYRO TORQ

 1776                         15,3161   77776 1  SURFDISP EXIT
 1777   REF   98  LAST  970   15,3162  0 5353 1           TC        PHASCHNG
 1778                         15,3163   04024 0           OCT       04024

 1780   REF  211  LAST  971   15,3164  0 6037 0           TC        INTPRET
 1781                         15,3165   75160 1           AXC,1     AXC,2
 1782   REF   11  LAST  971   15,3166   03606 1                     XSMD
 1783   REF   49  LAST  957   15,3167   01733 1                     REFSMMAT
 1784                         15,3170   45014 0           SET       CALL
 1785   REF    7  LAST  963   15,3171   01462 0                     REFSMFLG
 1786   REF    5  LAST  953   15,3172   31377 0                     MATMOVE
 1787                         15,3173   77776 1           EXIT
 1788   REF   11  LAST  928   15,3174  11'145 1           CCS       OPTION2       IF OPTION ZERO DO FINISH
 1789   REF    1              15,3175  1 3177 1           TCF       B2F8
 1790   REF    3  LAST  971   15,3176  1 3207 0           TCF       P57POST +1

 1791   REF    2  LAST  971   15,3177  3 4752 0  B2F8     CAF       INITABIT      IF INITIAL FLAG SET, RE-CYCLE.
 1792   REF   15  LAST  971   15,3200  7 0104 0           MASK      FLAGWRD8
 1793   REF  287  LAST  971   15,3201  10 000 0           CCS       A
 1794   REF    1              15,3202  1 3561 1           TCF       P57JUMP       ITS SET
 1795   REF  212  LAST  972   15,3203  0 6037 0           TC        INTPRET
 1796                         15,3204   77624 1           CALL
 1797   REF    2  LAST  792   15,3205   33506 1                     REFMF         GO GET ATTITUDE VEC IN MF(YNBSAV,XNBSAV)
 1798                         15,3206   77776 1  P57POST  EXIT
 1799   REF    3  LAST  942   15,3207  3 5751 1           CAF       OCT14         DISPLAY V50N25 CHK CODE 14
 1800   REF  303  LAST  971   15,3210  0 4616 1           TC        BANKCALL
 1801   REF    9  LAST  950   15,3211   20623 1           CADR      GOPERF1
 1802   REF   58  LAST  971   15,3212  1 6001 1           TCF       GOTOPOOH      VB34-TERMINATE
 1803   REF    2  LAST  972   15,3213  1 3561 1           TCF       P57JUMP       VB33-PROCEED TO RE-ALIGN
 1804   REF   45  LAST  928   15,3214  4 4752 1           CS        BIT2          TEST TO SE IF ALIGNED BY OPTION 2
 1805   REF   12  LAST  972   15,3215  6 1145 0           AD        OPTION2
 1806                         15,3216  0 0006 1           EXTEND
 1807                         15,3217  1 3221 1           BZF       +2            YES-GO CALCULATE LANDING SITE
 1808   REF   59  LAST  972   15,3220  1 6001 1           TCF       GOTOPOOH      NO-EXIT P57
 1809   REF   99  LAST  972   15,3221  0 5353 1           TC        PHASCHNG      RESTART PLACE
 1810                         15,3222   04024 0           OCT       04024
 1811   REF  213  LAST  972   15,3223  0 6037 0           TC        INTPRET
 1812                         15,3224   45175 0           VLOAD     CALL          USE GNB
 1813   REF    8  LAST  965   15,3225   02231 0                     GSAV
 1814   REF    3  LAST  818   15,3226   47661 0                     CDU*NBSM      GO TO SM COORDS
 1815                         15,3227   43105 1           VXM       SET                 ON MOON SO SET LUNAFLAG
 1816   REF   50  LAST  972   15,3230   01734 0                     REFSMMAT            G(REF) = (REFSMMAT)T (NBSM)GNB
 1817   REF       LAST  932   15,3231   01463 1                     LUNAFLAG
 1818                         15,3232   51515 1           PDVL      ABVAL
 1819   REF   10  LAST  932   15,3233   02023 1                     RLS
 1820                         15,3234   45561 1           VXSC      STADR
 1821   REF    6  LAST  932   15,3235   75745 0           STORE     ALPHAV              ALPHAV =  PLSMAG * G(REF)
 1822                         15,3236   47014 1           CLEAR     RTB
 1823   REF   3  LAST  932   15,3237    00662 0                ERADFLAG
 1824   REF  27  LAST  956   15,3240    21573 0                LOADTIME
 1825                        15,3241    77624 1         CALL
 1826   REF   2  LAST  932   15,3242    30446 1                N89DISP         SUBROUTINE TO CALC LS AND GIVE RLS BACK
 1827   REF  15  LAST  881   15,3243    01221 1         STORE  RN              RN=RLS B-29 = LM POSITION
 1828                        15,3244    65352 0         VSL2   PDDL            R-TO-RP GETS RLS B-27 AT  0-5D IN PDLIST
 1829  *REF  19  LAST  960   15,3245    01243 0                GDT/2 +4        TIME TEMP STORED IN N89DISP
 1830                        15,3246    77606 1         PUSH                   TIME AT  6-7 IN PDLIST
 1831   REF  23  LAST  901   15,3247    35235 0         STCALL PIPTIME         PIPTIME = LM STATE TIME
 1832   REF   2  LAST  791   15,3250    51670 1                R-TO-RP
 1833   REF  11  LAST  972   15,3251    02023 1         STORE  RLS             RLS IN MOON-FIXED COORDS
 1834                        15,3252    77776 1         EXIT
 1835   REF  60  LAST  972   15,3253  1 6001 1         TCF    GOTOPOOH        EXIT P57
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P1836   COARSE AND FINE ALIGN IMU
 1837                          15,3254   75160 1  COATRIM  AXC,1    AXC,2
 1838   REF   5  LAST  951     15,3255   02664 1                    XDC
 1839   REF  22  LAST  964     15,3256   02642 0                    XSM
 1840                          15,3257   77624 1           CALL
 1841   REF   6  LAST  972     15,3260   31377 0                    MATMOVE
 1842                          15,3261   77624 1           CALL
 1843   REF   8  LAST  968     15,3262   47537 0                    CDUTRIG
 1844                          15,3263   77624 1           CALL
 1845   REF   4  LAST  968     15,3264   20030 0                    CALCSMSC
 1846                          15,3265   77624 1           CALL
 1847   REF   4  LAST  964     15,3266   47353 1                    CALCGA
 18471                         15,3267   77414 0           BOFF     EXIT
 18472  REF   2  LAST  971     15,3270   04355 0                    INITALGN         IF INITIAL ALGNMENT DISPLAY FINAL
 18473  REF   1                15,3271   33303 1                    CORSIT           GIMBAL ANGLES IF COARSE ANGLES GREATER
 18474  REF   4  LAST  950     15,3272  3 5010 0           CAF      V06N22           THAN 5 DEGREES
 18475  REF 304  LAST  972     15,3273  0 4616 1           TC       BANKCALL
 18476  REF  41  LAST  971     15,3274   20476 0           CADR     GOFLASH
 18477  REF  61  LAST  973     15,3275  0 6001 0           TC       GOTOPOOH
 18478                         15,3276  1 3300 0           TCF      +2
 18479                         15,3277  1 3272 1           TCF      -5
 184791 REF 100  LAST  972     15,3300  0 5353 1           TC       PHASCHNG
 184792                        15,3301   04024 0           OCT      04024

 1848   REF 214  LAST  972     15,3302  0 6037 0           TC       INTPRET
 18481                         15,3303   77624 1  CORSIT   CALL
 1849   REF   3  LAST  950     15,3304   31565 0                    COARSE
 1850                          15,3305   77624 1           CALL
 1851   REF   4  LAST  950     15,3306   31602 1                    NCOARSE
 1852                          15,3307   77624 1           CALL
 1853   REF   1                15,3310   32774 1                    GYROTRIM
 1854                          15,3311   77650 1           GOTO
 1855   REF   2  LAST  971     15,3312   33161 1                    SURFDISP
 1856                          15,3313   01535 0  DISPGYRO VN       0693
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P1857    LUNAR SURFACE IMU ALIGNMENT PROGRAM

 1858    REF 305  LAST  974    15,3314  0 4616 1  P57        TC      BANKCALL        IS ISS ON - IF NOT, IMUCHK WILL SEND
 1859    REF   2  LAST  950    15,3315   33652 0             CADR    IMUCHK          ALARM CODE 210 AND EXIT VIA GOTOPOOH

 1860    REF  27  LAST  928    15,3316  3 6245 1             CAF     THREE           JAM REFSMMAT OPTION 3 FOR INITIAL DISP.
 1861    REF  13  LAST  972    15,3317  55'145 1             TS      OPTION2
 1862    REF  47  LAST  970    15,3320  3 4753 1  P57OPT     CAF     BIT1
 1863    REF 306  LAST  975    15,3321  0 4616 1             TC      BANKCALL
 1864    REF   2  LAST  928    15,3322   20713 0             CADR    GOPERF4R        FLASH V04N06 FOR ALIGNMENT CODE
 1865    REF  62  LAST  974    15,3323  0 6001 0             TC      GOTOPOOH        V34 TERMINATE
 1866    REF   1               15,3324  1 3331 1             TCF     ALIGNOPT        V33 PROCEED
 1867    REF   1               15,3325  1 3320 1             TCF     P57OPT          V32 RECYCLE

 1868    REF 101  LAST  974    15,3326  0 5353 1             TC      PHASCHNG
 1869                          15,3327   00014 1             OCT     00014
 1870    REF 143  LAST  966    15,3330  0 5155 0             TC      ENDOFJOB

 1871   *REF  14  LAST  975    15,3331  3 1145 0  ALIGNOPT   CA      OPTION2
 1872    REF  28  LAST  975    15,3332  7 6245 0             MASK    THREE
 1873    REF 288  LAST  972    15,3333  50 000 1             INDEX   A
 1874                          15,3334  1 3335 0             TCF     +1
 1875    REF   1               15,3335  1 3350 0             TCF     TDISP           OPTION 4 IS ORIENTATION
 1876    REF   1               15,3336  1 3411 1             TCF     PACKOPTN        OPTION 1 PREFERRED
 1877    REF   2  LAST  975    15,3337  1 3320 1             TCF     P57OPT          OPTION 2 INVALID IN P57, RECYCLE
 1878    REF 215  LAST  974    15,3340  0 6037 0             TC      INTPRET         OPTION 3 REFSMMAT
 1879                          15,3341   75160 1             AXC,1   AXC,2           JAM REFSMMAT IN XSMD LOC
 1880    REF  51  LAST  972    15,3342   01733 1                     REFSMMAT
 1881    REF  12  LAST  972    15,3343   03606 1                     XSMD
 1882                          15,3344   77624 1             CALL
 1883    REF   7  LAST  974    15,3345   31377 0                     MATMOVE
 1884                          15,3346   77650 1             GOTO
 1885    REF   2  LAST  975    15,3347   33410 1                     PACKOPTN -1

 1886    REF 216  LAST  975    15,3350  0 6037 0  TDISP      TC      INTPRET
 1887                          15,3351   77745 1             DLOAD
 1888    REF  42  LAST  839    15,3352   03442 0                     TIG             LOAD ASCENT TIME FOR DISPLAY
 1889    REF  29  LAST  965    15,3353   01046 1  P57A       STORE   DSPTEM1
 1890                          15,3354   77776 1             EXIT
 1891    REF   2  LAST  928    15,3355  3 2170 0  P57AA      CAF     V06N34*         DISPLAY TALIGN, TALIGN : DSPTEM1
 1892    REF 307  LAST  975    15,3356  0 4616 1             TC      BANKCALL
 1893    REF  42  LAST  974    15,3357   20476 0             CADR    GOFLASH
 1894    REF  63  LAST  975    15,3360  1 6001 1             TCF     GOTOPOOH        V34-TERMINATE
 1895                          15,3361  1 3363 0             TCF     +2
 1896    REF   1               15,3362  1 3355 0             TCF     P57AA           V832-RECYCLE

 1897    REF 217  LAST  975    15,3363  0 6037 0             TC      INTPRET
 1898                          15,3364   65234 1             RTB     PDDL
 1899    REF  28  LAST  973    15,3365   21573 0                     LOADTIME        PUSH CURRENT TIME AND PICK UP KEY IN
 1900    REF  30  LAST  975    15,3366   01046 1                     DSPTEM1
 1901                           15,3367   65254 1            BZE      PDDL
 1902   REF    1                15,3370   33400 0                     P57C          IF KEY IN TIME ZERO-TALIGN=CURRENT TIME
 1903                           15,3371   51025 1            DSU      BPL           NOT ZERO SO EXCHANGE PD WITH DSPTEM1
 1904   REF   31  LAST   975    15,3372   01046 1                     DSPTEM1
 1905   REF    2  LAST   976    15,3373   33400 0                     P57C
 1906                           15,3374   45545 1            DLOAD    STADR         IF KEYIN TIME GREATER THAN CURRENT TIME
 1907   REF   43  LAST   975    15,3375   74335 1            STORE    TIG           STORE IT IN TIG
 1908   REF    8  LAST   932    15,3376   36775 1            STCALL   TALIGN
 1909   REF    1                15,3377   33402 1                     P57D
 1910                           15,3400   45545 1  P57C      DLOAD    STADR
 1911   REF    9  LAST   976    15,3401   75002 1            STORE    TALIGN
 1912   REF   54  LAST   954    15,3402   34041 0  P57D      STCALL   TDEC1
 1913   REF   13  LAST   935    15,3403   27057 0                     LEMPREC       COMPUTE DESIRED IMU ORIENTATION STORE
 1914                           15,3404   53575 0            VLOAD    UNIT          IN  X,Y,ZSMD
 1915   REF   35  LAST   954    15,3405   00001 0                     RATT
 1916   REF   13  LAST   975    15,3406   37607 1            STCALL   XSMD
 1917   REF    2  LAST   932    15,3407   11013 0                     LSORIENT
 1918                           15,3410   77776 1            EXIT
 1919   REF  184  LAST   970    15,3411  3 4755 1  PACKOPTN  CAF      ZERO          PACK FLAG BITS FOR OPTION DISPLAY
 1920   REF    3  LAST   725    15,3412  55'145 1            TS       OPTION1 +1    JAM ZERO IN ALIGNMENT OPTION
 1921   REF    4  LAST   976    15,3413  55'146 1            TS       OPTION1 +2    INITIALIZE FLAG BIT CONFIGURATION
 1922   REF    4  LAST   957    15,3414  3 4737 0            CAF      REFSMBIT
 1923   REF   16  LAST   957    15,3415  7 0077 0            MASK     FLAGWRD3      REFSMFLG
 1924   REF  289  LAST   975    15,3416  10 000 0            CCS      A
 1925   REF   35  LAST   960    15,3417  3 4745 0            CAF      BIT7          SET
 1926   REF    5  LAST   976    15,3420  27'146 1            ADS      OPTION1 +2    CLEAR-JUST ZERO
 1927   REF    1                15,3421  3 4753 1            CAF      ATTFLBIT
 1928   REF   13  LAST   865    15,3422  7 0102 0            MASK     FLAGWRD6      ATTFLG
 1929   REF  290  LAST   976    15,3423  10 000 0            CCS      A
 1930   REF   38  LAST   920    15,3424  3 4750 1            CAF      BIT4          SET
 1931   REF    6  LAST   976    15,3425  27'146 1            ADS      OPTION1 +2    CLEAR-ZERO IN A
 1932   REF   39  LAST   976    15,3426  3 4750 1            CAF      BIT4
 1933   REF    7  LAST   976    15,3427  55'144 0            TS       OPTION1       JAM 00010 IN OPTION1 FOR CHECK LIST

 1934   REF    1                15,3430  3 3651 0  DSPOPTN   CAF      VB05N06       DISPLAY OPTION CODE AND FLAG BITS
 1935   REF  308  LAST   975    15,3431  0 4616 1            TC       BANKCALL
 1936   REF   43  LAST   975    15,3432   20476 0            CADR     GOFLASH
 1937   REF   64  LAST   975    15,3433  1 6001 1            TCF      GOTOPOOH      VB34-TERMINATE
 1938                           15,3434  1 3436 1            TCF      +2            V33-PROCEED
 1939   REF    1                15,3435  1 3430 1            TCF      DSPOPTN       V32-RECYCLE

 1940   REF    5  LAST   976    15,3436  3 4737 0            CAF      REFSMBIT
 1941   REF   17  LAST   976    15,3437  7 0077 0            MASK     FLAGWRD3
 1942   REF  291  LAST   976    15,3440  10 000 0            CCS      A
 1943   REF    1                15,3441  1 3541 0            TCF      GETLMATT      SET, GO COMPUTE LM ATTITUDE
 1944   REF    2  LAST   976    15,3442  3 4753 1            CAF      ATTFLBIT      CLEAR-CHECK ATTFLAG FOR STORED ATTITUDE.
 1945   REF   14  LAST   976    15,3443  7 0102 0            MASK     FLAGWRD6
 1946   REF  292  LAST   976    15,3444  10 000 0            CCS      A
 1947   REF    1                15,3445  1 3545 1            TCF      BYLMATT       ALLFLG SET, CHK OPTION FOR GRAVITY COMP
 1948   REF   46  LAST   972    15,3446  3 4752 0            CAF      BIT2          SEE IF OPTION 2 OR 3
 1949   REF  15  LAST  975   15,3447  7 1145 1          MASK    OPTION2
 1950   REF 293  LAST  976   15,3450  10 000 0          CCS     A
 1951   REF   2  LAST  976   15,3451  1 3545 1          TCF     BYLMATT          OPTION 2 OR 3 BUT DONT HAVE ATTITUDE
 1952   REF  39  LAST  959   15,3452  0 5567 0          TC      ALARM            OPTION INCONSISTANT WITH FLAGS-ALARM 701
 1953                        15,3453   00701 1          OCT     701
 1954   REF   3  LAST  959   15,3454  3 5006 1          CAF     VB05N09          DISPLAY ALARM FOR ACTION
 1955   REF 309  LAST  976   15,3455  0 4616 1          TC      BANKCALL
 1956   REF  44  LAST  976   15,3456   20476 0          CADR    GOFLASH
 1957   REF  65  LAST  976   15,3457  1 6001 1          TCF     GOTOPOOH         VB34-TERMINATE
 1958   REF   2  LAST  976   15,3460  1 3430 1          TCF     DSPOPTN          V33-PROCEED   ********TEMPORARY
 1959   REF   3  LAST  977   15,3461  1 3430 1          TCF     DSPOPTN          VB32-RECYCLE TO OPTION DISPLAY V 05N06
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449

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P1960   TRANSFORM VEC1,2 FROM MOON FIXED TO REF AND JAM BACK IN VEC1,2

 1961                               15,3462   40220 0  MFREF      STQ     SETPD
 1962   REF  12  LAST  954          15,3463   02746 0                     QMAJ
 1963                               15,3464   00001 0                     0
 1964                               15,3465   77634 0             RTB
 1965   REF  29  LAST  975          15,3466   21573 0                     LOADTIME
 1966   REF  12  LAST  970          15,3467   27562 0             STOVL   TSIGHT
 1967   REF   3  LAST  971          15,3470   02723 0                     VEC1
 1968                               15,3471   41525 0             PDDL    PUSH
 1969   REF  13  LAST  978          15,3472   03562 0                     TSIGHT
 1970                               15,3473   77624 1             CALL
 1971   REF   4  LAST  932          15,3474   55716 1                     RP-TO-R
 1972   REF   4  LAST  978          15,3475   26723 0             STOVL   VEC1
 1973   REF   2  LAST  970          15,3476   02731 0                     VEC2
 1974                               15,3477   65201 1             SETPD   PDDL
 1975                               15,3500   00001 0                     0
 1976   REF  14  LAST  978          15,3501   03562 0                     TSIGHT
 1977                               15,3502   45006 0             PUSH    CALL
 1978   REF   5  LAST  978          15,3503   55716 1                     RP-TO-R
 1979   REF   3  LAST  978          15,3504   36731 1             STCALL  VEC2
 1980   REF  13  LAST  978          15,3505   02746 0                     QMAJ
```

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P1981    COMPUTE LM ATTITUDE IN MOON FIXED COORDINATES USING REFSMMAT AND
R1982    STORE IN YNBSAV AND ZNBSAV

  1983                            15,3506   45020 1  REFMF    STQ     CALL
  1984    REF  14   LAST   978    15,3507   02746 0                   QMAJ
  1985    REF   9   LAST   974    15,3510   47537 0                   CDUTRIG          GET SIN AND COS OF CDUS
  1986                            15,3511   40234 0           RTB     SETPD
  1987    REF  30   LAST   978    15,3512   21573 0                   LOADTIME
  1988                            15,3513   00001 0                   0
  1989    REF  15   LAST   978    15,3514   37562 1           STCALL  TSIGHT
  1990    REF   5   LAST   974    15,3515   20030 0                   CALCSMSC         GET YNB IN SM
  1991                            15,3516   61375 1           VLOAD   VXM
  1992    REF   4   LAST   968    15,3517   02673 1                   YNB
  1993    REF  52   LAST   975    15,3520   01734 0                   REFSMMAT          YNB TO REF
  1994                            15,3521   65256 0           UNIT    PDDL
  1995    REF  16   LAST   979    15,3522   03562 0                   TSIGHT
  1996                            15,3523   45006 0           PUSH    CALL
  1997    REF   3   LAST   973    15,3524   51670 1                   R-TO-RP
  1998    REF   3   LAST   202    15,3525   26237 0           STOVL   YNBSAV           YNB TO MF
  1999    REF   4   LAST   938    15,3526   02701 0                   ZNB
  2000                            15,3527   53505 1           VXM     UNIT
  2001    REF  53   LAST   979    15,3530   01734 0                   REFSMMAT         ZNB TO REF
  2002                            15,3531   41525 0           PDDL    PUSH
  2003    REF  17   LAST   979    15,3532   03562 0                   TSIGHT
  2004                            15,3533   77624 1           CALL
  2005    REF   4   LAST   979    15,3534   51670 1                   R-TO-RP          ZNB TO MF
  2006    REF   1                 15,3535   02245 0           STORE   ZNBSAV
  2007                            15,3536   77614 1           SETGO
  2008    REF   1                 15,3537   03036 1                   ATTFLAG
  2009    REF  15   LAST   979    15,3540   02746 0                   QMAJ
```

```
P2010     BRANCH TO ALIGNMENT OPTION

 2011     REF 218  LAST  975    15,3541  0 6037 0  GETLMATT TC      INTPRET
 2012                           15,3542   77624 1           CALL
 2013     REF   3  LAST  972    15,3543   33506 1                   REFMF             GO TRANSFORM TO MF IN YNBSAV,ZNBSAV
 2014                           15,3544   77776 1           EXIT

 2015     REF  64  LAST  965    15,3545  0 5504 0  BYLMATT  TC      UPFLAG            SET INITIAL ALIGN FLAG
 2016     REF   3  LAST  974    15,3546   00205 0           ADRES   INITALGN
 2017     REF  48  LAST  975    15,3547  3 4753 1           CAF     BIT1
 2018     REF  16  LAST  977    15,3550  7 1145 1           MASK    OPTION2           SEE IF OPTION 1 OR 3
 2019     REF 2[illegible] LAST  977    15,3551 10 000 0           CCS     A
 2020     REF   2  LAST  965    15,3552  1 2563 1           TCF     GVDETER           OPTION 1 OR 2, GET GRAVITY

 2021     REF 102  LAST  975    15,3553  0 5353 1  ATTCHK   TC      PHASCHNG
 2022                           15,3554   04024 0           OCT     04024

 2023     REF   3  LAST  976    15,3555  3 4753 1           CAF     ATTFLBIT          NOT 1 OR 3, CHECK ATTFLAG
 2024     REF  15  LAST  976    15,3556  7 0102 0           MASK    FLAGWRD6
 2025     REF 295  LAST  980    15,3557 10 000 0            CCS     A
 2026     REF   1               15,3560  1 3575 1           TCF     P57OPT0           GET ALIGNMENT VECS FOR OPTION 0
 2027     REF 103  LAST  980    15,3561  0 5353 1  P57JUMP  TC      PHASCHNG
 2028                           15,3562   04024 0           OCT     04024

 2029     REF  89  LAST  965    15,3563  0 5516 0           TC      DOWNFLAG          ATTFLG CLEAR-RESET INTALIGN FLAG
 2030     REF   4  LAST  980    15,3564   00205 0           ADRES   INITALGN
 2031     REF  29  LAST  975    15,3565  3 6245 1           CAF     THREE
 2032     REF  17  LAST  980    15,3566  7 1145 1           MASK    OPTION2           BRANCH ON OPTION CODE
 2033     REF 296  LAST  980    15,3567 50 000 1            INDEX   A
 2034                           15,3570  1 3571 0           TCF     +1
 2035     REF   2  LAST  980    15,3571  1 3575 1           TCF     P57OPT0           OPTION IS 0
 2036     REF   1               15,3572  1 3616 1           TCF     P57OPT1           OPTION IS 1
 2037     REF   1               15,3573  1 3634 1           TCF     P57OPT2           OPTION IS 2
 2038     REF   1               15,3574  1 3635 0           TCF     P57OPT3           OPTION IS 3
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P2039   OPTION 0, GET TWO ATTITUDE VECS

 2040   REF 219  LAST  980   15,3575  0 6037 0  P57OPT0  TC      INTPRET
 2041                        15,3576   77775 1           VLOAD
 2042   REF   4  LAST  979   15,3577   02237 0                   YNBSAV      Y AND Z ATTITUDE WILL BE PUT IN REF
 2043   REF   5  LAST  978   15,3600   26723 0           STOVL   VEC1
 2044   REF   2  LAST  979   15,3601   02245 0                   ZNBSAV
 2045   REF   4  LAST  978   15,3602   36731 1           STCALL  VEC2
 2046   REF  10  LAST  979   15,3603   47537 0                   CDUTRIG
 2047                        15,3604   77624 1           CALL
 2048   REF   6  LAST  979   15,3605   20030 0                   CALCSMSC    COMPUTE SC AXIS WRT PRESENT SM
 2049                        15,3606   77775 1           VLOAD
 2050   REF      LAST  979   15,3607   02673 1                   YNB
 2051   REF  11  LAST  971   15,3610   26761 0  SAMETYP  STOVL   STARSAV1    Y SC AXIS WRT PRESENT SM
 2052   REF   5  LAST  979   15,3611   02701 0                   ZNB
 2053   REF [illegible]  LAST  951   15,3612   36767 1           STCALL  STARSAV2    Z SC AXIS WRT PRESENT SM
 2054   REF   1              15,3613   33462 1                   MFREF       TRANSFORM VEC1,2 FROM MF TO REF
 2055                        15,3614   77650 1           GOTO
 2056   REF   2  LAST  970   15,3615   33101 1                   SURFLINE

R2057   OPTION 1, GET LANDING SITE AND Z-ATTITUDE VEC

 2058   REF 220  LAST  981   15,3616  0 6037 0  P57OPT1  TC      INTPRET
 2059                        15,3617   53575 0           VLOAD   UNIT
 2060   REF  12  LAST  973   15,3620   02023 1                   RLS         LANDING SITE VEC
 2061   REF   6  LAST  981   15,3621   26723 0           STOVL   VEC1
 2062   REF   3  LAST  981   15,3622   02245 0                   ZNBSAV      Z ATTITUDE VEC
 2063   REF   5  LAST  981   15,3623   36731 1           STCALL  VEC2
 2064   REF  11  LAST  981   15,3624   47537 0                   CDUTRIG
 2065                        15,3625   77624 1           CALL
 2066   REF   7  LAST  981   15,3626   20030 0                   CALCSMSC    GET ZNB AXIS WRT PRES SM FOR STARSAV2
 2067                        15,3627   45175 0           VLOAD   CALL
 2068   REF   9  LAST  972   15,3630   02231 0                   GSAV        TRANS GSAV FROM NB TO SM FOR STARSAV1
 2069   REF   4  LAST  972   15,3631   47661 0                   CDU*NBSM
 2070                        15,3632   77650 1           GOTO
 2071   REF   1              15,3633   33610 0                   SAMETYP     NOW DO SAME AS OPTION 0
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P2072   OPTION 2, GET TWO STAR SIGHTINGS

 2073   REF   1                15,3634  1 3045 1  P57OPT2  TCF     2STARS          DO SIGHTING ON 2 STARS

P2074   OPTION 3, GET LANDING SITE VEC AND ONE STAR SIGHTING

 2075   REF 221  LAST  981     15,3635  0 6037 0  P57OPT3  TC      INTPRET
 2076                          15,3636   53575 0           VLOAD   UNIT
 2077   REF  13  LAST  981     15,3637   02023 1                   RLS             LANDING SITE VEC
 2078   REF   7  LAST  981     15,3640   02723 0           STORE   VEC1
 2079   REF   6  LAST  981     15,3641   26731 0           STOVL   VEC2            DUMMY VEC2 FOR 2ND CATALOG STAR
 2080   REF  10  LAST  981     15,3642   02231 0                   GSAV            GRAVITY VEC NB
 2081                          15,3643   77624 1           CALL
 2082   REF   5  LAST  981     15,3644   47661 0                   CDU*NBSM        TRANS GSAV FROM NB TO SM FOR STARSAV1
 2083   REF  12  LAST  981     15,3645   36761 1           STCALL  STARSAV1
 2084   REF   2  LAST  981     15,3646   33462 1                   MFREE           STARSAV2 IS STORED AS 2ND OBSERVED STAR
 2085                          15,3647   77776 1           EXIT
 2086   REF   2  LAST  970     15,3650  1 3047 0           TCF     1STAR           1STAR GET VEC2,STARSAV2,GOES TO SURFLINE

 2087                          15,3651   01206 1  VB05N06  VN      506
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P2088    CHECK IMODES30 TO VARIFY IMU IS ON

 2089    REF  46  LAST  470    15,3652  4 1302 0  IMUCHK    CS      IMODES30
 2090    REF  25  LAST  955    15,3653  7 4743 1            MASK    BIT9
 2091    REF 297  LAST  980    15,3654  10 000 0            CCS     A                 IS IMU ON
 2092                          15,3655  1 3661 1            TCF     +4                YES

 2093    REF  40  LAST  977    15,3656  0 5567 0            TC      ALARM             NO, SEND ALARM AND EXIT
 2094                          15,3657   00210 1            OCT     210
 2095    REF  66  LAST  977    15,3660  0 6001 0            TC      GOTOPOOH

 2096    REF  65  LAST  980    15,3661  0 5504 0            TC      UPFLAG
 2097    REF   5  LAST  388    15,3662   00007 0            ADRES   IMUSE             SET IMUSE FLAG

 2098    REF   [illegible]  LAST  878    15,3663  0 4631 1            TC      SWRETURN

 2099                          04,3013                      BANK    04
 2100    REF   2  LAST  249    04,2000                      SETLOC  AOTMARK2
 2101                          04,3013                      BANK
 2102    REF   1                                            COUNT*  $$/P57

 2103                          04,3013   77220 1  LSORIENT  STQ     VLOAD
 2104    REF  16  LAST  979    04,3014   02746 0                    QMAJ
 2105    REF   6  LAST  841    04,3015   01555 0                    RRECTCSM
 2106                          04,3016   47235 0            VXV     VXV
 2107    REF   2  LAST  841    04,3017   01563 0                    VRECTCSM
 2108    REF  14  LAST  976    04,3020   03607 0                    XSMD
 2109                          04,3021   77656 1            UNIT
 2110    REF   5  LAST  954    04,3022   03623 0            STORE   ZSMD
 2111                          04,3023   53435 0            VXV     UNIT
 2112    REF  15  LAST  983    04,3024   03607 0                    XSMD
 2113    REF   6  LAST  [illegible]    04,3025   37615 1            STCALL  YSMD
 2114    REF  17  LAST  983    04,3026   02746 0                    QMAJ
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R2000   NAME - LSPOS  - LOCATE SUN AND MOON                                                      DATE - 25 OCT 67
R2002   MOD NO.1
R2004   MOD BY NEVILLE                                                                           ASSEMBLY SUNDANCE

R2006   FUNCTIONAL DESCRIPTION

R2007          COMPUTES UNIT POSITION VECTOR OF THE SUN AND MOON IN THE BASIC REFERENCE SYSTEM. THE SUN VECTOR S IS
R2009   LOCATED VIA TWO ANGLES. THE FIRST ANGLE(OBLIQUITY) IS THE ANGLE BETWEEN THE EARTH EQUATOR AND THE ECLIPTIC. THE
R2011   SECOND ANGLE IS THE LONGITUDE OF THE SUN MEASURED IN THE ECLIPTIC.
R2012   THE POSITION VECTOR OF THE SUN IS
R2013          -
R2014          S=(COS(LOS), COS(OBL)*SIN(LOS), SIN(OBL)*SIN(LOS)), WHERE

R2015        LOS=LOS +LOS *T-(C *SIN(2PI*T)/365.24 +C *COS(2PI*T)/365.24)
R2016               0    R     0                     1
R2017        LOS  (RAD) IS THE LONGITUDE OF THE SUN FOR MIDNIGHT JUNE 30TH OF THE PARTICULAR YEAR.
R2018           0
R2020        LOS  (RAD/DAY) IS THE MEAN RATE FOR THE PARTICULAR YEAR.
R2021           R
R2022   LOS  AND LOS  ARE STORED AS LOSO AND LOSR IN RATESP.
R2023      0        R
R2024   COS(OBL) AND SIN(OBL) ARE STORED IN THE MATRIX KONMAT.
R2025   T, TIME MEASURED IN DAYS(24 HOURS), IS STORED IN TIMEP.
R2026   C  AND C  ARE FUDGE FACTORS TO MINIMIZE THE DEVIATION. THEY ARE STORED AS ONE CONSTANT(CMOD), SINCE
R2028    0      1                               2  2 1/2
R2029   C *SIN(X)+C *COS(X) CAN BE WRITTEN AS (C +C )   *SIN(X+PHI), WHERE PHI=ARCTAN(C /C ).
R2031    0         1                            0  1                                   1  0

R2033   THE MOON IS LOCATED VIA FOUR ANGLES. THE FIRST IS THE OBLIQUITY. THE SECOND IS THE MEAN LONGITUDE OF THE MOON,
R2035   MEASURED IN THE ECLIPTIC FROM THE MEAN EQUINOX TO THE MEAN ASCENDING NODE OF THE LUNAR ORBIT, AND THEN ALONG THE
R2037   ORBIT. THE THIRD ANGLE IS THE ANGLE BETWEEN THE ECLIPTIC AND THE LUNAR ORBIT. THE FOURTH ANGLE IS THE LONGITUDE
R2039   OF THE NODE OF THE MOON, MEASURED IN THE LUNAR ORBIT. LET THESE ANGLES BE OBL,LOM,IM, AND LON RESPECTIVELY.

R2041   THE SIMPLIFIED POSITION VECTOR OF THE MOON IS
R2042     -
R2043     M=(COS(LOM), COS(OBL)*SIN(LOM)-SIN(OBL)*SIN(IM)*SIN(LOM-LON), SIN(OBL)*SIN(LOM)+COS(OBL)*SIN(IM)*SIN(LOM-LON))

R2045     WHERE
R2046        LOM=LOM +LOM *T-(A *SIN 2PI*T/27.5545+A *COS(2PI*T/27.5545)+B *SIN 2PI*T/32+B *COS(2PI*T /32)), AND
R2048               0    R     0                    1                     0               1
R2050        LON=LON +LON
R2051               0    R
R2052   A , A , B  AND B  ARE STORED AS AMOD AND BMOD (SEE DESCRIPTION OF CMOD, ABOVE).  COS(OBL), SIN(OBL)*SIN(IM),
R2054    0   1   0      1
R2055   SIN(OBL), AND COS(OBL)*SIN(IM) ARE STORED IN KONMAT AS K1, K2, K3 AND K4, RESPECTIVELY. LOM , LOM , LON , LON
R2057   ARE STORED AS LOMO, LOMR, LONO, AND LONR IN RATESP.                                        0     R     0     R
R2059   THE THREE PHIS ARE STORED AS AARG, BARG, AND CARG(SUN).  ALL CONSTANTS ARE UPDATED BY YEAR.

R2061   CALLING SEQUENCE
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R2062      CALL LSPOS.  RETURN IS VIA QPRET.

R2063    ALARMS OR ABORTS

R2064      NONE

R2065    ERASABLE INITIALIZATION REQUIRED

R2066      TEPHEM - TIME FROM MIDNIGHT 1 JULY PRECEDING THE LAUNCH TO THE TIME OF THE LAUNCH (WHEN THE AGC CLOCK WENT
R2068    TO ZERO). TEPHEM IS TP WITH UNITS OF CENTI-SECONDS.
R2069      TIME2 AND TIME1 ARE IN MPAC AND MPAC +1 WHEN PROGRAM IS CALLED.

R2070    OUTPUT

R2071      UNIT POSITIONAL VECTOR OF SUN IN VSUN.    (SCALED B-1)
R2072      UNIT POSITIONAL VECTOR OF MOON IN VMOON. (SCALED B-1)

R2073    SUBROUTINES USED

R2074      NONE

R2075    DEBRIS

R2076      CURRENT CORE SET,WORK AREA AND FREEFLAG
 2077                              04,3027                            BANK    04
 207701 REF    1                   15,2000                            SETLOC  EPHEM
 207702                            15,3664                            BANK

 2078   REF      LAST  962         E5.1714                            EBANK=  VSUN
 20785  REF    1                                                      COUNT*  $$/EPHEM
 20786  REF    2  LAST  935        15,3664                  LUNPOS    EQUALS  LSPOS

 2079                              15,3664   54201 0   LSPOS     SETPD   SF
 2080                              15,3665   00001 0                     0
 2082                              15,3666   20617 0                     14D               TP
 2083                              15,3667   56371 1             TAD     DDV
 2084   REF    3  LAST  243        15,3670   01707 0                     TEPHEM            TIME OF LAUNCH
 2086   REF    1                   15,3671   12024 1                     CSTODAY           24 HOURS-8640000 CENTI-SECS/DAY B-33
 2087   REF    1                   15,3672   00031 0             STORE   TIMEP             T IN DAYS
 2088                              15,3673   77170 1             AXT,1   AXT,2
 2089                              15,3674   00000 1                     0
 2090                              15,3675   00000 1                     0
 2091                              15,3676   77614 1             CLEAR
 2092   REF   11  LAST  971        15,3677   00274 0                     FREEFLAG          SWITCH BIT
 2093                              15,3700   77745 1   POSITA    DLOAD
 2094   REF    1                   15,3701   12004 0                     KONMAT +2         ZEROS
 2095   REF    1                   15,3702   00027 1             STORE   GTMP
 2096                              15,3703   40745 0   POSITB    DLOAD   DMP*
 2097   REF    2  LAST  985        15,3704   00031 0                     TIMEP             T
 2098   REF    1                   15,3705   12050 1                     VAL67 +4,1        1/27 OR 1/32 OR 1/365
 2099                       15,3706   42661 0            SL      DAD*
 2100                       15,3707   20211 1                    9D
 2101   REF   2  LAST  985  15,3710   12046 0                    VAL67 +2,1       AARG
 2102                       15,3711   40756 1            SIN     DMP*             SIN(T/27+PHI) OR T/32 OR T/365
 2103   REF   3  LAST  986  15,3712   12044 1                    VAL67,1          (A0**2+A1**2)**1/2SIN(X+PHIA)
 2104                       15,3713   62015 1            DAD     INCR,1           PLUS
 2105   REF   2  LAST  985  15,3714   00027 1                    GTMP             (B0**2+B1**2)**1/2SIN(X+PHIB)
 2106                       15,3715   77771 0            DEC     -6
 2107   REF   3  LAST  986  15,3716   00027 1            STORE   GTMP             OR (C0**2+C1**2)**1/2SIN(X+PHIC)
 2108                       15,3717   77614 1            BOFSET
 2109   REF  12  LAST  985  15,3720   00054 0                    FREEFLAG
 2110   REF   1             15,3721   33703 0                    POSITB
 2111                       15,3722   40745 0  POSITD    DLOAD   DMP*
 2112   REF   3  LAST  985  15,3723   00031 0                    TIMEP            T
 2113   REF   1             15,3724   65747 0                    RATESP,2         LOMR,LOSR,LONR
 2114                       15,3725   42661 0            SL      DAD*
 2115                       15,3726   20206 1                    5D
 2116   REF   2  LAST  986  15,3727   65741 0                    RATESP +6,2      LOMO,LOSO,LONO
 2117                       15,3730   77625 0            DSU
 2118   REF   4  LAST  986  15,3731   00027 1                    GTMP
 2119   REF   1             15,3732   10021 0            STORE   STMP,2           LOM,LOS,LON
 2120                       15,3733   63135 0            SLOAD   INCR,2
 2121   REF  17  LAST  964  15,3734   00050 1                    X2
 2122                       15,3735   77775 1            DEC     -2
 2123                       15,3736   53015 0            DAD     BZE
 2124   REF   1             15,3737   12026 0                    RCB-13           PLUS 2
 2125   REF   1             15,3740   33770 1                    POSITE           2ND
 2126                       15,3741   77644 1            BPL
 2127   REF   1             15,3742   33700 0                    POSITA           1ST
 2128                       15,3743   45345 1  POSITE    DLOAD   DSU              3RD
 2129   REF   2  LAST  986  15,3744   00021 1                    STMP             LOM
 2130   REF   3  LAST  986  15,3745   00025 0                    STMP +4          LON
 2131                       15,3746   65356 1            SIN     PDDL             SIN(LOM-LON)
 2132   REF   4  LAST  986  15,3747   00021 1                    STMP
 2133                       15,3750   65356 1            SIN     PDDL             SIN LOM
 2134   REF   5  LAST  986  15,3751   00021 1                    STMP
 2135                       15,3752   55546 0            COS     VDEF             COS LOM
 2136                       15,3753   53521 1            MXV     UNIT
 2137   REF   2  LAST  985  15,3754   12002 0                    KONMAT           K1,K2,K3,K4,
 2138   REF   8  LAST  935  15,3755   02723 0            STORE   VMOON
 2139                       15,3756   65345 0            DLOAD   PDDL
 2140   REF   3  LAST  986  15,3757   12004 0                    KONMAT +2        ZERO
 2141   REF   6  LAST  986  15,3760   00023 0                    STMP +2
 2142                       15,3761   65356 1            SIN     PDDL             SIN LOS
 2143   REF   7  LAST  986  15,3762   00023 0                    STMP +2
 2144                       15,3763   55546 0            COS     VDEF             COS LOS
 2145                       15,3764   53521 1            MXV     UNIT
 2146   REF   4  LAST  986  15,3765   12002 0                    KONMAT
 2147   REF   7  LAST  985  15,3766   02715 0            STORE   VSUN
 2148                       15,3767   77616 0            RVQ
 2149                        15,3770   77745 1  POSITE   DLOAD
 2150   REF   5  LAST  986   15,3771   12004 0                  KONMAT +2        ZEROS
 2151   REF   5  LAST  986   15,3772   00027 1           STORE  GTMP
 2152                        15,3773   77650 1           GOTO
 2153   REF   1              15,3774   33722 0                  POSITD
 21535                       15,3775   77616 0  LUNVEL   RVQ                           TO FOOL INTEGRATION
 21536  REF   2  LAST   51   05,2000                     SETLOC EPHEM1
 21537                       05,3506                     BANK

 21538  REF  2 LAST   51 TO   52:     52     52*         COUNT* $$/EPHEM

 2163                           0020        STMP     EQUALS 16D

 2164                           0026        GTMP     EQUALS 22D

 2165                           0030        TIMEP    EQUALS 24D


*** END OF LEMP50S .115 ***
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R0001    PROGRAM NAME- DOWN TELEMETRY PROGRAM
R0002    MOD NO.- 0          TO COMPLETELY REWRITE THE DOWN TELEMETRY PROGRAM AND DOWNLINK ERASABLE DUMP PROGRAM FOR THE
R0004                        PURPOSE OF SAVING APPROXIMATELY 150 WORDS OF CORE STORAGE.
R0006                        THIS CHANGE REQUIRES AN ENTIRELY NEW METHOD OF SPECIFYING DOWNLINK LISTS.REFER TO DOWNLINK
R0008                        LISTS LOG SECTION FOR MORE DETAILS. HOWEVER THIS CHANGE WILL NOT AFFECT THE GROUND PROCESSING
R0010                        OF DOWN TELEMETRY DATA.
R0011    MOD BY-  KILROY, SMITH, DEWITT
R0012    DATE-    02OCT67
R0013    AUTHORS- KILROY, SMITH, DEWITT, DEWOLF, FAGIN
R0014    LOG SECTION- DOWN-TELEMETRY PROGRAM
R0015    FUNCTIONAL DESCRIPTION- THIS ROUTINE IS INITIATED BY TELEMETRY END
R0016              PULSE FROM THE DOWNLINK TELEMETRY CONVERTER. THIS PULSE OCCURS
R0017              AT 50 TIMES PER SEC(EVERY 20 MS) THEREFORE DODOWNTM IS
R0018              EXECUTED AT THESE RATES. THIS ROUTINE SELECTS THE APPROPRIATE
R0019              AGC DATA TO BE TRANSMITTED DOWNLINK AND LOADS IT INTO OUTPUT
R0020              CHANNELS 34 AND 35. THE INFORMATION IS THEN GATED OUT FROM THE
R0021              LGC IN SERIAL FASHION.
R0022              THIS PROGRAM IS CODED FOR A 2 SECOND DOWNLIST. SINCE DOWNRUPTS
R0023              OCCUR EVERY 20MS AND 2 AGC COMPUTER WORDS CAN BE PLACED IN
R0024              CHANNELS 34 AND 35 DURING EACH DOWNRUPT THE PROGRAM IS CAPABLE
R0025              OF SENDING 200 AGC WORDS EVERY 2 SECONDS.
R0026    CALLING SEQUENCE- NONE
R0027              PROGRAM IS ENTERED VIA TCF DODOWNTM WHICH IS EXECUTED AS A
R0028              RESULT OF A DOWNRUPT. CONTROL IS RETURNED VIA TCF RESUME WHICH
R0029              IN EFFECT IS A RESUME.
R0030    SUBROUTINES CALLED- NONE
R0031    NORMAL EXIT MODE- TCF RESUME
R0032    ALARM OR ABORT EXIT MODE- NONE
R0033    RESTART PROTECTION:
R0034              ON A FRESH START AND RESTART THE 'STARTSUB' SUBROUTINE WILL INITIALIZE THE DOWNLIST POINTER(ACTUALLY
R0036              DNTMGOTO) TO THE BEGINNING OF THE CURRENT DOWNLIST(I.E. CURRENT CONTENTS OF DNLSTADR). THIS HAS THE
R0039              EFFECT OF IGNORING THE REMAINDER OF THE DOWNLIST WHICH THE DOWN-TELEMETRY PROGRAM WAS WORKING ON WHEN
R0040              THE RESTART(OR FRESH START) OCCURRED AND RESUME DOWN TELEMETRY FROM THE BEGINNING OF THE CURRENT
R0042              DOWNLIST.
R0043              ALSO OF INTEREST IS THE FACT THAT ON A RESTART THE AGC WILL ZERO DOWNLINK CHANNELS 13, 34 AND 35.
R0047    DOWNLINK LIST SELECTION:
R0048              THE APPROPRIATE DOWNLINK LISTS ARE SELECTED BY THE FOLLOWING:
R0049              1. FRESH START
R0050              2. V37EXXE  WHERE XX = THE MAJOR MODE BEING SELECTED.
R0051              3. UPDATE PROGRAM(P27)
R0052              4.      NON-V37 SELECTABLE TYPE PROGRAMS(E.G. AGS INITIALIZATION(SUNDANCE,LUMINARY) AND P61-P62
R00522                     TRANSITION(COLOSSUS) ETC.).
R00525   DOWNLINK LIST RULES AND LIMITATIONS:
R00526             READ SECTION(S) WHICH FOLLOW 'DEBRIS' WRITEUP.
R0053    OUTPUT-   EVERY 2 SECONDS 100 DOUBLE PRECISION WORDS(I.E. 200 LGC
R0054              COMPUTER WORDS) ARE TRANSMITTED VIA DOWNLINK.
R0055    ERASABLE INITIALIZATION REQUIRED- NONE
R0056              'DNTMGOTO' AND 'DNLSTADR' ARE INITIALIZED BY THE FRESH START PROGRAM.
R0058    DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)-
R0059              LDATALST,DNTMBUFF TO DNTMBUFF +21D,TMINDEX,DNQ.
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R0060
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R0065   DODOWNTM IS ENTERED EVERY 20 MS BY AN INTERRUPT TRIGGERED BY THE
R0066   RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

R0067   NOTES REGARDING DOWNLINK LISTS ASSOCIATED WITH THIS PROGRAM:
R0068   1. DOWNLISTS. - DOWNLISTS MUST BE COMPILED IN THE SAME BANK AS THE
R0069      DOWN-TELEMETRY PROGRAM. THIS IS DONE FOR EASE OF CODING, FASTER
R0070      EXECUTION.
R0075   2. EACH DOWNLINK LIST CONSISTS OF A CONTROL LIST AND A NUMBER OF
R0076      SUBLISTS.
R0077   3. A SUBLIST REFERS TO A SNAPSHOT OR DATA COMMON TO THE SAME OR OTHER
R0078      DOWNLINK LISTS.  ANY SUBLIST CONTAINING COMMON DATA NEEDS TO BE
R0079      CODED ONLY ONCE FOR THE APPLICABLE DOWNLINK LISTS.
R0080   4. SNAPSHOT SUBLISTS REFER SPECIFICALLY TO HOMOGENOUS DATA WHICH MUST BE
R0081      SAVED IN A BUFFER DURING ONE DOWNRUPT.
R0082   5. THE 1DNADR FOR THE 1ST WORD OF SNAPSHOT DATA IS FOUND AT THE END
R0083      OF EACH SNAPSHOT SUBLIST, SINCE THE PROGRAM CODING SENDS THIS DP WORD
R0084      IMMEDIATELY AFTER STORING THE OTHERS IN THE SNAPSHOT BUFFER.
R0085   6. ALL LISTS ARE COMBINATIONS OF CODED ERASABLE ADDRESS CONSTANTS
R0086      CREATED FOR THE DOWNLIST PROGRAM.
R0087      A. 1DNADR                 1-WORD DOWNLIST ADDRESS.
R0088          SAME AS ECADR, BUT USED WHEN THE WORD ADDRESSED IS THE LEFT
R0089          HALF OF A DOUBLE-PRECISION WORD FOR DOWN TELEMETRY.
R0090      B. 2DNADR - 6DNADR        N-WORD DOWNLIST ADDRESS, N = 2 - 6.
R0091          SAME AS 1DNADR, BUT WITH THE 4 UNUSED BITS OF THE ECADR FORMAT
R0092          FILLED IN WITH 0001-0101.  USED TO POINT TO A LIST OF N DOUBLE-
R0093          PRECISION WORDS, STORED CONSECUTIVELY, FOR DOWN TELEMETRY.
R0094      C. DNCHAN                 DOWNLIST CHANNEL ADDRESS.
R0095          SAME AS 1DNADR, BUT WITH PREFIX BITS 0111.  USED TO POINT TO
R0096          A PAIR OF CHANNELS FOR DOWN TELEMETRY.
R0097      D. DNPTR                  DOWN TELEMETRY SUBLIST POINTER.
R0098       SAME AS CAF BUT TAGGED AS A CONSTANT. USED IN CONTROL LIST TO POINT TO A SUBLIST.
R0100       CAUTION--- A DNPTR CANNOT BE USED IN A SUBLIST.
R0101   7. THE WORD ORDER CODE IS SET TO ZERO AT THE BEGINNING OF EACH DOWNLIST (I.E. CONTROL LIST) AND WHEN
R0103      A '1DNADR TIME2' IS DETECTED IN THE CONTROL LIST(ONLY).
R0104   8. IN THE SNAPSHOT SUBLIST ONLY, THE DNADR'S CANNOT POINT TO THE FIRST WORD OF ANY EBANK.

R0106   DOWNLINK LIST RESTRICTIONS:
R0107     (THE FOLLOWING POINTS MAY BE LISTED ELSEWHERE BUT ARE LISTED HERE SO  IT IS CLEAR THAT THESE THINGS CANNOT BE
R0109     DONE)

R0110   1. SNAPSHOT DOWNLIST:
R0111     (A) CANNOT CONTAIN THE FOLLOWING ECADRS(I.E. 1DNADR'S): 0, 400, 1000, 1400, 2000, 2400, 3000, 3400.
R0113     (B) CAN CONTAIN ONLY 1DNADR'S

R0114   2. ALL DOWNLINKED DATA(EXCEPT CHANNELS) IS PICKED UP BY A <DCA<SO DOWNLINK LISTS CANNOT CONTAIN THE
R0116      EQUIVALENT OF THE FOLLOWING ECADRS(I.E. IDNADRS): 377, 777, 1377, 1777, 2377, 27777, 3377, 3777.

R0118      (NOTE: THE TERM EQUIVALENT ' MEANT THAT THE IDNADR  TO 6DNADR  WILL BE PROCESSED LIKE 1 TO 6 ECADRS)

R0120   3. CONTROL LISTS AND SUBLISTS CANNOT HAVE ENTRIES = OCTAL 00000 OR OCTAL 77777
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R0122    4. THE '1DNADR TIME2' WHICH WILL CAUSE THE DOWNLINK PROGRAM TO SET THE WORDER CODE TO 3 MUST APPEAR IN THE
R0124       CONTROL SECTION OF THE DOWNLIST.

R0125    5. 'DNCHAN 0' CANNOT BE USED.

R0126    6. 'DNPTR 0' CANNOT BE USED.

R0127    7. DNPTR CANNOT APPEAR IN A SUBLIST.

R0128


R0129    EBANK SETTINGS
R0130              IN THE PROCESS OF SETTING THE EBANK(WHEN PICKING UP DOWNLINK DATA) THE DOWN TELEMETRY PROGRAM PUTS
R0132              'GARBAGE' INTO BITS15-12 OF EBANK. HUGH BLAIR-SMITH WARNS US THAT BITS15-12 OF EBANK MAY BECOME
R0134              SIGNIFICANT SOMEDAY IN THE FUTURE. IF/WHEN THAT HAPPENS, THE PROGRAM SHOULD INSURE(BY MASKING ETC.)
R0136              THAT BITS15-12 OF EBANK ARE ZERO.
R0137    INITIALIZATION REQUIRED- TO INTERRUPT CURRENT LIST AND START A NEW ONE..
R0138         1.   ADRES OF DOWNLINK LIST INTO DNLSTADR
R0139         2.   NEGONE INTO SUBLIST
R0140         3.   NEGONE INTO DNECADR

 0142                        22,3711                            BANK    22
 0143   REF   2  LAST  193   05,2000                            SETLOC  DOWNTELM
 0144                        05,3506                            BANK

 0145   REF  17  LAST  204      0340                            EBANK=  DNTMBUFF

 0146   REF   1                                                 COUNT*  $$/DPROG
 0147   REF   5  LAST  820   05,3506  54 016 1  DODOWNTM TS      BANKRUPT
 0148                        05,3507  0 0006 1           EXTEND
 0149   REF   5  LAST  820   05,3510  22 012 1           QXCH    QRUPT             SAVE Q
 0150  *REF   1              05,3511  1 3763 1           TCF     WOTEST
 0151  *                     05,3512  0 0006 1  WO1      EXTEND                    SET WORD ORDER BIT TO 1 ONLY IF IT
 0152  *REF  17  LAST  821   05,3513  05 013 0           WOR     CHAN13            ALREADY ISN'T.
 0153   REF   4  LAST  288   05,3514  0 0335 1           TC      DNTMGOTO          GO TO APPROPRIATE PHASE OF PROGRAM

 0154   REF   2  LAST  219   05,3515  3 7747 1  DNPHASE1 CA      NEGONE            INITIALIZE ALL CONTROL WORDS
 0155   REF   1              05,3516  54 337 1           TS      SUBLIST           WORDS TO MINUS ONE
 0156   REF   1              05,3517  54 336 0           TS      DNECADR
 0157   REF   1              05,3520  3 3640 0           CA      LDNPHAS2          SET DNTMGOTO =0 ALL SUBSEQUENT DOWNRUPTS
 0158   REF   5  LAST  991   05,3521  54 335 0           TS      DNTMGOTO          GO TO DNPHASE2
 0159   REF   1              05,3522  1 3536 0           TCF     NEWLIST
 0160   REF   2  LAST  991   05,3523  10 336 0  DNPHASE2 CCS     DNECADR           SENDING OF DATA IN PROGRESS
 0161   REF   1              05,3524  0 3653 1  DODNADR  TC      FETCH2WD          YES - THEN FETCH THE NEXT 2 SP WORDS
 0162   REF  29  LAST  928   05,3525   77753 0  MINTIME2-1DNADR TIME2              NEGATIVE OF TIME2 1DNADR
 0163                        05,3526  1 3527 0           TCF     +1                (ECADR OF  3776 + 74001 = 77777)

 0164   REF   2  LAST  991   05,3527  10 337 1           CCS     SUBLIST           IS THE SUBLIST IN CONTROL
 0165   REF   1              05,3530  1 3666 0           TCF     NEXTINSL          YES
 0166                       05,3531   74001 0  DNADRDCR OCT    74001      DNADR COUNT AND ECADR DECREMENTER

 0167  REF   1              05,3532  3 0334 0  CHKLIST  CA     CTLIST
 0168                       05,3533  0 0006 1           EXTEND
 0169  REF   2  LAST  991   05,3534  6 3536 1           BZMF   NEWLIST    IT WILL BE NEGATIVE AT END OF LIST
 0170  REF   1              05,3535  1 3543 1           TCF    NEXTINCL
 0171  REF   7  LAST  229   05,3536  50 332 0  NEWLIST  INDEX  DNLSTCOD
 0172  REF   1              05,3537  3 2441 1           CA     DNTABLE    INITIALIZE CTLIST WITH
 0173  REF   2  LAST  992   05,3540  54 334 1           TS     CTLIST       STARTING ADDRESS OF NEW LIST
 0174  REF   8  LAST  992   05,3541  4 0332 1           CS     DNLSTCOD
 0175  REF   1              05,3542  1 3756 1           TCF    SENDID +3
 0177  REF   3  LAST  992   05,3543  50 334 0  NEXTINCL INDEX  CTLIST
 0178                       05,3544  3 0000 1           CA     0
 0179  REF 298  LAST  983   05,3545  10 000 0           CCS    A
 0180  REF   4  LAST  992   05,3546  24 334 0           INCR   CTLIST     SET POINTER TO PICK UP NEXT CTLIST WORD
 0181                       05,3547  1 3553 0           TCF    +4         ON NEXT ENTRY TO PROG. (A SHOULD NOT =0)
 0182  REF   5  LAST  992   05,3550  56 334 0           XCH    CTLIST     SET CTLIST TO NEGATIVE AND PLACE(CODING)
 0183                       05,3551  4 0000 0           COM               UNCOMPLEMENTED DNADR INTO A.    (FOR LA)
 0184  REF   6  LAST  992   05,3552  56 334 0           XCH    CTLIST                                     (ST IN )
 0185  REF 299  LAST  992   05,3553  24 000 1   +4      INCR   A                                          (CTLIST)
 0186  REF   3  LAST  991   05,3554  54 336 0           TS     DNECADR    SAVE DNADR
 0187  REF   1              05,3555  6 3525 0           AD     MINTIME2   TEST FOR TIME2 (NEG. OF ECADR)
 0188  REF 300  LAST  992   05,3556  10 000 0           CCS    A
 0189  REF   1              05,3557  1 3563 0           TCF    SETWO +1   DON'T SET WORD ORDER CODE
 0190                       05,3560   47777 0  MINB1314 OCT    47777      MINUS BIT 13 AND 14  (CAN'T GET HERE)
 0191  REF   2  LAST  992   05,3561  1 3563 0           TCF    SETWO +1   DON'T SET WORD ORDER CODE
 0192  REF   1              05,3562  0 3605 1  SETWO    TC     WOZERO     GO SET WORD ORDER CODE TO ZERO.
 0193  REF   4  LAST  992   05,3563  3 0336 1   +1      CA     DNECADR    RELOAD A WITH THE DNADR.
 0194  REF   1              05,3564  6 3560 1   +2      AD     MINB1314   IS THIS A REGULAR DNADR?
 0195                       05,3565  0 0006 1           EXTEND
 0196  REF   2  LAST  991   05,3566  6 3653 1           BZMF   FETCH2WD   YES. (A MUST NEVER BE ZERO)
 0197  REF   1              05,3567  6 7741 1           AD     MINB12     NO- IS IT A POINTER (DNPTR) OR A
 0198                       05,3570  0 0006 1           EXTEND                CHANNEL(DNCHAN)
 0199  REF   1              05,3571  6 3611 1           BZMF   DODNPTR    IT'S A POINTER. (A MUST NEVER BE ZERO)

 0200                       05,3572  0 0006 1  DODNCHAN TC     6          (EXECUTED AS EXTEND) IT S A CHANNEL
 0201  REF   5  LAST  992   05,3573  50 336 1           INDEX  DNECADR
 0202                       05,3574  44'000 1           INDEX  0 -4000    (EXECUTED AS READ)
 0203  REF 166  LAST  961   05,3575  54 001 1           TS     L
 0204                       05,3576  0 0006 1           TC     6          (EXECUTED AS EXTEND)
 0205  REF   6  LAST  992   05,3577  50 336 1           INDEX  DNECADR
 0206                       05,3600  43'777 1           INDEX  0 -4001    (EXECUTED AS READ)
 0207  REF   7  LAST  992   05,3601  54 336 0           TS     DNECADR    SET DNECADR
 0208  REF   3  LAST  991   05,3602  3 7747 1           CA     NEGONE         TO MINUS
 0209  REF   8  LAST  992   05,3603  56 336 1           XCH    DNECADR            WHILE PRESERVING A.
 0210  REF   1              05,3604  1 3701 0           TCF    DNTMEXIT   GO SEND CHANNELS

 0211  REF  36  LAST  976   05,3605  4 4745 1  WOZERO   CS     BIT7
 0212                       05,3606  0 0006 1           EXTEND
 0213  REF  18  LAST  991   05,3607  03 013 0           WAND   CHAN13     SET WORD ORDER CODE TO ZERO
 0214    REF 223  LAST  924    05,3610  0 0002 0            TC      Q                    RETURN TO CALLER

 0215    REF   9  LAST  992    05,3611  50 336 1  DODNPTR   INDEX   DNECADR              DNECADR CONTAINS ADRES OF SUBLIST
 0216                          05,3612  0 0000 1            0       0                    CLEAR AND ADD LIST ENTRY INTO A.
 0217    REF 301  LAST  992    05,3613  10 000 0            CCS     A                    IS THIS A SNAPSHOT SUBLIST
 0218    REF  10  LAST  993    05,3614  3 0336 1            CA      DNECADR              NO, IT IS A REGULAR SUBLIST.
 0219    REF   1               05,3615  1 3665 0            TCF     DOSUBLST             A MUST NOT BE ZERO.

 0220    REF  11  LAST  993    05,3616  56 336 1            XCH     DNECADR              YES, IT IS A SNAPSHOT SUBLIST.
 0221    REF   3  LAST  991    05,3617  54 337 1            TS      SUBLIST              C(DNECADR) INTO SUBLIST
 0222    REF 185  LAST  976    05,3620  3 4755 1            CAF     ZERO                     A    INTO    A
 0223    REF   3  LAST  993    05,3621  56 336 1            XCH     TMINDEX              (NOTE.. TMINDEX = DNECADR)


R0224    THE FOLLOWING CODING (FROM SNAPLOOP TO SNAPEND)IS FOR THE PURPOSE OF TAKING A SNAPSHOT OF 12 DP REGISTERS.
R0226    THIS IS DONE BY SAVING 11 DP REGISTERS IN DNTMBUFF AND SENDING THE FIRST DP WORD IMMEDIATELY.
R0228    THE SNAPSHOT PROCESSING IS THE MOST TIME CONSUMING AND THEREFORE THE CODING AND LIST STRUCTURE WERE DESIGNED
R0230    TO MINIMIZE TIME. THE TIME OPTIMIZATION RESULTS IN RULES UNIQUE TO THE SNAPSHOT PORTION OF THE DOWNLIST.
R0232    THESE RULES ARE......
R0233                  1.     ONLY 1DNADR'S CAN APPEAR IN THE SNAPSHOT SUBLIST
R0234                  2.     THE 1DNADR'S CANNOT REFER TO THE FIRST LOCATION IN ANY  BANK.


 0236    REF  53  LAST  958    05,3622  54 003 0  SNAPLOOP  TS      EBANK                SET EBANK
 0237    REF   5  LAST  795    05,3623  7 4357 0            MASK    LOW8                 ISOLATE RELATIVE ADDRESS
 0238                          05,3624  0 0006 1            EXTEND
 0239    REF 302  LAST  993    05,3625  5 0000 1            INDEX   A
 0240                          E3,1401                      EBANK=  1401
 0241                          05,3626  3 1402 0            DCA     1401                 PICK UP 2 SNAPSHOT WORDS.
 0242    REF  18  LAST  991       0340                      EBANK=  DNTMBUFF
 0243    REF   4  LAST  993    05,3627  50 336 1            INDEX   TMINDEX
 0244    REF  19  LAST  993    05,3630  52 341 0            DXCH    DNTMBUFF             STORE 2 SNAPSHOT WORDS IN BUFFER
 0245    REF   5  LAST  993    05,3631  24 336 1            INCR    TMINDEX              SET BUFFER INDEX FOR NEXT 2 WORDS.
 0246    REF   6  LAST  993    05,3632  24 336 1            INCR    TMINDEX
 0247    REF   4  LAST  993    05,3633  24 337 0  SNAPAGN   INCR    SUBLIST              SET POINTER TO NEXT 2 WORDS OF SNAPSHOT
 0248    REF   5  LAST  993    05,3634  50 337 0            INDEX   SUBLIST
 0249                          05,3635  0 0000 1            0       0                    = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0250    REF 303  LAST  993    05,3636  10 000 0            CCS     A                    TEST FOR LAST TWO WORDS OF SNAPSHOT.
 0251    REF   1               05,3637  1 3622 0            TCF     SNAPLOOP             NOT LAST TWO.
 0252    REF   1               05,3640   03523 0  LDNPHAS2  GENADR  DNPHASE2
 0253    REF   6  LAST  993    05,3641  54 337 1            TS      SUBLIST              YES, LAST.  SAVE A.
 0254    REF   4  LAST  992    05,3642  3 7747 1            CA      NEGONE               SET DNECADR AND
 0255    REF  12  LAST  993    05,3643  54 336 0            TS      DNECADR                  SUBLIST POINTERS
 0256    REF   7  LAST  993    05,3644  56 337 0            XCH     SUBLIST                      TO NEGATIVE VALUES.
 0257    REF  54  LAST  993    05,3645  54 003 0            TS      EBANK
 0258    REF   6  LAST  993    05,3646  7 4357 0            MASK    LOW8
 0259                          05,3647  0 0006 1            EXTEND
 0260    REF 304  LAST  993    05,3650  5 0000 1            INDEX   A
 0261                          E3,1401                      EBANK=  1401
 0262                          05,3651  3 1402 0            DCA     1401                 PICK UP FIRST 2 WORDS OF SNAPSHOT.
 0263   REF  20  LAST  993        0340                     EBANK=  DNTMBUFF
 0264   REF   2  LAST  992    05,3652  1 3701 0  SNAPEND   TCF     DNTMEXIT          NOW GO SEND THEM.

 0265   REF  13  LAST  993    05,3653  3 0336 1  FETCH2WD  CA      DNECADR
 0266   REF  55  LAST  993    05,3654  54 003 0            TS      EBANK           SET EBANK
 0267   REF   7  LAST  993    05,3655  7 4357 0            MASK    LOW8            ISOLATE RELATIVE ADDRESS
 0268   REF 167  LAST  992    05,3656  54 001 1            TS      L
 0269   REF   1               05,3657  3 3531 0            CA      DNADRDCR        DECREMENT COUNT AND ECADR
 0270   REF  14  LAST  994    05,3660  26 336 0            ADS     DNECADR
 0271                         05,3661  0 0006 1            EXTEND
 0272   REF 168  LAST  994    05,3662  5 0001 0            INDEX   L
 0273                         E3,1400                      EBANK=  1400
 0274                         05,3663  3 1401 0            DCA     1400            PICK UP 2 DATA WORDS
 0275   REF  21  LAST  994        0340                     EBANK=  DNTMBUFF
 0276   REF   3  LAST  994    05,3664  1 3701 0            TCF     DNTMEXIT          NOW GO SEND THEM.

 0277   REF   8  LAST  993    05,3665  54 337 1  DOSUBLST  TS      SUBLIST         SET SUBLIST POINTER
 0278   REF   9  LAST  994    05,3666  50 337 0  NEXTINSL  INDEX   SUBLIST
 0279                         05,3667  0 0000 1            0       0               = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0280   REF 305  LAST  993    05,3670  10 000 0            CCS     A               IS IT THE END OF THE SUBLIST
 0281   REF  10  LAST  994    05,3671  24 337 0            INCR    SUBLIST         NO-
 0282                         05,3672  1 3676 1            TCF     +4
 0283   REF  11  LAST  994    05,3673  54 337 1            TS      SUBLIST         SAVE A.
 0284   REF   5  LAST  993    05,3674  3 7747 1            CA      NEGONE          SET SUBLIST TO MINUS
 0285   REF  12  LAST  994    05,3675  56 337 0            XCH     SUBLIST         RETRIEVE A.
 0286   REF 306  LAST  994    05,3676  24 000 1   +4       INCR    A
 0287   REF  15  LAST  994    05,3677  54 336 0            TS      DNECADR         SAVE DNADR
 0288   REF   3  LAST  992    05,3700  1 3564 1            TCF     SETWD +2        GO USE COMMON CODING(PROBLEMS WOULD
A0289                                                                              OCCUR IF THE PROGRAM ENCOUNTERED A
A0290                                                                              DNPTR NOW)

 0291                         05,3701  0 0006 1  DNTMEXIT  EXTEND                  DOWN-TELEMETRY EXIT
 0292   REF   1               05,3702  01 034 1            WRITE   DNTM1           TO SEND A + L TO CHANNELS 34 + 35
 0293   REF 169  LAST  994    05,3703  3 0001 0            CA      L               RESPECTIVELY
 0294                         05,3704  0 0006 1  TMEXITL   EXTEND
 0295   REF   1               05,3705  01 035 0            WRITE   DNTM2
 0296   REF  21  LAST  822    05,3706  1 5270 0  TMRESUME  TCF     RESUME          EXIT TELEMETRY PROGRAM VIA RESUME.

 0297   REF   2  LAST  528        7741           MINB12    EQUALS  -1/8
 0298   REF   7  LAST  993        0336           DNECADR   EQUALS  TMINDEX
 0299   REF   2  LAST   99        0334           CTLIST    EQUALS  LDATALST
 0300   REF   2  LAST   99        0337           SUBLIST   EQUALS  DNQ
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P0301   SUBROUTINE NAME- DNDUMP
R0302   FUNCTIONAL DESCRIPTION - TO SEND(DUMP) ALL ERASABLE STORAGE 'N' TIMES.(N = 1 TO 4). BANKS ARE SENT ONE AT A TIME
R0304             EACH BANK IS PRECEEDED BY AN ID WORD, SYNCH BITS, ECADR AND TIME1 FOLLOWED BY THE 256D WORDS OF EACH
R0306             EBANK. EBANKS ARE DUMPED IN ORDER(I.E. EBANK 0 FIRST, THEN EBANK1 ETC.)
R0308   CALLING SEQUENCE- THE GROUND OR ASTRONAUT BY KEYING V74E CAN INITIALIZE THE DUMP.
R0310             AFTER KEYING IN V74E THE CURRENT DOWNLIST WILL BE IMMEDIATELY TERMINATED AND THE DOWNLINK ERASABLE DUMP
R0312             WILL BEGIN.
R0313             ONCE INITIATED THE DOWNLINK ERASABLE DUMP CAN BE TERMINATED (AND INTERRUPTED DOWNLIST REINSTATED) ONLY
R0315             BY THE FOLLOWING:
R0316              1. A FRESH START
R0317              2. COMPLETION OF ALL DOWNLINK DUMPS REQUESTED (ACCORDING TO BITS SET IN DUMPCNT). NOTE THAT DUMPCNT
R0319                 CAN BE ALTERED BY A V21N01.
R0320              3. AND INVOLUNTARILY BY A RESTART.
R0321   NORMAL EXIT MODE- TCF DNPHASE1
R0322   ALARM OR ABORT MODE- NONE
R0323   *SUBROUTINES CALLED- NONE.
R0324   ERASABLE INITIALIZATION REQUIRED-
R0325             DUMPCNT    OCT   20000    IF 4 COMPLETE ERASABLE DUMPS ARE DESIRED
R0326             DUMPCNT    OCT   10000    IF 2 COMPLETE ERASABLE DUMPS ARE DESIRED
R0327             DUMPCNT    OCT   04000    IF 1 COMPLETE ERASABLE DUMP  IS  DESIRED
R0328   DEBRIS- DUMPLOC, DUMPSW, DNTMGOTO, EBANK AND CENTRAL REGISTERS
R0329   TIMING-    TIME(IN SECS) = ((NO.DUMPS)*(NO.EBANKS)* (WDSPEREBANK + NO.IDWDS)) / NO.WDSPERSEC
R0331              TIME(IN SECS) =  (     4      )*(      8      )* (      256        +       4     )   /       100
R0333        THUS TIME(IN SECS TO SEND DUMP OF ERASABLE 4 TIMES VIA DOWNLINK) = 83.2 SECONDS

R0335   STRUCTURE OF ONE EBANK AS IT IS SENT BY DOWNLINK PROGRAM-
R0336      (REMINDER-THIS ONLY DESCRIBES ONE OF THE 8 EBANKS X 4 (DUMPS) = 32 EBANKS WHICH WILL BE SENT BY DNDUMP)
R0338           DOWNLIST                                             W
R0339             WORD   TAKEN FROM CONTENTS OF       EXAMPLE 0   COMMENTS

R0340               1     ERASID                         0177X   0   DOWNLIST I.D. FOR DOWNLINK ERASABLE DUMP (X=7 CSM, 6 LM)
R0342               2     LOWIDCOD                       77340   1   DOWNLINK SYNCH BITS.(SAME ONE USED IN ALL OTHER DOWNLISTS)
R0344               3     DUMPLOC                        13400   1   (SEE NOTES ON DUMPLOC)1= 3RD ERAS DUMP, 3400=ECADR OF 5TH WD
R0346               4     TIME1                          14120   1   TIME IN CENTISECONDS
R0347               5     FIRST WORD OF EBANK X          03400   1   IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1400 (ECADR 3400)
R0349               6     2ND   WORD OF EBANK X          00142   1   IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1401 (ECADR 3401)
R0351               7     3RD   WORD OF EBANK X          00142   1   IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1402 (ECADR 3402)
R0353               .                                            1
R0354               .                                            1
R0355               .                                            1
R0356            260D   256TH WORD OF EBANK X          03777   1   IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1777 (ECADR 3777)

R0358   NOTE- DUMPLOC CONTAINS THE COUNTER AND ECADR FOR EACH WORD BEING SENT.
R0359         THE BIT STRUCTURE OF DUMPLOC IS FOLLOWS---
R0360                                                  X = NOT USED
R0361             X ABC EEE RRRRRRRR                 ABC = ERASABLE DUMP COUNTER(I.E. ABC = 0,1,2 OR 3 WHICH MEANS THAT
R0363                                                      COMPLETE ERASABLE DUMP NUMBER  1,2,3 OR 4 RESPECTIVELY IS IN PROGRESS)
R0365                                                EEE = EBANK BITS
R0366                                           RRRRRRRR = RELATIVE ADDRESS WITHIN AN EBANK.
```

```
 0368  REF 186  LAST  993   05,3707  3 4755 1  DNDUMPI   CA       ZERO            INITIALIZE DOWNLINK
 0369  REF   1              05,3710  54 336 0            TS       DUMPLOC         ERASABLE DUMP
 0370  REF   2  LAST  992   05,3711  0 3753 0   +2       TC       SENDID          GO SEND ID AND SYNCH BITS
 0371  REF   1              05,3712  3 3721 0            CA       LDNDUMP1        SET DNTMGOTO
 0372  REF   6  LAST  991   05,3713  54 335 0            TS       DNTMGOTO        TO LOCATION FOR NEXT PASS
 0373  REF  16  LAST  952   05,3714  3 0025 0            CA       TIME1           PLACE TIME1
 0374  REF 170  LAST  994   05,3715  56 001 0            XCH      L               INTO L
 0375  REF   2  LAST  996   05,3716  3 0336 1            CA       DUMPLOC         AND ECADR OF THIS EBANK INTO A
 0376  REF   4  LAST  994   05,3717  1 3701 0            TCF      DNTMEXIT        SEND DUMPLOC AND TIME1

 0377  REF   1              05,3720   03722 0  LDNDUMP   ADRES    DNDUMP
 0378  REF   1              05,3721   03735 0  LDNDUMP1  ADRES    DNDUMP1

 0379  REF  63  LAST  918   05,3722  3 4752 0  DNDUMP    CA       TWO             INCREMENT ECADR IN DUMPLOC
 0380  REF   3  LAST  [illegible]   05,3723  26 336 0            ADS      DUMPLOC         TO NEXT DP WORD TO BE
 0381  REF   8  LAST  994   05,3724  7 4357 0            MASK     LOW8            DUMPED AND SAVE IT.
 0382  REF 307  LAST  994   05,3725  10 000 0            CCS      A               IS THIS THE BEGINNING OF A NEW EBANK
 0383  REF   1              05,3726  1 3737 0            TCF      DNDUMP2         NO- THEN CONTINUE DUMPING
 0384  REF   4  LAST  996   05,3727  3 0336 1            CA       DUMPLOC         YES- IS THIS THE END OF THE
 0385  REF   2  LAST  211   05,3730  7 0333 0            MASK     DUMPCNT         N TH(N = 1 TO 4) COMPLETE ERASABLE
 0386  REF   1              05,3731  7 7722 0            MASK     PRIO34          DUMP(BIT14 FOR 4, BIT13 FOR 2 OR BIT12
 0387  REF 308  LAST  996   05,3732  10 000 0            CCS      A               FOR 1 COMPLETE ERASABLE DUMP(S)).
 0388  REF   2  LAST  222   05,3733  1 3515 1            TCF      DNPHASE1        YES- START SENDING INTERRUPTED DOWNLIST
A0389                                                                             AGAIN
 0390  REF   2  LAST  288   05,3734  1 3711 1            TCF      DNDUMPI +2      NO- GO BACK AND INITIALIZE NEXT BANK

 0391  REF   1              05,3735  3 3720 1  DNDUMP1   CA       LDNDUMP         SET DNTMGOTO
 0392  REF   7  LAST  996   05,3736  54 335 0            TS       DNTMGOTO        FOR WORDS 3 TO 256D OF CURRENT EBANK

 0393  REF   5  LAST  996   05,3737  3 0336 1  DNDUMP2   CA       DUMPLOC
 0394  REF  56  LAST  994   05,3740  54 003 0            TS       EBANK           SET EBANK
 0395  REF   9  LAST  996   05,3741  7 4357 0            MASK     LOW8            ISOLATE RELATIVE ADDRESS.
 0396  REF 229  LAST  993   05,3742  54 002 1            TS       Q               (NOTE: MASK INSTRUCTION IS USED TO PICK
 0397  REF  26  LAST  928   05,3743  3 4754 0            CA       NEGO            UP ERASABLE REGISTERS SO THAT EDITING
 0398  REF 171  LAST  996   05,3744  54 001 1            TS       L               REGISTERS 20-23 WILL NOT BE ALTERED.)
 0399  REF 230  LAST  996   05,3745  50 002 0            INDEX    Q
 0400                       E3,1400                      EBANK=   1400            PICK UP LOW ORDER REGISTER OF PAIR
 0401                       05,3746  7 1401 1            MASK     1401            OF ERASABLE REGISTERS.
 0402  REF 172  LAST  996   05,3747  56 001 0            XCH      L
 0403  REF 231  LAST  996   05,3750  50 002 0            INDEX    Q               PICK UP HIGH ORDER REGISTER OF PAIR
 0404                       05,3751  7 1400 0            MASK     1400            OF ERASABLE REGISTERS.
 0405  REF  22  LAST  994      0340                      EBANK=   DNTMBUFF
 0406  REF   5  LAST  996   05,3752  1 3701 0            TCF      DNTMEXIT        GO SEND THEM


 0407                       05,3753  0 0006 1  SENDID    EXTEND                   **ENTRANCE USED BY ERASABLE DUMP PROG.**
 0408  REF   8  LAST  996   05,3754  22 335 1            QXCH     DNTMGOTO        SET DNTMGOTO SO NEXT TIME PROG WILL GO
 0409  REF   1              05,3755  3 5011 1            CAF      ERASID          TO LOCATION FOLLOWING :TC SENDID:

 0410  REF 173  LAST  996   05,3756  54 001 1            TS       L               **ENTRANCE USED BY REGULAR DOWNLINK PG**
 0411   REF   2  LAST  992   05,3757  0 3605 1            TC      WCZERO         GO SET WORD ORDER CODE TO ZERO
 0412   REF   1              05,3760  3 2065 0            CAF     LOWIDCOD       PLACE SPECIAL ID CODE INTO L
 0413   REF 174  LAST  996   05,3761  56 001 0            XCH     L              AND ID BACK INTO A
 0414   REF   6  LAST  996   05,3762  1 3701 0            TCF     DNTMEXIT       SEND DOWNLIST ID CODE(S).

R5000  *

 5010  *REF  37  LAST  992   05,3763  3 4745 0  WOTEST    CA      BIT7           AT THE BEGINNING OF THE LIST THE WORD
 5020  *                     05,3764  0 0006 1            EXTEND                 ORDER BIT WILL BE SET BACK TO ZERO
 5030  *REF  19  LAST  992   05,3765  02 013 1            RAND    CHAN13
 5040  *REF 309  LAST  996   05,3766  10 000 0            CCS     A
 5050  *REF   9  LAST  996   05,3767  0 0335 1            TC      DNTMGOTO
 5060  *REF  38  LAST  997   05,3770  3 4745 0            CA      BIT7
 5070  *REF   1              05,3771  1 3512 0            TCF     WO1
```

```
L         INTER-BANK COMMUNICATION                                                          USER'S PAGE NO.   1        EO S3

R0001              THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003     CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 0005                                4616                      BLOCK   02
 00055   REF    1                                              COUNT*  $$/BANK
 0006    REF    7  LAST   878        4616  52 134 0  BANKCALL  DXCH    BUF2                 SAVE INCOMING A,L.
 0007    REF  232  LAST   996        4617  50 002 0            INDEX   Q                    PICK UP CADR.
 0008                                4620  3 0000 1            CA      0
 0009    REF  233  LAST   998        4621  24 002 0            INCR    Q                    SO WE RETURN TO THE LOC. AFTER THE CADR.

 R0010              SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012    REF  175  LAST   997        4622  54 001 1  SWCALL    TS      L
 0013    REF    3  LAST   464        4623  22 004 0            LXCH    FBANK                SWITCH BANKS, SAVING RETURN.
 0014    REF    8  LAST   751        4624  7 5012 0            MASK    LOW10                GET SUB-ADDRESS OF CADR.
 0015    REF  234  LAST   998        4625  56 002 0            XCH     Q                    A,L NOW CONTAINS DP RETURN.
 0016    REF    8  LAST   998        4626  52 134 0            DXCH    BUF2                 RESTORING INPUTS IF THIS IS A BANKCALL.
 0017    REF  235  LAST   998        4627  50 002 0            INDEX   Q
 0018                                4630  0 2000 0            TC      10000                SETTING Q TO SWRETURN.

 0019    REF    9  LAST   998        4631  56 134 1  SWRETURN  XCH     BUF2 +1              COMES HERE TO RETURN TO CALLER. C(A,L)
 0020    REF    4  LAST   998        4632  56 004 0            XCH     FBANK                ARE PRESERVED FOR RETURN.
 0021    REF   10  LAST   998        4633  56 134 1            XCH     BUF2 +1
 0022    REF   11  LAST   998        4634  0 0133 0            TC      BUF2


 R0023              THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
 R0025     FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026    REF  236  LAST   998        4635  56 002 0  POSTJUMP  XCH     Q                    SAVE INCOMING C(A).
 0027    REF  310  LAST   997        4636  50 000 1            INDEX   A                    GET CADR.
 0028                                4637  3 0000 1            CA      0

 R0029              BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031    REF    5  LAST   998        4640  54 004 1  BANKJUMP  TS      FBANK
 0032    REF    9  LAST   998        4641  7 5012 0            MASK    LOW10
 0033    REF  237  LAST   998        4642  56 002 0            XCH     Q                    RESTORING INPUT C(A) IF THIS WAS A
 0034    REF  238  LAST   998        4643  50 002 0  Q+10000   INDEX   Q                    POSTJUMP.
 0035                                4644  1 2000 1  PRIO12    TCF     10000                PRIO12 = TCF   10000 = 12000
```

```
P0036             THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

 0038   REF  10   LAST  998         4645   3 5012 1  MAKECADR CAF      LOW10
 0039   REF  12   LAST  998         4646   7 0133 1           MASK     BUF2
 0040   REF  13   LAST  999         4647   6 0134 1           AD       BUF2 +1
 0041   REF 239   LAST  998         4650   0 0002 0           TC       Q


 00465  REF   5   LAST  885         4651  54 135 1   SUPDACAL TS       MPTEMP
 0047   REF   6   LAST  998         4652  56 004 0            XCH      FBANK            SET FBANK FOR DATA.
 00475                              4653   0 0006 1           EXTEND
 0048   REF  11   LAST  555         4654  04 007 1            ROR      SUPERBNK         SAVE FBANK IN BITS 15-11, AND
 00485  REF   6   LAST  999         4655  56 135 0            XCH      MPTEMP            SUPERBANK IN BITS  7-5.
 0049   REF  11   LAST  999         4656   7 5012 0           MASK     LOW10
 00495  REF 176   LAST  998         4657  56 001 0            XCH      L                SAVE REL. ADR. IN BANK, FETCH SUPERBITS.
 0050                               4660   0 0004 0           INHINT                    BECAUSE RUPT DOES NOT SAVE SUPERBANK.
 00505                              4661   0 0006 1           EXTEND
 0051   REF  12   LAST  999         4662  01 007 1            WRITE    SUPERBNK         SET SUPERBANK FOR DATA.
 0052   REF 177   LAST  999         4663  50 001 0            INDEX    L
 00525                              4664   3 2000 0           CA       10000            PINBALL (FIX MEM DISP) PREVENTS DCA HERE
 0053   REF   7   LAST  999         4665  56 135 0            XCH      MPTEMP           SAVE 1ST WD, FETCH OLD FBANK AND SBANK.
 00534                              4666   0 0006 1           EXTEND
 00535  REF  13   LAST  999         4667  01 007 1            WRITE    SUPERBNK         RESTORE SUPERBANK.
 0054                               4670   0 0003 1           RELINT
 00545  REF   7   LAST  999         4671  54 004 1            TS       FBANK            RESTORE FBANK.
 0055   REF   8   LAST  999         4672   3 0135 0           CA       MPTEMP           RECOVER FIRST WORD OF DATA.
 00555                              4673   0 0002 0           RETURN                    24 WDS. DATACALL 516 MU, SUPDACAL 432 MU
```

```
P0056             THE FOLLOWING ROUTINES ARE IDENTICAL TO BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

 0058    REF          LAST  907        4674  52 073 1  IBNKCALL DXCH    RUPTREG3          USES RUPTREG3,4 FOR DP RETURN ADDRESS.
 0059    REF 240      LAST  999        4675  50 002 0           INDEX   Q
 0060                                  4676  3 0000 1           CAF     0
 0061    REF 241      LAST  1[illegible]  4677  24 002 0       INCR    Q

 0062    REF 178      LAST  999        4700  54 001 1  ISWCALL  TS      L
 0063    REF   8      LAST  9[illegible]  4701  22 004 0       LXCH    FBANK
 0064    REF  12      LAST  999        4702  7 5012 0           MASK    LOW10
 0065    REF 242      LAST 1000        4703  56 002 0           XCH     Q
 0066    REF  10      LAST 1000        4704  52 073 1           DXCH    RUPTREG3
 0067    REF 243      LAST 1000        4705  50 002 0           INDEX   Q
 0068                                  4706  0 2000 0           TC      10000

 0069    REF   3      LAST   95        4707  56 073 0  ISWRETRN XCH     RUPTREG4
 0070    REF   9      LAST 1000        4710  56 004 0           XCH     FBANK
 0071    REF   4      LAST 1000        4711  56 073 0           XCH     RUPTREG4
 0072    REF  11      LAST 1000        4712  0 0072 1           TC      RUPTREG3

R0090    2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

A0092                                                  L        TC      USPRCADR
A0093                                                  L+1      CADR    INTPRETX          INTPRETX IS THE INTERPRETIVE CODING
A0094                                                                                     RETURN IS TO L+2

 0103    REF   2      LAST [illegible]  4713  54 164 0  USPRCADR TS      LOC               SAVE A
 0104    REF  33      LAST [illegible]  4714  3 4744 1           CA      BIT8
 0105    REF   7      LAST  453        4715  54 023 1           TS      EDOP              EXIT INSTRUCTION TO EDOP
 0106    REF  23      LAST  825        4716  3 0006 1           CA      BBANK
 0107    REF   1                       4717  54 165 1           TS      BANKSET           USER'S BBANK TO BANKSET
 0108    REF 244      LAST 1000        4720  50 002 0           INDEX   Q
 0109                                  4721  3 0000 1           CA      0
 0110    REF  10      LAST 1000        4722  54 004 1           TS      FBANK             INTERPRETIVE BANK TO FBANK
 0111    REF  13      LAST 1000        4723  7 5012 0           MASK    LOW10             YIELDS INTERPRETIVE RELATIVE ADDRESS
 0112    REF 245      LAST 1000        4724  56 002 0           XCH     Q                 INTERPRETIVE ADDRESS TO Q, FETCHING L+1
 0113    REF   6      LAST 1000        4725  56 164 1           XCH     LOC               L+1 TO LOC, RETRIEVING ORIGINAL A
 0114    REF   1                       4726  1 4643 0           TCF     Q+10000
```

```
P0117    THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07. (CHANNEL 07 CONTAINS THE SUPERBANK SETTING.)
R0119                                               PSEUDO-FIXED       OCTAL PSEUDO
R0120    SUPERBANK       SETTING      S-REG. VALUE   BANK NUMBERS       ADDRESSES
R0121    ----------      -------      ------------    ------------       ------------

R0122    SUPERBANK 3       0XX        2000 - 3777       30 - 37        70000 - 107777   (WHERE XX CAN BE ANYTHING AND
R0124                                                                                   WILL USUALLY BE SEEN AS 11)
R0126    SUPERBANK 4       100        2000 - 3777       40 - 47        110000 - 127777  (AS FAR AS IT CAN BE SEEN,
R0128                                                                                   ONLY BANKS 40-43 WILL EVER BE
R0130                                                                                   AND ARE PRESENTLY AVAILABLE)
R0132    SUPERBANK 5       101        2000 - 3777       50 - 57        130000 - 147777  (PRESENTLY NOT AVAILABLE TO
R0134                                                                                   THE USER)
R0136    SUPERBANK 6       110        2000 - 3777       60 - 67        150000 - 167777  (PRESENTLY NOT AVAILABLE TO
R0138                                                                                   THE USER)
R0142    ***  THIS ROUTINE MAYBE CALLED BY ANY PROGRAM LOCATED IN BANKS 00 - 27.  I.E., NO PROGRAM LIVING IN ANY
R0144    SUPERBANK SHOULD USE SUPERSW.  ***

R0145    SUPERSW MAYBE CALLED IN THIS FASHION:

R0146               CAF     ABBCON             WHERE  --  ABBCON   BBCON  SOMETHIN  --
R0147               TCR     SUPERSW            (THE SUPERBNK BITS ARE IN THE BBCON)
R0148               ...       ...
R0149                .         .
R0150                .         .

R0151    OR IN THIS FASHION :

R0152               CAF     SUPERSET           WHERE SUPERSET IS ONE OF THE FOUR AVAILABLE
R0154               TCR     SUPERSW            SUPERBANK BIT CONSTANTS:
R0155               ...       ...                                          SUPER011 OCTAL  60
R0157                .         .                                           SUPER100 OCTAL 100
R0159                .         .                                           SUPER101 OCTAL 120
R0161                                                                      SUPER110 OCTAL 140

 0163                                 4727  0 0006 1  SUPERSW  EXTEND
 0164    REF  14  LAST  999           4730  01 007 1           WRITE   SUPERBNK        WRITE BITS 7-6-5 OF THE ACCUMULATOR INTO
A0165                                                                                  CHANNEL 07
 0166    REF 246  LAST 1000           4731  0 0002 0           TC      Q               TC TO INSTRUCTION FOLLOWING
A0167                                                                                    TC  SUPERSW
```

```
R0001   SECTION 1  DISPATCHER

R0002            ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST  INSTRUCTION, BANKSET TO THE BBANK OF THE
R0004   OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006   VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008   (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.
R0010   E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.


 0012                              6037                         BLOCK   03

 0013    REF    1                                               COUNT*  $$/INTER
 00135                             6037   0 0003 1  INTPRET     RELINT
 0014                              6040   0 0006 1              EXTEND                     SET LOC TO THE WORD FOLLOWING THE TC.
 0015    REF    7  LAST 1000       6041   22 164 1              QXCH    LOC

 0016    REF   24  LAST 1000       6042   3 0006 1    +2        CA      BBANK              INTERPRETIVE BRANCHES FINISH HERE.
 0017    REF    2  LAST 1000       6043   54 165 1              TS      BANKSET
 0018    REF   34  LAST  900       6044   7 4735 0              MASK    BIT15              GET 15TH BIT FOR INDEXABLE ADDRESSES.
 0019    REF    5  LAST   96       6045   54 115 0              TS      INTBIT15

 0020    REF    8  LAST 1000       6046   54 023 1              TS      EDOP               MAKE SURE NO INSTRUCTIONS LEFT OVER

 0021    REF    1                  6047   1 6070 1              TCF     NEWOPS             PICK UP OP CODE PAIR AND BEGIN.


 0022    REF   25  LAST 1002       6050   22 006 1  INTRSM      LXCH    BBANK              RESUME SUSPENDED INTERPRETIVE JOB
 0023    REF  222  LAST  982       6051   1 6042 0              TCF     INTPRET +3
R0024              DLOAD LOADS MPAC, MPAC +1, LEAVING ZERO IN MPAC +2.

 0025                              6052   0 0006 1  DLOAD       EXTEND
 0026    REF    4  LAST  921       6053   5 0116 1              INDEX   ADDRWD
 0027                              6054   3 0001 0              DCA     0                  LOAD DP C(C(ADDRWD)) INTO MPAC,MPAX +1
 0028    REF  367  LAST  962       6055   52 155 1  SLOAD2      DXCH    MPAC
 0029    REF  187  LAST  996       6056   3 4755 1              CAF     ZERO               ZERO MPAC +2
```

```
P0030              AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0032   REF 368  LAST 1002       6057  54 156 1             TS      MPAC +2          AND DECLARE DP MODE

 0033   REF  15  LAST  886       6060  54 163 1  NEWMODE    TS      MODE             PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0034   REF   3  LAST 1002       6061   3 0165 0  DANZIG    CA      BANKSET          SET BBANK BEFORE TESTING NEWJOB SO THAT
 0035   REF  26  LAST 1002       6062  54 006 0             TS      BBANK            IT MAY BE SAVED DIRECTLY BY CHANJOB.

 0036   REF   9  LAST 1002       6063  10 023 1  NOIBNKSW   CCS     EDOP             SEE IF AN ORDER CODE IS LEFT OVER FROM
 0037   REF   1                  6064   1 6077 0            TCF     OPJUMP           THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0038                                                                                EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0039   REF   5  LAST  717       6065  10 067 1             CCS     NEWJOB           SEE IF A JOB OF HIGHER PRIORITY IS
 0040   REF   1                  6066   1 5126 0            TCF     CHANG2           PRESENT, AND IF SO, CHANGE JOBS.

 0041   REF   8  LAST 1002       6067  24 164 1             INCR    LOC              ADVANCE THE LOCATION COUNTER.
R0042            ITRACE (1) REFER'S TO "NEWOPS".
 0043   REF   9  LAST 1003       6070  50 164 1  NEWOPS     INDEX   LOC              ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0044                            6071   3 0000 1            CA      0                MAY BE AN OPCODE PAIR OR A STORE CODE.
 0045   REF 311  LAST  998       6072  10 000 0             CCS     A                TEST SIGN AND GET DABS(A).
 0046   REF   1                  6073   1 6362 1            TCF     DOSTORE          PROCESS STORE CODE.

 0047                            6074   00177 0  LOW7       OCT     177

 0048   REF  10  LAST 1003       6075  54 023 1             TS      EDOP             OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0049   REF   6  LAST  453       6076   7 6074 0            MASK    LOW7             WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0050   REF  13  LAST  460       6077  54 020 1  OPJUMP     TS      CYR              LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0051   REF  14  LAST 1003       6100  10 020 1             CCS     CYR              CODE IS TO BE PROCESSED. TEST PREFICES.
 0052   REF   1                  6101   1 6247 1            TCF     OPJUMP2          TEST SECOND PREFIX BIT.

 0053   REF   1                  6102   1 6743 0            TCF     EXIT             +0 OP CODE IS EXIT.
```

```
P0054             PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

 0056   REF  49  LAST  980       6103  7 4753 0  ADDRESS  MASK    BIT1               SEE IF ADDRESS IS INDEXED. CYR CONTAINED
 0057   REF 312  LAST 1003       6104  10 000 0           CCS     A                  400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
 0058   REF   1                  6105  1 6146 0           TCF     INDEX              FORM INDEXED ADDRESS.

 0059   REF  10  LAST 1003       6106  50 164 1  DIRADRES INDEX   LOC                LOOK AHEAD TO NEXT WORD TO SEE IF
 0060                            6107  4 0001 1  OCT40001 CS      1                  ADDRESS IS GIVEN.
 0061   REF 313  LAST 1004       6110  10 000 0           CCS     A
 0062   REF   1                  6111  1 6215 0           TCF     PUSHUP             IF NOT.

 0063                            6112   77773 1  NEG4     DEC     -4

 0064   REF  11  LAST 1004       6113  24 164 1           INCR    LOC                IF SO, TO SHOW WE PICKED UP A WORD.
 0065   REF   5  LAST 1002       6114  54 116 0           TS      ADDRWD
```

```
P0066             FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0068     REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS
R0070     THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.


 0072   REF   1                  6115  6 6251 1            AD       -ENDVAC          SEE IF ADDRESS RELATIVE TO WORK AREA.
 0073   REF 314  LAST 1004       6116  10 000 0            CCS      A
 0074   REF   1                  6117  6 7743 0            AD       -ENDERAS         IF NOT, SEE IF IN GENERAL ERASABLE.
 0075   REF   1                  6120  1 6125 0            TCF      IERASTST

 0076   REF  38  LAST  961       6121  3 0120 1  NETZERO   CA       FIXLOC           IF SO, LEAVE THE MODIFIED ADDRESS IN
 0077   REF   6  LAST 1004       6122  26 116 0            ADS      ADDRWD           ADDRWD AND DISPATCH.
 0078   REF  15  LAST 1003       6123  50 020 0  ITR15     INDEX    CYR              THIS INDEX MAKES THE NEXT INSTRUCTION
 0079   REF   1                  6124  7 6273 0            7        INDJUMP -1       TCF INDJUMP + OP, EDITING CYR.

 0080                            6125  0 0006 1  IERASTST  EXTEND
 0081   REF   1                  6126  6 6136 0            BZMF     GEADDR           GO PROCESS GENERAL-ERASABLE ADDRESS.

 0082   REF  14  LAST 1000       6127  7 5012 0            MASK     LOW10            FIXED BANK ADDRESS. RESTORE AND ADD B15.
 0083   REF  15  LAST 1005       6130  6 5012 1            AD       LOW10            SWITCH BANKS AND LEAVE SUBADDRESS IN
 0084   REF   7  LAST 1005       6131  56 116 1            XCH      ADDRWD           ADDRWD FOR OPERAND RETRIEVAL. (THIS
 0085   REF   6  LAST 1002       6132  6 0115 1            AD       INTBIT15         METHOD PRECLUDES USE OF THE LAST
 0086   REF  11  LAST 1000       6133  54 004 1            TS       FBANK            LOCATION IN EACH FBANK.)
 0087   REF  16  LAST 1005       6134  50 020 0  ITR12     INDEX    CYR
 0088   REF   2  LAST 1005       6135  7 6273 0            7        INDJUMP -1

 0089   REF  10  LAST  996       6136  7 4357 0  GEADDR    MASK     LOW8
 0090   REF   3  LAST  460       6137  6 5007 0            AD       OCT1400
 0091   REF   8  LAST 1005       6140  56 116 1            XCH      ADDRWD
 0092   REF  57  LAST  996       6141  54 003 0            TS       EBANK
 0093   REF  17  LAST 1005       6142  50 020 0  ITR10     INDEX    CYR
 0094   REF   3  LAST 1005       6143  7 6273 0            7        INDJUMP -1
```

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P0095           THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0097    CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0099    BANK, OR ANY INTEGER IN THAT RANGE.

 0100    REF    1                  6144   3 7733 1  DODLOAD* CAF     DLOAD*               STODL* COMES HERE TO PROCESS LOAD ADR.
 0101    REF   18   LAST 1005      6145   54 020 1           TS      CYR                  (STOVL* ENTERS HERE).

 0102    REF   39   LAST 1005      6146   3 0120 1  INDEX    CA      FIXLOC               SET UP INDEX LOCATION.
 0103    REF    1                  6147   54 130 1           TS      INDEXLOC
 0104    REF   12   LAST 1004      6150   24 164 1           INCR    LOC                  (ADDRESS ALWAYS GIVEN).
 0105    REF   13   LAST 1005      6151   50 164 1           INDEX   LOC
 0106                              6152   4 0000 0           CS      0
 0107    REF  315   LAST 1005      6153   10 000 0           CCS     A                    INDEX 2 IF ADDRESS STORED COMPLEMENTED.
 0108    REF    2   LAST 1006      6154   24 130 0           INCR    INDEXLOC
 0109                              6155   10 156 1           NOOP

 0110    REF    9   LAST 1005      6156   54 116 0           TS      ADDRWD               14 BIT ADDRESS TO ADDRWD.
 0111    REF    1                  6157   7 7742 0           MASK    HIGH4                IF ADDRESS GREATER THAN 2K, ADD INTBIT15
 0112                              6160   0 0006 1           EXTEND
 0113    REF    1                  6161   1 6164 0           BZF     INDEX2
 0114    REF    7   LAST 1005      6162   3 0115 1           CA      INTBIT15
 0115    REF   10   LAST 1006      6163   26 116 0           ADS     ADDRWD

 0116    REF    3   LAST 1006      6164   50 130 0  INDEX2   INDEX   INDEXLOC
 0117    REF   28   LAST  961      6165   4 0046 1           CS      X1
 0118    REF   11   LAST 1006      6166   26 116 0           ADS     ADDRWD               DO AUGMENT, IGNORING AND CORRECTING OVF.

 0119    REF    8   LAST  961      6167   7 7744 0           MASK    HIGH9                SEE IF ADDRESS IS IN WORK AREA.
 0120                              6170   0 0006 1           EXTEND
 0121    REF    1                  6171   1 6204 0           BZF     INDWORK
 0122    REF    2   LAST 1006      6172   7 7742 0           MASK    HIGH4                SEE IF IN FIXED BANK.
 0123                              6173   0 0006 1           EXTEND
 0124    REF    1                  6174   1 6206 1           BZF     INDERASE

 0125    REF   12   LAST 1006      6175   3 0116 1           CA      ADDRWD               IN FIXED - SWITCH BANKS AND CREATE
 0126    REF   12   LAST 1005      6176   54 004 1           TS      FBANK                SUB-ADDRESS.
 0127    REF   16   LAST 1005      6177   7 5012 0           MASK    LOW10
 0128    REF    1                  6200   6 4741 1           AD      2K
 0129    REF   13   LAST 1006      6201   54 116 0           TS      ADDRWD
 0130    REF   19   LAST 1006      6202   50 020 0  ITR11    INDEX   CYR
 0131    REF    4   LAST 1005      6203   3 6273 1           3       INDJUMP -1

 0132    REF   40   LAST 1006      6204   3 0120 1  INDWORK  CA      FIXLOC               MAKE ADDRWD RELATIVE TO WORK AREA.
 0133    REF    1                  6205   1 6212 1           TCF     ITR13 -1

 0134    REF    4   LAST 1005      6206   3 5007 0  INDERASE CA      OCT1400
 0135    REF   14   LAST 1006      6207   56 115 1           XCH     ADDRWD
 0136    REF   58   LAST 1005      6210   54 003 0           TS      EBANK
 0137    REF   11   LAST 1005      6211   7 4357 0           MASK    LOW8
 0138    REF   15   LAST 1006      6212   26 116 0   -1      ADS     ADDRWD
 0139    REF  20  LAST 1006        6213  50 020 0  ITR13     INDEX  CYR
 0140    REF   5  LAST 1006        6214   3 6273 1           3      INDJUMP -1
```

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P0141           PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0143   LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0145   IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0147   BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0148           1.  VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0150   RESULT, VXSC WANTS A SCALAR.

R0151           2.  THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0153   INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0154           3.  SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0156   THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

 0157   REF   2  LAST  747        6215  3 4360 0  PUSHUP    CAF     OCT23              IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0158   REF  21  LAST 1007        6216  7 0020 1            MASK    CYR                20, THIS OP REQUIRES SPECIAL ATTENTION.
 0159   REF   1                   6217  6 6222 0            AD      -OCT10             (NO -0).
 0160   REF 316  LAST 1006        6220  10 000 0            CCS     A
 0161   REF   1                   6221  1 6233 1            TCF     REGUP              FOR ALL CODES GREATER THAN OCT 7.

 0162                             6222   77767 1  -OCT10    OCT     -10

 0163   REF   1                   6223  6 6112 0            AD      NEG4               WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
 0164   REF 317  LAST 1008        6224  10 000 0            CCS     A                  THE OP CODE (MOD4) IS THREE (REVERSE).
 0165   REF 318  LAST 1008        6225  50 000 1            INDEX   A                  NO - THE MODE IS DEFINITE. PICK UP THE
 0166   REF   1                   6226  4 6244 1            CS      NO.WDS
 0167   REF   2  LAST 1008        6227  1 6235 1            TCF     REGUP +2

 0168   REF  16  LAST 1003        6230  50 163 0            INDEX   MODE               FOR VXSC AND V/SC WE WANT THE REQUIRED
 0169   REF   4  LAST  961        6231  4 6242 1            CS      REVCNT             PUSHLOC DECREMENT WITHOUT CHANGING THE
 0170   REF   3  LAST 1008        6232  1 6235 1            TCF     REGUP +2           MODE AT THIS TIME.

 0171   REF  17  LAST 1008        6233  50 163 0  REGUP     INDEX   MODE               MOST ALL OP CODES PUSHUP HERE.
 0172   REF   2  LAST 1008        6234  4 6244 1            CS      NO.WDS
 0173   REF  11  LAST  886        6235  26 166 1   +2       ADS     PUSHLOC
 0174   REF  16  LAST 1006        6236  54 116 0            TS      ADDRWD
 0175   REF  22  LAST 1008        6237  50 020 0  ITR14     INDEX   CYR
 0176   REF   6  LAST 1007        6240  7 6273 0            7       INDJUMP -1         (THE INDEX MAKES THIS A TCF.)

 0177                             6241   00002 0            OCT     2                  REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0178                             6242   00006 1  REVCNT    OCT     6                  WORDS, SCALAR TAKES 6.
 0179                             6243   00006 1            OCT     6
 0180                             6244   00002 0  NO.WDS    OCT     2                  CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0181                             6245   00003 1  OCTAL3    OCT     3                  2 IN DP, AND 3 IN TP.
 0182                             6246   00006 1            OCT     6
```

```
P0183           TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0185   REF  23  LAST 1008        6247  10 020 1  OPJUMP2  CCS     CYR               TEST SECOND PREFIX BIT.
 0186   REF   1                   6250   1 6263 1          TCF     OPJUMP3           TEST THIRD BIT TO SEE IF UNARY OF SHIFT.

 0187                             6251    77722 0  -ENDVAC  DEC     -45

R0188           THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0190   IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0192   IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0193   REF  14  LAST 1006        6252  24 164 1  15BITADR INCR    LOC               (ENTRY HERE FROM STCALL).
 0194   REF  15  LAST 1009        6253  50 164 1           INDEX   LOC               PICK UP ADDRESS WORD.
 0195                             6254   3 0000 1          CA      0
 0196   REF   6  LAST   98        6255  54 117 1           TS      POLISH            WE MAY NEED A SUBADDRESS LATER.

 0197   REF   1                   6256   3 5013 0          CAF     LOW7+2K           THESE INSTRUCTIONS ARE IN BANK 1.
 0198   REF  13  LAST 1006        6257  54 004 1           TS      FBANK
 0199   REF  24  LAST 1009        6260   7 0020 1          MASK    CYR
 0200   REF 319  LAST 1008        6261  50 000 1  ITR7     INDEX   A
 0201   REF   1                   6262   1 6334 1          TCF     MISCJUMP
```

```
P0202           COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0203   REF  14  LAST 1009       6263  54 004 1  OPJUMP3  TS      FBANK             CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
R0204            'TRACE (6) REFERS TO "OPJUMP3".
 0205   REF  25  LAST 1009       6264  10 020 1           CCS     CYR               TEST THIRD PREFIX BIT.
 0206   REF 320  LAST 1009       6265  50 000 1           INDEX   A                 THE DECREMENTED UNARY CODE IS IN BITS
 0207   REF   1                  6266   1 2000 1          TCF     UNAJUMP           1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0208   REF  18  LAST 1008       6267  10 163 1           CCS     MODE              ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0209   REF   1                  6270   1 2017 1          TCF     SHORTT            SCALAR OR VECTOR.
 0210   REF   2  LAST 1010       6271   1 2017 1          TCF     SHORTT
 0211   REF   1                  6272   1 2121 0          TCF     SHORTV            CALLS THE APPROPRIATE ROUTINE.


 0212   REF   1                  4350             FBANKMSK EQUALS BANKMASK
 0213   REF  34  LAST  603       6273    00122 0  LVBUF    ADRES  VBUF
```

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P0214             THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

 0216   REF   1                   6274  1 6505 0  INDJUMP  TCF    VLOAD              00 - LOAD MPAC WITH A VECTOR.
 0217   REF   1                   6275  1 7071 1           TCF    TAD                01 - TRIPLE PRECISION ADD TO MPAC.
 0218   REF   1                   6276  1 7655 1           TCF    SIGN               02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
 0219   REF   1                   6277  1 7401 1           TCF    VXSC               03 - VECTOR TIMES SCALAR.
 0220   REF   1                   6300  1 6703 1           TCF    CGOTO              04 - COMPUTED GO TO.
 0221   REF   2  LAST   357       6301  1 6470 0           TCF    TLOAD              05 - LOAD MPAC WITH TRIPLE PRECISION.
 0222   REF   1                   6302  1 6052 1           TCF    DLOAD              06 - LOAD MPAC WITH A DP SCALAR.
 0223   REF   1                   6303  1 7624 1           TCF    V/SC               07 - VECTOR DIVIDED BY SCALAR.

 0224   REF   1                   6304  1 6501 1           TCF    SLOAD              10 - LOAD MPAC IN SINGLE PRECISION.
 0225   REF   1                   6305  1 6620 1           TCF    SSP                11 - SET SINGLE PRECISION INTO X.
 0226   REF   1                   6306  1 6523 1           TCF    PDDL               12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
 0227   REF   1                   6307  1 7334 0           TCF    MXV                13 - MATRIX POST-MULTIPLIED BY VECTOR.
 0228   REF   1                   6310  1 6557 1           TCF    PDVL               14 - PUSH DOWN AND VECTOR LOAD.
 0229   REF   1                   6311  1 6626 1           TCF    CCALL              15 - COMPUTED CALL.
 0230   REF   1                   6312  1 7337 0           TCF    VXM                16 - MATRIX PRE-MULTIPLIED BY VECTOR.
 0231   REF   1                   6313  1 7616 0           TCF    TSLC               17 - NORMALIZE MPAC (SCALAR ONLY).

 0232   REF   1                   6314  1 7574 1           TCF    DMPR               20 - DP MULTIPLY AND ROUND.
 0233   REF   1                   6315  1 7577 1           TCF    DDV                21 - DP DIVIDE BY.
 0234   REF   1                   6316  1 7603 1           TCF    BDDV               22 - DP DIVIDE INTO.
 0235   REF   1                   6317  1 7621 1           TCF    GSHIFT             23 - GENERAL SHIFT INSTRUCTION.
 0236   REF   1                   6320  1 6751 0           TCF    VAD                24 - VECTOR ADD.
 0237   REF   1                   6321  1 6747 1           TCF    VSU                25 - VECTOR SUBTRACT.
 0238   REF   1                   6322  1 7036 1           TCF    BVSU               26 - VECTOR SUBTRACT FROM.
 0239   REF   1                   6323  1 7331 0           TCF    DOT                27 - VECTOR DOT PRODUCT.

 0240   REF   1                   6324  1 7460 0           TCF    VXV                30 - VECTOR CROSS PRODUCT.
 0241   REF   1                   6325  1 7425 1           TCF    VPROJ              31 - VECTOR PROJECTION.
 0242   REF   1                   6326  1 7005 1           TCF    DSU                32 - DP SUBTRACT.
 0243   REF   1                   6327  1 7062 0           TCF    BDSU               33 - DP SUBTRACT FROM.
 0244   REF   1                   6330  1 6775 0           TCF    DAD                34 - DP ADD.
 0245                             6331  1 6331 1           TCF                       35 - AVAILABLE
 0246   REF   1                   6332  1 7572 1           TCF    DMP1               36 - DP MULTIPLY.
 0247   REF   1                   6333  1 7613 0           TCF    SETPD              37 - SET PUSH DOWN POINTER (DIRECT ONLY)

R0248   CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.
```

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P0250            THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

 0252  REF   1                   6334  1 2344 1  MISCJUMP TCF      AXT                 00 - ADDRESS TO INDEX TRUE.
 0253  REF   1                   6335  1 2351 0           TCF      AXC                 01 - ADDRESS TO INDEX COMPLEMENTED.
 0254  REF   1                   6336  1 2354 0           TCF      LXA                 02 - LOAD INDEX FROM ERASABLE.
 0255  REF   1                   6337  1 2360 1           TCF      LXC                 03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
 0256  REF   1                   6340  1 2364 0           TCF      SXA                 04 - STORE INDEX IN ERASABLE.
 0257  REF   1                   6341  1 2372 1           TCF      XCHX                05 - EXCHANGE INDEX WITH ERASABLE.
 0258  REF   1                   6342  1 2406 0           TCF      INCR                06 - INCREMENT INDEX REGISTER.
 0259  REF   1                   6343  1 2415 1           TCF      TIX                 07 - TRANSFER ON INDEX.

 0260  REF   1                   6344  1 2400 0           TCF      XAD                 10 - INDEX REGISTER ADD FROM ERASABLE.
 0261  REF   1                   6345  1 2411 0           TCF      XSU                 11 - INDEX SUBTRACT FROM ERASABLE.
 0262  REF   1                   6346  1 2467 1           TCF      BZE/GOTO            12 - BRANCH ZERO AND GOTO.
 0263  REF   1                   6347  1 2474 0           TCF      BPL/BMN             13 - BRANCH PLUS AND BRANCH MINUS.
 0264  REF   1                   6350  1 2447 0           TCF      RTB/BHIZ            14 - RETURN TO BASIC AND BRANCH HI ZERO.
 0265  REF   1                   6351  1 2507 0           TCF      CALL/ITA            15 - CALL AND STORE QPRET.
 0266  REF   1                   6352  1 2516 0           TCF      SW/                 16 - SWITCH INSTRUCTIONS AND AVAILABLE.
 0267  REF   1                   6353  1 2457 1           TCF      BOV(B)              17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

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P0268             THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

 0269   REF    2 LAST 1002 TO 1013:    205    205*            COUNT* $$/INTER
 0270                          00,2000                        BANK    0                  00 - EXIT - DETECTED EARLIER.
 0271   REF    1               00,2000  1 3207 0  UNAJUMP     TCF     SQRT               01 - SQUARE ROOT.
 0272   REF    1               00,2001  1 3530 0              TCF     SINE               02 - SIN.
 0273   REF    1               00,2002  1 3517 0              TCF     COSINE             03 - COS.
 0274   REF    1               00,2003  1 3610 1              TCF     ARCSIN             04 - ARC SIN.
 0275   REF    1               00,2004  1 3612 0              TCF     ARCCOS             05 - ARC COS.
 0276   REF    1               00,2005  1 3174 1              TCF     DSQ                06 - DP SQUARE.
 0277   REF    1               00,2006  1 2116 1              TCF     ROUND              07 - ROUND TO DP.

 0278   REF    1               00,2007  1 7670 0              TCF     COMP               10 - COMPLEMENT VECTOR OR SCALAR.
 0279   REF    1               00,2010  1 3232 0              TCF     VDEF               11 - VECTOR DEFINE.
 0280   REF    2  LAST  601    00,2011  1 3023 1              TCF     UNIT               12 - UNIT VECTOR.
 0281   REF    1               00,2012  1 3176 0              TCF     ABVALABS           13 - LENGTH OF VECTOR OR MAG OF SCALAR.
 0282   REF    1               00,2013  1 3245 0              TCF     VSQ                14 - SQUARE OF LENGTH OF VECTOR.
 0283   REF    1               00,2014  1 6354 1              TCF     STADR              15 - PUSH UP ON STORE CODE.
 0284   REF    1               00,2015  1 3274 1              TCF     RVQ                16 - RETURN VIA QPRET.
 0285   REF    1               00,2016  1 3247 1              TCF     PUSH               17 - PUSH MPAC DOWN.
```

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R0286   SECTION 2  LOAD AND STORE PACKAGE.

R0287             A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0289   ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0291   STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0293   FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0295             1. STORE                  STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0297             2. STODL                  STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).
R0299             3. STOVL                  STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0301             4. STCALL                 STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0303             STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.


 0305                           6354                         BLOCK   3

 0306   REF   3 LAST 1013 TO 1014:     15    220*            COUNT*  $$/INTER
 0307   REF   4  LAST 1003      6354  3 0165 0   STADR      CA      BANKSET          THE STADR CODE (PUSHUP UP ON STORE
 0308   REF  15  LAST 1010      6355  54 004 1              TS      FBANK            ADDRESS) ENTERS HERE.
 0309   REF  16  LAST 1009      6356  24 164 1              INCR    LOC
 0310   REF  17  LAST 1014      6357  50 164 1   ITR1       INDEX   LOC              THE STORECODE WAS STORED COMPLEMENTED TO
 0311                           6360  4 0000 0              CS      0                MAKE IT LOOK LIKE AN OPCODE PAIR.
 0312   REF   6  LAST [illegible]  6361  6 7747 1           AD      NEGONE           (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

 0313   REF  17  LAST 1008      6362  54 116 0   DOSTORE    TS      ADDRWD
 0314   REF   7  LAST  461      6363  7 4356 1              MASK    LOW11            ENTRY FROM DISPATCHER. SAVE THE ERASABLE
 0315   REF  19  LAST 1014      6364  56 116 1              XCH     ADDRWD           ADDRESS AND JUMP ON THE STORE CODE NO.
 0316   REF   1                 6365  7 7722 0              MASK    B12T14
 0317                           6366  0 0006 1              EXTEND
 0318   REF  36  LAST  821      6367  7 4747 0              MP      BIT5             EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
 0319   REF 321  LAST 1010      6370  50 000 1   ITR0       INDEX   A
 0320   REF   1                 6371  1 6372 0              TCF     STORJUMP
```

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P0321              STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0323    A SUPPLIED OPERATION CODE.

R03231             STORE STORE,1 AND STORE,2 RETURN TO DANZIG, THUS RESETTING THE EBANK TO ITS STATE AT INTPRET.

 0324   REF    1                6372  0 6422 0  STORJUMP TC       STORE            STORE.
 0325   REF    2  LAST  948     6373  1 6061 1           TCF      DANZIG           PICK UP NEW OP CODE(S).
 0326   REF    1                6374  0 6414 0           TC       STORE,1
 0327   REF    3  LAST 1015     6375  1 6061 1           TCF      DANZIG
 0328   REF    1                6376  0 6417 0           TC       STORE,2
 0329   REF    4  LAST 1015     6377  1 6061 1           TCF      DANZIG

 0330   REF    2  LAST 1015     6400  0 6422 0           TC       STORE            STODL.
 0331   REF    1                6401  1 6460 1           TCF      DDDLOAD

 0332   REF    3  LAST 1015     6402  0 6422 0           TC       STORE            STODL WITH INDEXED LOAD ADDRESS.
 0333   REF    1                6403  1 6144 1           TCF      DDDLOAD*

 0334   REF    4  LAST 1015     6404  0 6422 0           TC       STORE            STOVL.
 0335   REF    1                6405  1 6463 1           TCF      DOVLOAD

 0336   REF    5  LAST 1015     6406  0 6422 0           TC       STORE            STOVL WITH INDEXED LOAD ADDRESS.
 0337   REF    1                6407  1 6466 1           TCF      DOVLOAD*
 0338   REF    6  LAST 1015     6410  0 6422 0           TC       STORE            STOTC.
 0339   REF    2  LAST  279     6411  3 4766 1           CAF      CALLCODE
 0340   REF   26  LAST 1010     6412 54 020 1            TS       CYR
 0341   REF    1                6413  1 6252 0           TCF      15BITADR         GET A 15 BIT ADDRESS.
```

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P0342              STORE CODE ADDRESS PROCESSOR.

 0343    REF  41   LAST 1006        6414  50 120 1  STORE,1   INDEX   FIXLOC
 0344    REF  29   LAST 1006        6415   4 0046 1           CS      X1
 0345    REF   1                    6416   1 6421 1           TCF     PRESTORE

 0346    REF  42   LAST 1016        6417  50 120 1  STORE,2   INDEX   FIXLOC
 0347    REF  18   LAST  986        6420   4 0047 0           CS      X2
 0348    REF  19   LAST 1014        6421  26 116 0  PRESTORE  ADS     ADDRWD          RESULTANT ADDRESS IS IN ERASABLE.

 0349    REF  20   LAST 1016        6422   + 0116 0 STORE     CS      ADDRWD
 0350    REF   1                    6423   6 4772 1           AD      DEC45
 0351    REF 322   LAST 1014        6424  10 000 0            CCS     A               DOES THE ADDRESS POINT TO THE WORK AREA?
 0352    REF  43   LAST 1016        6425   3 0120 1           CA      FIXLOC          YES.
 0353    REF   1                    6426   1 6433 1           TCF     AHEAD5
 0354    REF   5   LAST 1006        6427   3 5007 0           CA      OCT1400         NO.  SET EBANK & MAKE UP SUBADDRESS.
 0355    REF  21   LAST 1016        6430  56 116 1            XCH     ADDRWD
 0356    REF  5[illegible]   LAST 1006        6431  54 003 0            TS      EBANK
 0357    REF  12   LAST 1006        6432   7 4357 0           MASK    LOW8
 0358    REF  22   LAST 1016        6433  26 116 0  AHEAD5    ADS     ADDRWD
```

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P0359             STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0360                                  6434   0 0006 1   STARTSTO EXTEND                      MPAC,+1 MUST BE STORED IN ANY EVENT.
R0361             ITRACE (9) REFERS TO "STARTSTO".
 0362    REF 369  LAST 1003            6435   3 0155 0            DCA      MPAC
 0363    REF  23  LAST 1016            6436   50 116 1            INDEX    ADDRWD
 0364                                  6437   52 001 1            DXCH     0

 0365    REF  19  LAST 1010            6440   10 163 1            CCS      MODE
 0366    REF   1                       6441   1 6454 0            TCF      TSTORE
 0367    REF 247  LAST 1001            6442   0 0002 0            TC       Q

 0368                                  6443   0 0006 1   VSTORE   EXTEND
 0369    REF 370  LAST 1017            6444   3 0160 0            DCA      MPAC +3
 0370    REF  24  LAST 1017            6445   50 116 1            INDEX    ADDRWD
 0371                                  6446   52 003 0            DXCH     2

 0372                                  6447   0 0006 1            EXTEND
 0373    REF 371  LAST 1017            6450   3 0162 1            DCA      MPAC +5
 0374    REF  25  LAST 1017            6451   50 116 1            INDEX    ADDRWD
 0375                                  6452   52 005 0            DXCH     4
 0376    REF 248  LAST 1017            6453   0 0002 0            TC       Q

 0377    REF 372  LAST 1017            6454   3 0156 0   TSTORE   CA       MPAC +2
 0378    REF  26  LAST 1017            6455   50 116 1            INDEX    ADDRWD
 0379                                  6456   54 002 1            TS       2
 0380    REF 249  LAST 1017            6457   0 0002 0            TC       Q
```

```
P0381            ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0383    ITSELF.

 0384    REF   1                6460  3 7732 0  DODLOAD  CAF     DLOADCOD
 0385    REF  27  LAST 1015     6461  54 020 1           TS      CYR
 0386    REF   1                6462  1 6106 1           TCF     DIRADRES         GO GET A DIRECT ADDRESS.

 0387    REF   1                6463  3 4735 1  DOVLOAD  CAF     VLOADCOD
 0388    REF  28  LAST 1018     6464  54 020 1           TS      CYR
 0389    REF   2  LAST 1018     6465  1 6106 1           TCF     DIRADRES

 0390    REF   1                6466  3 6107 1  DOVLOAD* CAF     VLOAD*
 0391    REF   2  LAST 1015     6467  1 6145 0           TCF     DODLOAD* +1      PROLOGUE TO INDEX ROUTINE.
```

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P0392           THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

 0394  REF  27  LAST 1017     6470  50 116 1  TLOAD     INDEX   ADDRWD
 0395                         6471   3 0002 0           CA      2                 LOAD A TRIPLE PRECISION ARGUMENT INTO
 0396  REF 373  LAST 1017     6472  54 156 1            TS      MPAC +2           THE FIRST THREE MPAC REGISTERS, WITH THE
 0397                         6473   0 0006 1           EXTEND                    CONTENTS OF THE OTHER FOUR IRRELEVANT.
 0398  REF  28  LAST 1019     6474   5 0116 1           INDEX   ADDRWD
 0399                         6475   3 0001 0           DCA     0
 0400  REF 374  LAST 1019     6476  52 155 1            DXCH    MPAC
 0401  REF 106  LAST  924     6477   3 4753 1  TMODE    CAF     ONE
 0402  REF   1                6500   1 6060 0           TCF     NEWMODE           DECLARE TRIPLE PRECISION MODE.

 0403                         6501  22 007 0  SLOAD     ZL                        LOAD A SINGLE PRECISION NUMBER INTO
 0404  REF  29  LAST 1019     6502  50 116 1            INDEX   ADDRWD            MPAC, SETTING MPAC+1,2 TO ZERO. THE
 0405                         6503   3 0000 1           CA      0                 CONTENTS OF THE REMAINING MPAC REGISTERS
 0406  REF   1                6504   1 6055 0           TCF     SLOAD2            ARE IRRELEVANT.

 0407                         6505   0 0006 1  VLOAD    EXTEND                    LOAD A DOUBLE PRECISION VECTOR INTO
 0408  REF  30  LAST 1019     6506   5 0116 1           INDEX   ADDRWD            MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
 0409                         6507   3 0001 0           DCA     0                 CONTENTS OF MPAC +2 ARE IRRELEVANT.
 0410  REF 375  LAST 1019     6510  52 155 1            DXCH    MPAC

 0411                         6511   0 0006 1  ENDVLOAD EXTEND                    PDVL COMES HERE TO FINISH UP FOR DP, TP.
 0412  REF  31  LAST 1019     6512   5 0116 1           INDEX   ADDRWD
 0413                         6513   3 0003 1           DCA     2
 0414  REF 376  LAST 1019     6514  52 160 1            DXCH    MPAC +3

 0415                         6515   0 0006 1   +4      EXTEND                    TPDVL FINISHES HERE.
 0416  REF  32  LAST 1019     6516   5 0116 1           INDEX   ADDRWD
 0417                         6517   3 0005 1           DCA     4
 0418  REF 377  LAST 1019     6520  52 162 0            DXCH    MPAC +5

 0419  REF 107  LAST 1019     6521   4 4753 0  VMODE    CS      ONE               DECLARE VECTOR MODE.
 0420  REF   2  LAST 1019     6522   1 6060 0           TCF     NEWMODE
```

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P0421             THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0423             1.  PUSH                PUSHDOWN AND NO LOAD.
R0424             2.  PDDL                PUSHDOWN AND DOUBLE PRECISION LOAD.
R0425             3.  PDVL                PUSHDOWN AND VECTOR LOAD.

 0426                              6523  0 0006 1  PDDL      EXTEND
 0427  REF  33  LAST 1019          6524  5 0116 1            INDEX   ADDRWD            LOAD MPAC,+1, PUSHING THE FORMER
 0428                              6525  3 0001 0            DCA     0                 CONTENTS DOWN.
 0429  REF 378  LAST 1019          6526  52 155 1            DXCH    MPAC
 0430  REF  12  LAST 1020          6527  50 166 0            INDEX   PUSHLOC
 0431                              6530  52 001 1            DXCH    0

 0432  REF  20  LAST 1017          6531  50 163 0            INDEX   MODE              ADVANCE THE PUSHDOWN POINTER APPRO-
 0433  REF   3  LAST 1008          6532  3 6244 0            CAF     NO.WDS            PRIATELY.
 0434  REF  13  LAST 1020          6533  26 166 1            ADS     PUSHLOC

 0435  REF  21  LAST 1020          6534  10 163 1            CCS     MODE
 0436  REF   1                     6535  1 6552 1            TCF     ENDTPUSH
 0437  REF   1                     6536  1 6550 0            TCF     ENDDPUSH

 0438  REF  22  LAST 1020          6537  54 163 1            TS      MODE              NOW DP.
 0439  REF 379  LAST 1020          6540  54 156 1  ENDVPUSH  TS      MPAC +2
 0440  REF 380  LAST 1020          6541  52 160 1            DXCH    MPAC +3           PUSH DOWN THE REST OF THE VECTOR HERE.
 0441  REF  14  LAST 1020          6542  50 166 0            INDEX   PUSHLOC
 0442                              6543  51'775 0            DXCH    0 -4

 0443  REF 381  LAST 1020          6544  52 162 0            DXCH    MPAC +5
 0444  REF  15  LAST 1020          6545  50 166 0            INDEX   PUSHLOC
 0445                              6546  51'777 1            DXCH    0 -2

 0446  REF   5  LAST 1015          6547  1 6061 1            TCF     DANZIG

 0447  REF 382  LAST 1020          6550  54 156 1  ENDDPUSH  TS      MPAC +2           SET MPAC +2 TO ZERO AND EXIT ON DP.
 0448  REF   6  LAST 1020          6551  1 6061 1            TCF     DANZIG

 0449  REF  23  LAST 1020          6552  54 163 1  ENDTPUSH  TS      MODE
 0450  REF 383  LAST 1020          6553  56 156 0            XCH     MPAC +2           ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
 0451  REF  16  LAST 1020          6554  50 166 0   +2       INDEX   PUSHLOC           DOWN THE OLD CONTENTS
 0452                              6555  53'777 0            TS      0 -1
 0453  REF   7  LAST 1020          6556  1 6061 1            TCF     DANZIG
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P0454              PDVL - PUSHDOWN AND VECTOR LOAD.

 0455                             6557   0 0006 1   PDVL      EXTEND             RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0456    REF  34   LAST 1020      6560   5 0116 1             INDEX   ADDRWD
 0457                             6561   3 0001 0             DCA     0
 0458    REF 384   LAST 1020      6562  52 155 1              DXCH    MPAC
 0459    REF  17   LAST 1020      6563  50 166 0              INDEX   PUSHLOC
 0460                             6564  52 001 1              DXCH    0

 0461    REF  24   LAST 1020      6565  50 163 0              INDEX   MODE       ADVANCE THE PUSHDOWN POINTER.
 0462    REF   4   LAST 1020      6566   3 6244 0             CAF     NO.WDS
 0463    REF  18   LAST 1021      6567  26 166 1              ADS     PUSHLOC

 0464    REF  25   LAST 1021      6570  10 163 1              CCS     MODE       TEST PAST MODE.
 0465    REF   1                  6571   1 6610 1             TCF     TPDVL
 0466    REF   1                  6572   1 6511 0             TCF     ENDVLOAD   JUST LOAD LAST FOUR REGISTERS ON DP.

 0467                             6573   0 0006 1   VPDVL     EXTEND             PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0468    REF  35   LAST 1021      6574   5 0116 1             INDEX   ADDRWD
 0469                             6575   3 0003 1             DCA     2
 0470    REF 385   LAST 1021      6576  52 160 1              DXCH    MPAC +3
 0471    REF  19   LAST 1021      6577  50 166 0              INDEX   PUSHLOC
 0472                             6600  51'775 0              DXCH    0 -4

 0473                             6601   0 0006 1             EXTEND
 0474    REF  36   LAST 1021      6602   5 0116 1             INDEX   ADDRWD
 0475                             6603   3 0005 1             DCA     4
 0476    REF 386   LAST 1021      6604  52 162 0              DXCH    MPAC +5
 0477    REF  20   LAST 1021      6605  50 166 0              INDEX   PUSHLOC
 0478                             6606  51'777 1              DXCH    0 -2

 0479    REF   8   LAST 1020      6607   1 6061 1             TCF     DANZIG

 0480                             6610   0 0006 1   TPDVL     EXTEND             ON TP, WE MUST LOAD THE Y COMPONENT
 0481    REF  37   LAST 1021      6611   5 0116 1             INDEX   ADDRWD     BEFORE STORING MPAC +2 INCASE THIS IS A
 0482                             6612   3 0003 1             DCA     2          PUSHUP.
 0483    REF 387   LAST 1021      6613  52 160 1              DXCH    MPAC +3

 0484    REF 388   LAST 1021      6614   3 0156 0             CA      MPAC +2
 0485    REF  21   LAST 1021      6615  50 166 0              INDEX   PUSHLOC    IN DP.
 0486                             6616  53'777 0              TS      0 -1
 0487    REF   2   LAST 1021      6617   1 6515 1             TCF     ENDVLOAD +4

R0488              SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0489    REF  18   LAST 1014      6620  24 164 1    SSP       INCR    LOC        PICK UP THE WORD FOLLOWING THE GIVEN
 0490    REF  19   LAST 1021      6621  50 164 1              INDEX   LOC        ADDRESS AND STORE IT AT X.
 0491                             6622   3 0000 1             CA      0
 0492    REF  38   LAST 1021      6623  50 116 1    STORE1    INDEX   ADDRWD     SOME INDEX AND MISCELLANEOUS OPS END
 0493                             6624  54 000 0              TS      0          HERE.
 0494   REF   9  LAST 1021       6625   1 6061 1            TCF      DANZIG
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R0495   SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0496             THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0498             1.  GOTO              GO TO.
R0499             2.  CALL              CALL SUBROUTINE SETTING QPRET.
R0500             3.  CGOTO             COMPUTED GO TO.
R0501             4.  CCALL             COMPUTED CALL.
R0502             7.  BPL               BRANCH IF MPAC POSITIVE OR ZERO.
R0503             8.  BZE               BRANCH IF MPAC ZERO.
R0504             9.  BMN               BRANCH IF MPAC NEGATIVE NON-ZERO.

 0505   REF  20  LAST 1021       6626  24 164 1  CCALL     INCR    LOC            MAINTAIN LOC FOR QPRET COMPUTATION.
 0506   REF  21  LAST 1023       6627  50 164 1            INDEX   LOC
 0507                            6630  3 0000 1            CAF     0              GET BASE ADDRESS OF CADR LIST.
 0508   REF  39  LAST 1021       6631  50 116 1            INDEX   ADDRWD
 0509                            6632  6 0000 1            AD      0              ADD INCREMENT.
 0510   REF  14  LAST 1014       6633  54 004 1            TS      FBANK          SELECT DESIRED CADR.
 0511   REF  17  LAST 1006       6634  7 5012 0            MASK    LOW10
 0512   REF 323  LAST 1016       6635  50 000 1            INDEX   A
 0513                            6636  3 2000 0            CAF     10000
 0514   REF   7  LAST 1009       6637  54 117 1            TS      POLISH

 0515   REF   5  LAST 1014       6640  3 0165 0  CALL      CA      BANKSET        FOR ANY OF THE CALL OPTIONS, MAKE UP THE
 0516   REF   2  LAST 1010       6641  7 4350 1            MASK    BANKMASK       ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0517   REF   3  LAST 1023       6642  6 4350 0            AD      BANKMASK       CODE AND LEAVE IT IN QPRET.  NOTE THAT
 0518   REF  22  LAST 1023       6643  6 0164 1            AD      LOC            BANKMASK = -(2000 - 1).
 0519   REF  44  LAST 1016       6644  50 120 1            INDEX   FIXLOC
 0520   REF  10  LAST  939       6645  54 052 1            TS      QPRET

 0521   REF   8  LAST 1023       6646  3 0117 0  GOTO      CA      POLISH         BASIC BRANCHING SEQUENCE.
 0522   REF   3  LAST 1006       6647  7 7742 0   +1       MASK    HIGH4
 0523                            6650  0 0006 1            EXTEND
 0524   REF   1                  6651  1 6662 1            BZF     GOTOERS        SEE IF ADDRESS POINTS TO FIXED OR ERAS.
 0525   REF   6  LAST 1023       6652  3 0165 0   +4       CA      BANKSET        SET EBANK PART OF BBANK. NEXT, SET UP
 0526   REF  27  LAST 1023       6653  54 006 0            TS      BBANK          FBANK. THE COMBINATION IS PICKED UP &
 0527   REF   9  LAST 1023       6654  3 0117 0            CA      POLISH         PUT INTO BANKSET AT INTPRET +2.
 0528   REF  17  LAST 1023       6655  54 004 1            TS      FBANK
 0529   REF  18  LAST 1023       6656  7 5012 0            MASK    LOW10
 0530   REF   2  LAST 1006       6657  6 4741 1            AD      2K
 0531   REF  23  LAST 1023       6660  54 164 0            TS      LOC
 0532   REF 223  LAST 1002       6661  1 6042 0            TCF     INTPRET +3

 0533                       E3,1400                        EBANK= 1400            SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

 0534   REF  10  LAST 1023       6662  3 0117 0  GOTOERS   CA      POLISH         THE GIVEN ADDRESS IS IN ERASABLE - SEE
 0535   REF   2  LAST 1005       6663  6 6251 1            AD      -ENDVAC        IF RELATIVE TO THE WORK AREA.
 0536   REF 324  LAST 1023       6664  10 000 0            CCS     A
 0537   REF  11  LAST 1023       6665  3 0117 0            CA      POLISH         GENERAL ERASABLE.
 0538   REF   1                  6666  1 6675 1            TCF     GOTOGE
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0539   REF  45  LAST 1023      6667  3 0120 1             CA      FIXLOC          WORK AREA.
0540   REF  12  LAST 1023      6670  6 0117 0             AD      POLISH
0541   REF 325  LAST 1023      6671  50 000 1             INDEX   A               USE THE GIVEN ADDRESS AS THE ADDRESS OF
0542                           6672  3 0000 1             CA      0               THE BRANCH ADDRESS.
0543   REF  13  LAST 1024      6673  54 117 1             TS      POLISH
0544   REF   1                 6674  1 6647 0             TCF     GOTO +1         ALLOWS ARBITRARY INDIRECTNESS LEVELS.

0545   REF  60  LAST 1016      6675  54 003 0  GOTOGE     TS      EBANK
0546   REF  13  LAST 1016      6676  7 4357 0             MASK    LOW8
0547   REF 326  LAST 1024      6677  50 000 1             INDEX   A               USE THE GIVEN ADDRESS AS THE ADDRESS OF
0548                           6700  3 1400 1             CA      1400            THE BRANCH ADDRESS.
0549   REF  14  LAST 1024      6701  54 117 1             TS      POLISH
0550   REF   2  LAST 1024      6702  1 6647 0             TCF     GOTO +1

0551   REF  24  LAST 1023      6703  50 164 1  CGOTO      INDEX   LOC             COMPUTED GO TO. PICK UP ADDRESS OF CADR
0552                           6704  3 0001 0             CA      1               LIST.
0553   REF  40  LAST 1023      6705  50 116 1             INDEX   ADDRWD          ADD MODIFIER.
0554                           6706  6 0000 1             AD      0
0555   REF  13  LAST 1023      6707  54 004 1             TS      FBANK           SELECT GOTO ADDRESS.
0556   REF  19  LAST 1023      6710  7 5012 0             MASK    LOW10
0557   REF 327  LAST 1024      6711  50 000 1             INDEX   A
0558                           6712  3 2000 0             CA      10000
0559   REF  15  LAST 1024      6713  54 117 1             TS      POLISH
0560   REF   3  LAST 1024      6714  1 6647 0             TCF     GOTO +1         WITH ADDRESS IN A.

0561   REF   7  LAST 1023      6715  3 0165 0  SWBRANCH   CA      BANKSET         SWITCH INSTRUCTIONS WHICH ELECT TO
0562   REF  13  LAST 1024      6716  54 004 1             TS      FBANK           BRANCH COME HERE TO DO SO.
0563   REF  25  LAST 1024      6717  50 164 1             INDEX   LOC
0564                           6720  3 0001 0             CA      1
0565   REF  16  LAST 1024      6721  54 117 1             TS      POLISH
0566   REF   4  LAST 1024      6722  1 6647 0             TCF     GOTO +1
```

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P0567           TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0569           L+1  IF MPAC IS GREATER THAN ZERO.
R0570           L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0571           L+3  IF MPAC IS LESS THAN ZERO.


 0572   REF 389  LAST 1021      6723  10 154 0  BRANCH    CCS     MPAC
 0573   REF 250  LAST 1017      6724   0 0002 0           TC      Q
 0574                           6725   1 6727 1           TCF     +2                  ON ZERO.
 0575   REF   1                 6726   1 6741 1           TCF     NEG

 0576   REF 390  LAST 1025      6727  10 155 1            CCS     MPAC +1
 0577   REF 251  LAST 1025      6730   0 0002 0           TC      Q
 0578                           6731   1 6733 1           TCF     +2
 0579   REF   2  LAST 1025      6732   1 6741 1           TCF     NEG

 0580   REF 391  LAST 1025      6733  10 156 1            CCS     MPAC +2
 0581   REF 252  LAST 1025      6734   0 0002 0           TC      Q
 0582                           6735   1 6737 0           TCF     +2
 0583   REF   3  LAST 1025      6736   1 6741 1           TCF     NEG

 0584   REF 253  LAST 1025      6737  50 002 0  Q+1       INDEX   Q
 0585                           6740   0 0001 0           TC      1

 0586   REF 254  LAST 1025      6741  50 002 0  NEG       INDEX   Q                   IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
 0587                           6742   0 0002 0           TC      2


 0588   REF   4  LAST 1025      6741            Q+2       =       NEG

R0589           ITRACE (3) REFERS TO "EXIT".
 0590   REF   8  LAST 1024      6743   3 0165 0  EXIT      CA      BANKSET             RESTORE USER'S BANK SETTING, AND LEAVE
 0591   REF  28  LAST 1023      6744  54 006 0            TS      BBANK               INTERPRETIVE MODE.
 0592   REF  26  LAST 1024      6745  50 164 1            INDEX   LOC
 0593                           6746   0 0001 0           TC      1
```

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L        INTERPRETER                                                                              USER'S PAGE NO.  25      E3 S3

P0594    SECTION 3 - ADD/SUBTRACT PACKAGE.

R0595              THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0597    MPAC:

R0598              1.  DAD                    DOUBLE PRECISION ADD.
R0599              2.  DSU                    DOUBLE PRECISION SUBTRACT.
R0600              3.  BDSU                   DOUBLE PRECISION SUBTRACT FROM.

R0601              4.  TAD                    TRIPLE PRECISION ADD.

R0602              5.  VAD                    VECTOR ADD.
R0603              6.  VSU                    VECTOR SUBTRACT.
R0604              7.  BVSU                   VECTOR SUBTRACT FROM.

R0605    THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.

 0607    REF  35  LAST 1002       6747  3 4735 1  VSU      CAF     BIT15          CHANGES 0 TO DCS.
 0608                             6750  1 6752 0           TCF     +2

 0609    REF   9  LAST  831       6751  3 4355 0  VAD      CAF     PRIO30         CHANGES 0 TO DCA.
 0610    REF  41  LAST 1024       6752 26 116  0           ADS     ADDRWD
 0611                             6753  0 0006 1           EXTEND
 0612    REF  42  LAST 1026       6754  5 0116 1           INDEX   ADDRWD
 0613    REF   2  LAST  381       6755 00 003  1           READ    HISCALAR       DCA  2   OR   DCS  2
 0614    REF 392  LAST 1025       6756 20 160  1           DAS     MPAC +3
 0615                             6757  0 0006 1           EXTEND                 CHECK OVERFLOW.
 0616                             6760  1 6762 0           BZF     +2
 0617    REF   1                  6761  0 7014 0           TC      OVERFLWY

 0618                             6762  0 0006 1           EXTEND
 0619    REF  43  LAST 1026       6763  5 0116 1           INDEX   ADDRWD
 0620    REF   2  LAST  212       6764 00 005  1           READ    CHAN5          DCA  4   OR   DCS  4
 0621    REF 393  LAST 1026       6765 20 162  0           DAS     MPAC +5
 0622                             6766  0 0006 1           EXTEND
 0623                             6767  1 6771 1           BZF     +2
 0624    REF   1                  6770  0 7011 0           TC      OVERFLWZ

 0625                             6771  0 0006 1           EXTEND
 0626    REF  44  LAST 1026       6772  5 0116 1           INDEX   ADDRWD
 0627    REF  15  LAST  743       6773 00 001  0           READ    LCHAN          DCA  0   OR   DCS  0
 0628    REF   1                  6774  1 7000 1           TCF     ENDVXV

 0629                             6775  0 0006 1  DAD      EXTEND
 0630    REF  45  LAST 1026       6776  5 0116 1           INDEX   ADDRWD
 0631                             6777  3 0001 0           DCA     0
 0632    REF 394  LAST 1026       7000 20 155  1  ENDVXV   DAS     MPAC           VXV FINISHES HERE.
 0633                             7001  0 0006 1           EXTEND
 0634    REF  10  LAST 1022       7002  1 6061 1           BZF     DANZIG
 0635    REF    1                 7003  0 7017 0  SETOVF     TC      OVERFLOW
 0636    REF   11  LAST 1026      7004  1 6061 1             TCF     DANZIG
 0637                              7005   0 0006 1  DSU       EXTEND
 0638   REF  46  LAST 1026         7006   5 0116 1            INDEX   ADDRWD
 0639                              7007   4 0001 1            DCS     0
 0640   REF   2  LAST 1026         7010   1 7000 1            TCF     ENDVXV

 0641   REF 179  LAST 1000         7011  54 001  1  OVERFLWZ  TS      L               ENTRY FOR THIRD COMPONENT.
 0642   REF  19  LAST  858         7012   3 4756 1            CAF     FIVE
 0643                              7013   1 7016 0            TCF     +3

 0644   REF 180  LAST 1028         7014  54 001  1  OVERFLWY  TS      L               ENTRY FOR SECOND COMPONENT.
 0645   REF  30  LAST  980         7015   3 6245 1            CAF     THREE
 0646   REF 181  LAST 1028         7016  56 001  0            XCH     L

 0647   REF 328  LAST 1024         7017  50 000  1  OVERFLOW  INDEX   A               ENTRY FOR 1ST COMP OR DP (L=0).
 0648   REF   2  LAST  923         7020   4 4734 1            CS      LIMITS          PICK UP POSMAX OR NEGMAX.
 0649   REF  82  LAST  890         7021  54 130  1            TS      BUF
 0650                              7022   0 0006 1            EXTEND
 0651   REF 329  LAST 1028         7023  24 000  1            AUG     A               FORCE OVERFLOW.
 0652   REF 182  LAST 1028         7024  50 001  0            INDEX   L
 0653   REF 395  LAST 1026         7025  26 155  1            ADS     MPAC +1
 0654                              7026  54 007  1            TS      7
 0655   REF 188  LAST 1002         7027   3 4755 1            CAF     ZERO
 0656   REF  83  LAST 1028         7030   6 0130 0            AD      BUF
 0657   REF 183  LAST 1028         7031  50 001  0            INDEX   L
 0658   REF 396  LAST 1028         7032  26 154  0            ADS     MPAC
 0659                              7033  54 007  1            TS      7
 0660   REF 255  LAST 1025         7034   0 0002 0            TC      Q               NO OVERFLOW EXIT.
 0661   REF   1                    7035   1 7152 1            TCF     SETOVF2         SET OVFIND AND EXIT.

 0662                              7036   0 0006 1  BVSU      EXTEND
 0663   REF  47  LAST 1028         7037   5 0116 1            INDEX   ADDRWD
 0664                              7040   3 0003 1            DCA     2
 0665   REF 397  LAST 1028         7041  52 160  1            DXCH    MPAC +3
 0666                              7042   0 0006 1            EXTEND
 0667                              7043   4 0001 1            DCOM
 0668   REF 398  LAST 1028         7044  20 160  1            DAS     MPAC +3
 0669                              7045   0 0006 1            EXTEND
 0670                              7046   1 7050 1            BZF     +2
 0671   REF   2  LAST 1028         7047   0 7014 0            TC      OVERFLWY

 0672                              7050   0 0006 1            EXTEND
 0673   REF  48  LAST 1028         7051   5 0116 1            INDEX   ADDRWD
 0674                              7052   3 0005 1            DCA     4
 0675   REF 399  LAST 1028         7053  52 162  0            DXCH    MPAC +5
 0676                              7054   0 0006 1            EXTEND
 0677                              7055   4 0001 1            DCOM
 0678   REF 400  LAST 1028         7056  20 162  0            DAS     MPAC +5
 0679                              7057   0 0006 1            EXTEND
 0680                              7060   1 7062 0            BZF     +2
 0681   REF   2  LAST 1026         7061   0 7011 0            TC      OVERFLWZ
 0682                             7062  0 0006 1  BDSU     EXTEND
 0683   REF  49  LAST 1028        7063  5 0116 1           INDEX   ADDRWD
 0684                             7064  3 0001 0           DCA     0
 0685   REF 401  LAST 1028        7065  52 155 1           DXCH    MPAC
 0686                             7066  0 0006 1           EXTEND
 0687                             7067  4 0001 1           DCC
 0688   REF   3  LAST 1028        7070  1 7000 1           TCF     ENDVXV
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P0689             TRIPLE PRECISION ADD ROUTINE.

 0690                                    7071  0 0006 1   TAD        EXTEND
 0691    REF  50   LAST 1029             7072  5 0116 1              INDEX   ADDRWD
 0692                                    7073  3 0002 0              DCA     1                 ADD MINOR PARTS FIRST.
 0693    REF 402   LAST 1029             7074  20 156 1              DAS     MPAC +1
 0694    REF  51   LAST 1030             7075  50 116 1              INDEX   ADDRWD
 0695                                    7076  6 0000 1              AD      0
 0696    REF 403   LAST 1030             7077  6 0154 1              AD      MPAC
 0697    REF 404   LAST 1030             7100  54 154 0              TS      MPAC
 0698    REF  12   LAST 1027             7101  1 6061 1              TCF     DANZIG

 0699    REF   1                         7102  1 7003 1              TCF     SETOVF            SET OVFIND IF SUCH OCCURS.
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P0700   ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0701              1.  DMPSUB      DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
R0703                              IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0705              2.  ROUNDSUB    ROUND THE TRIPLE PRECISION CONTENTS OF MPAC TO DOUBLE PRECISION.
R0707              3.  DOTSUB      TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0709                              AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0710              4.  POLY        USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0712                              COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)


 0714   REF 256  LAST 1028        7103  50 002 0  DMP       INDEX   0                BASIC SUBROUTINE FOR USE BY PINBALL, ETC
 0715                             7104  3 0000 1            CAF     0                ADDRES OF ARGUMENT FOLLOWS  TC DMP   .
 0716   REF 257  LAST 1031        7105  24 002 0            INCR    Q
 0717   REF  52  LAST 1030        7106  54 116 0   -1       TS      ADDRWD           (PROLOGUE FOR SETTING ADDRWD.)

 0718   REF  53  LAST 1031        7107  50 116 1  DMPSUB    INDEX   ADDRWD           GET MINOR PART OF OPERAND AT C(ADDRWD).
 0719                             7110  3 0001 0            CA      1
 0720   REF 405  LAST 1030        7111  54 156 1            TS      MPAC +2          THIS WORKS FOR SQUARING MPAC AS WELL.
 0721   REF 189  LAST 1028        7112  3 4755 1            CAF     ZERO             SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
 0722   REF 406  LAST 1031        7113  56 155 0            XCH     MPAC +1          THE PARTIAL PRODUCTS WITH DAS
 0723   REF   9  LAST  999        7114  54 135 1            TS      MPTEMP           INSTRUCTIONS.
 0724                             7115  0 0006 1            EXTEND
 0725   REF 407  LAST 1031        7116  7 0156 1            MP      MPAC +2          MINOR OF MPAC X MINOR OF C(ADDRWD).

 0726   REF 408  LAST 1031        7117  56 156 0            XCH     MPAC +2          DISCARD MINOR PART OF ABOVE RESULT AND
 0727                             7120  0 0006 1            EXTEND                   FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
 0728   REF 409  LAST 1031        7121  7 0154 0            MP      MPAC
 0729   REF 410  LAST 1031        7122  20 155 1            DAS     MPAC +1          GUARANTEED NO OVERFLOW.

 0730   REF  54  LAST 1031        7123  50 116 1            INDEX   ADDRWD           GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
 0731                             7124  3 0000 1            CA      0
 0732   REF  10  LAST 1031        7125  56 135 0            XCH     MPTEMP           SAVE AND BRING OUT MINOR OF MPAC.
 0733                             7126  0 0006 1  DMPSUB2   EXTEND
 0734   REF  11  LAST 1031        7127  7 0135 1            MP      MPTEMP           MAJOR OF C(ADDRWD) X MINOR OF MPAC.
 0735   REF 411  LAST 1031        7130  20 156 1            DAS     MPAC +1          ACCUMULATE, SETTING A TO NET OVERFLOW.

 0736   REF 412  LAST 1031        7131  56 154 1            XCH     MPAC             SETTING MPAC TO 0 OR +-1.
 0737                             7132  0 0006 1            EXTEND
 0738   REF  12  LAST 1031        7133  7 0135 1            MP      MPTEMP           MAJOR OF MPAC X MAJOR OF C(ADDRWD).
 0739   REF 413  LAST 1031        7134  20 155 1            DAS     MPAC             GUARANTEED NO OVERFLOW.
 0740   REF 258  LAST 1031        7135  0 0002 0            TC      Q                49 MCT = .573 MS. INCLUDING RETURN.
```

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P0741                ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

 0743    REF 190  LAST 1031       7136  3 4755 1  ROUNDSUB CAF      ZERO                SET MPAC +2 = 0 FOR SCALARS AND CHANGE
 0744    REF  26  LAST 1021       7137  54 163 1   +1      TS       MODE                MODE TO DP.

 0745    REF 414  LAST 1031       7140  56 156 0  VROUND   XCH      MPAC +2             BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
 0746                             7141  6 0000 1           DOUBLE
 0747    REF 184  LAST 1028       7142  54 001 1           TS       L
 0748    REF 259  LAST 1031       7143  0 0002 0           TC       Q

 0749    REF 415  LAST 1032       7144  6 0155 0           AD       MPAC +1             ADD ROUNDING BIT IF MPAC +2 WAS GREATER
 0750    REF 416  LAST 1032       7145  54 155 1           TS       MPAC +1             THAN .5 IN MAGNITUDE.
 0751    REF 260  LAST 1032       7146  0 0002 0           TC       Q

 0752    REF 417  LAST 1032       7147  6 0154 1           AD       MPAC                PROPAGATE INTERFLOW.
 0753    REF 418  LAST 1032       7150  54 154 0           TS       MPAC
 0754    REF 261  LAST 1032       7151  0 0002 0           TC       Q

 0755    REF   2  LAST  813       7152  54 121 1  SETOVF2  TS       OVFIND              (RARE).
 0756    REF 262  LAST 1032       7153  0 0002 0           TC       Q
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P0757            THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0759      REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0761      6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.


 0763    REF  64  LAST  996         7154  3 4752 0  PREDOT    CAF     TWO                PROLOGUE TO SET DOTINC TO 2.
 0764    REF   4  LAST   97         7155 54 136 1             TS      DOTINC

 0765                               7156  0 0006 1  DOTSUB    EXTEND
 0766    REF   5  LAST   97         7157 22 137 1             QXCH    DOTRET             SAVE RETURN.
 0767    REF   1                    7160  0 7107 0            TC      DMPSUB             DOT X COMPONENTS.
 0768    REF 419  LAST 1032         7161 52 160 1             DXCH    MPAC +3            POSITION Y COMPONENT OF MPAC FOR
 0769    REF 420  LAST 1033         7162 52 155 1             DXCH    MPAC               MULTIPLICATION WHILE SAVING RESULT IN
 0770    REF  84  LAST 1028         7163 52 131 0             DXCH    BUF                THREE WORD BUFFER, BUF.
 0771    REF 421  LAST 1033         7164  3 0156 0            CA      MPAC +2
 0772    REF  85  LAST 1033         7165 54 132 0             TS      BUF +2

 0773    REF   5  LAST 1033         7166  3 0136 0            CA      DOTINC             ADVANCE ADDRWD TO Y COMPONENT OF
 0774    REF  55  LAST 1031         7167 26 116 0             ADS     ADDRWD             OTHER ARGUMENT.
 0775    REF   2  LAST 1033         7170  0 7107 0            TC      DMPSUB
 0776    REF 422  LAST 1033         7171 52 156 1             DXCH    MPAC +1            ACCUMULATE PARTIAL PRODUCTS.
 0777    REF  86  LAST 1033         7172 20 132 0             DAS     BUF +1
 0778    REF 423  LAST 1033         7173  6 0154 1            AD      MPAC
 0779    REF  87  LAST 1033         7174  6 0130 0            AD      BUF
 0780    REF  88  LAST 1033         7175 54 130 1             TS      BUF
 0781                               7176  1 7200 0            TCF     +2
 0782    REF   3  LAST 1032         7177 54 121 1             TS      OVFIND             IF OVERFLOW OCCURS.

 0783    REF 424  LAST 1033         7200 52 162 0             DXCH    MPAC +5            MULTIPLY Z COMPONENTS.
 0784    REF 425  LAST 1033         7201 52 155 1             DXCH    MPAC
 0785    REF   6  LAST 1033         7202  3 0136 0            CA      DOTINC
 0786    REF  56  LAST 1033         7203 26 116 0             ADS     ADDRWD
 0787    REF   3  LAST 1033         7204  0 7107 0            TC      DMPSUB
 0788    REF  89  LAST 1033         7205 52 132 0  ENDDOT     DXCH    BUF +1             LEAVE FINAL ACCUMULATION IN MPAC.
 0789    REF 426  LAST 1033         7206 20 156 1             DAS     MPAC +1
 0790    REF 427  LAST 1033         7207  6 0154 1            AD      MPAC
 0791    REF  90  LAST 1033         7210  6 0130 0            AD      BUF
 0792    REF 428  LAST 1033         7211 54 154 0             TS      MPAC
 0793    REF   6  LAST 1033         7212  0 0137 1            TC      DOTRET

 0794    REF   2  LAST 1027         7213  0 7017 0            TC      OVERFLOW           ON OVERFLOW HERE.
 0795    REF   7  LAST 1033         7214  0 0137 1            TC      DOTRET
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P0796   DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0797                                      N        N-1
R0798            THIS ROUTINE EVALUATES A X  + A    X    + ... + A X + A  LEAVING THE DP RESULT IN MPAC ON EXIT.
R0800                                    N      N-1               1     0

R0801   THE ROUTINE HAS TWO ENTRIES

R0802            1. ENTRY THRU POWRSERS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE, THE CALL IS BY
R0804               TC POWRSERS, AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

A0806                                           A        SP     LOC-3            ADDRESS FOR REFERENCING COEF TABLE
A0807                                           L        SP     N-1              N IS THE DEGREE OF THE POWER SERIES
A0808                                           MPAC     DP     X                ARGUMENT

A0809                                           LOC-2N   DP     A(0)
A0810                                                    ...
A0811                                           LOC      DP     A(N)

R0812            2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

A0814                                           MPAC     DP     X                ARGUMENT

A0815                                           LOC      TC     POLY
A0816                                           LOC+1    SP     N-1
A0817                                           LOC+2    DP     A(0)
A0818                                                    ...
A0819                                           LOC+2N+2 DP     A(N)             RETURN IS TO LOC+2N+4

 0820                           7215  0 0006 1  POWRSERS EXTEND
 0821   REF   1                 7216  22 141 0           QXCH   POLYRET          RETURN ADDRESS
 0822   REF  17  LAST 1024      7217  54 117 1           TS     POLISH           POWER SERIES ADDRESS
 0823   REF   1                 7220  22 140 1           LXCH   POLYCNT          N-1 TO COUNTER
 0824   REF   1                 7221  1 7232 1           TCF    POLYCOM          SKIP SET UP BY POLY

 0825   REF 263  LAST 1032      7222  50 002 0  POLY     INDEX  Q
 0826                           7223  3 0000 1           CAF    0
 0827   REF   2  LAST 1034      7224  54 140 0           TS     POLYCNT          N-1 TO COUNTER
 0828                           7225  6 0000 1           DOUBLE
 0829   REF 264  LAST 1034      7226  6 0002 0           AD     Q
 0830   REF  18  LAST 1034      7227  54 117 1           TS     POLISH           L(A(N))-3 TO POLISH
 0831   REF  20  LAST 1028      7230  6 4756 1           AD     FIVE
 0832   REF   2  LAST 1034      7231  54 141 1           TS     POLYRET          STORE RETURN ADDRESS

 0833   REF   1                 7232  3 6273 1  POLYCOM  CAF    LVBUF            INCOMING X WILL BE MOVED TO VBUF, SO
 0834   REF  57  LAST 1033      7233  54 116 0           TS     ADDRWD           SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0835                           7234  0 0006 1           EXTEND
 0836   REF  19  LAST 1034      7235  5 0117 0           INDEX  POLISH
 0837                           7236  3 0004 0           DCA    3
 0838   REF 429  LAST 1033      7237  52 155 1            DXCH    MPAC              LOAD A(N) INTO MPAC,
 0839   REF  35  LAST 1010      7240  52 123 0            DXCH    VBUF              SAVING X IN VBUF
 0840   REF   1                 7241   1 7245 1           TCF     POLY2

 0841   REF   3  LAST 1034      7242  54 140 0  POLYLOOP  TS      POLYCNT           SAVE DECREMENTED LOOP COUNTER
 0842   REF  65  LAST 1033      7243   4 4752 1           CS      TWO
 0843   REF  20  LAST 1034      7244  26 117 1            ADS     POLISH            REGRESS COEFFICIENT POINTER

 0844   REF   4  LAST 1033      7245   0 7107 0  POLY2    TC      DMPSUB            MULTIPLY BY X
 0845                           7246   0 0006 1           EXTEND
 0846   REF  21  LAST 1035      7247   5 0117 0           INDEX   POLISH
 0847                           7250   3 0002 0           DCA     1                 ADD IN NEXT COEFFICIENT
 0848   REF 430  LAST 1035      7251  20 155 1            DAS     MPAC              USERS RESPONSIBILITY TO ASSURE NO OVFLOW

 0849   REF   4  LAST 1035      7252  10 140 0            CCS     POLYCNT
 0850   REF   1                 7253   1 7242 0           TCF     POLYLOOP
 0851   REF   3  LAST 1034      7254   0 0141 0           TC      POLYRET           RETURN CALLER
```

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P0852            MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

 085398 REF 191  LAST 1032       7255  3 4755 1  DPAGREE   CAF     ZERO              DOUBLE PRECISION ENTRY -
 085399 REF 431  LAST 1035       7256  54 156 1            TS      MPAC +2           ZERO LOW-ORDER WORD

 0854   REF 265  LAST 1034       7257  22 002 0  TPAGREE   LXCH    Q                 FORCE SIGN AGREEMENT AMONG THE TRIPLE
 0855   REF   4  LAST  887       7260  0 6723 1            TC      BRANCH            PRECISION CONTENTS OF MPAC. RETURNING
 0856   REF   1                  7261  1 7265 0            TCF     ARG+              WITH SIGNUM OF THE INPUT IN A.
 0857   REF   1                  7262  1 7305 1            TCF     ARGZERO

 0858   REF  23  LAST  920       7263  4 4733 0            CS      POSMAX            IF NEGATIVE.
 0859                            7264  1 7266 0            TCF     +2

 0860   REF  24  LAST 1036       7265  3 4733 1  ARG+      CAF     POSMAX
 0861   REF 266  LAST 1036       7266  54 002 1            TS      Q
 0862                            7267  0 0006 1            EXTEND
 0863   REF 330  LAST 1028       7270  24 000 1            AUG     A                 FORMS +-1.0.
 0864   REF 432  LAST 1036       7271  6 0156 0            AD      MPAC +2
 0865   REF 433  LAST 1036       7272  54 156 1            TS      MPAC +2
 0866   REF 192  LAST 1036       7273  3 4755 1            CAF     ZERO
 0867   REF 267  LAST 1036       7274  6 0002 0            AD      Q
 0868   REF 434  LAST 1036       7275  6 0155 0            AD      MPAC +1
 0869   REF 435  LAST 1036       7276  54 155 1            TS      MPAC +1
 0870   REF 193  LAST 1036       7277  3 4755 1            CAF     ZERO
 0871   REF 268  LAST 1036       7300  6 0002 0            AD      Q                 Q STILL HAS POSMAX OR NEGMAX IN IT.
 0872   REF 436  LAST 1036       7301  6 0154 1            AD      MPAC
 0873   REF 437  LAST 1036       7302  54 154 0  ARGZERO2  TS      MPAC              ALWAYS SKIPPING UNLESS ARGZERO.
 0874   REF 438  LAST 1036       7303  54 155 1            TS      MPAC +1
 0875   REF 185  LAST 1032       7304  0 0001 0            TC      L                 RETURN VIA L.

 0876   REF 439  LAST 1036       7305  54 156 1  ARGZERO   TS      MPAC +2           SET ALL THREE MPAC REGISTERS TO ZERO.
 0877   REF   1                  7306  1 7302 0            TCF     ARGZERO2

R0878            SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

 0880   REF  13  LAST 1031       7307  54 135 1  SHORTMP   TS      MPTEMP
 0881                            7310  0 0006 1            EXTEND
 0882   REF 440  LAST 1036       7311  7 0156 1            MP      MPAC +2
 0883   REF 441  LAST 1036       7312  54 156 1            TS      MPAC +2
 0884   REF 194  LAST 1036       7313  3 4755 1  SHORTMP2  CAF     ZERO              SO SUBSEQUENT DAS WILL WORK.
 0885   REF 442  LAST 1036       7314  56 155 0            XCH     MPAC +1
 0886   REF   1                  7315  1 7126 1            TCF     DMPSUB2
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R0887          DMPNSUB MULTIPLIES THE DP FRACTION ARRIVING IN MPAC BY THE SP
R0888     INTEGER ARRIVING IN A.  THE DP PRODUCT DEPARTS BOTH IN MPAC AND IN
R0889     A AND L.  NOTE THAT DMPNSUB NORMALLY INCREASES THE MAGNITUDE OF THE
R0890     CONTENTS OF MPAC.  THE CUSTOMER MUST INSURE THAT B(A) X B(MPAC,MPAC+1)
R0891     AND B(A) X B(MPAC) ARE LESS THAN 1 IN MAGNITUDE, WHERE B, AS IS OBVIOUS,
R0892     INDICATES THE ARRIVING CONTENTS.

 0893     REF   1                  7316  54 135 1  DMPNSUB   TS      DMPNTEMP
 0894                              7317   0 0006 1            EXTEND
 0895     REF 443  LAST 1036       7320   7 0155 1            MP      MPAC +1
 0896     REF 444  LAST 1037       7321  52 155 1             DXCH    MPAC              LOW PRODUCT TO MPAC, HIGH FACTOR TO A
 0897                              7322   0 0006 1            EXTEND
 0898     REF   2  LAST 1037       7323   7 0135 1            MP      DMPNTEMP
 0899     REF 186  LAST 1036       7324   3 0001 0            CA      L
 0900     REF 445  LAST 1037       7325  26 154 0             ADS     MPAC              COMPLETING THE PRODUCT IN MPAC
 0901                              7326   0 0006 1            EXTEND
 0902     REF 446  LAST 1037       7327   3 0155 0            DCA     MPAC              BRINGING THE PRODUCT INTO A AND L
 0903     REF 269  LAST 1036       7330   0 0002 0            TC      Q
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P0904   MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0905           1.  DOT                 DP VECTOR DOT PRODUCT.
R0906           2.  VXV                 DP VECTOR CROSS PRODUCT.
R0907           3.  VXSC                DP VECTOR TIMES SCALAR.
R0908           4.  V/SC                DP VECTOR DIVIDED BY SCALAR.
R0909           5.  VPROJ               DP VECTOR PROJECTION. ( (MPAC.X)MPAC ).
R0910           6.  VXM                 DP VECTOR POST-MULTIPLIED BY MATRIX.
R0911           7.  MXV                 DP VECTOR PRE-MULTIPLIED BY MATRIX.


 0912   REF   1                 7331  0 7154 0  DOT      TC      PREDOT          DO THE DOT PRODUCT AND EXIT, CHANGING
 0913   REF 195  LAST 1036      7332  3 4755 1  DMODE    CAF     ZERO            THE MODE TO DP SCALAR.
 0914   REF   3  LAST 1019      7333  1 6060 0           TCF     NEWMODE


 0915   REF  66  LAST 1035      7334  3 4752 0  MXV      CAF     TWO             SET UP MATINC AND DOTINC FOR ROW
 0916   REF   6  LAST   98      7335  54 140 0           TS      MATINC          VECTORS.
 0917   REF   1                 7336  1 7342 1           TCF     VXM/MXV         GO TO COMMON PORTION.

 0918   REF   7  LAST  801      7337  4 4363 1  VXM      CS      TEN             SET MATINC AND DOTINC TO REFER TO MATRIX
 0919   REF   7  LAST 1038      7340  54 140 0           TS      MATINC          AS THREE COLUMN VECTORS.
 0920   REF  19  LAST  889      7341  3 6242 0           CAF     SIX
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P0921              COMMON PORTION OF MXV AND VXM.

 0922  REF    7  LAST 1033      7342  54 136 1  VXM/MXV  TS       DOTINC
R0923               ITRACE (2) REFERS TO "VXM/MXV".
 0924  REF    2  LAST  601      7343  0 7532 1           TC       MPACVBUF          SAVE VECTOR IN MPAC FOR FURTHER USE.

 0925  REF    1                 7344  0 7156 1           TC       DOTSUB            GO DOT TO GET X COMPONENT OF ANSWER.
 0926                           7345  0 0006 1           EXTEND
 0927  REF   36  LAST 1035      7346  3 0123 1           DCA      VBUF              MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0928  REF  447  LAST 1037      7347  52 155 1           DXCH     MPAC              NEW X COMPONENT IN BUF2.
 0929  REF   14  LAST  999      7350  52 134 0           DXCH     BUF2
 0930                           7351  0 0006 1           EXTEND
 0931  REF   37  LAST 1039      7352  3 0125 1           DCA      VBUF +2
 0932  REF  448  LAST 1039      7353  52 160 1           DXCH     MPAC +3
 0933                           7354  0 0006 1           EXTEND
 0934  REF   38  LAST 1039      7355  3 0127 0           DCA      VBUF +4
 0935  REF  449  LAST 1039      7356  52 162 0           DXCH     MPAC +5
 0936  REF    8  LAST 1038      7357  3 0140 1           CA       MATINC            INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0937  REF   58  LAST 1034      7360  26 116 0           ADS      ADDRWD            FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0938  REF    2  LAST 1039      7361  0 7156 1           TC       DOTSUB
 0939  REF   39  LAST 1039      7362  52 123 0           DXCH     VBUF              MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0940  REF  450  LAST 1039      7363  52 155 1           DXCH     MPAC              COMPONENT OF ANSWER IN VBUF +2.
 0941  REF   40  LAST 1039      7364  52 125 0           DXCH     VBUF +2
 0942  REF  451  LAST 1039      7365  52 160 1           DXCH     MPAC +3
 0943  REF   41  LAST 1039      7366  52 127 1           DXCH     VBUF +4
 0944  REF  452  LAST 1039      7367  52 162 0           DXCH     MPAC +5
 0945  REF    9  LAST 1039      7370  3 0140 1           CA       MATINC            FORM ADDRESS OF LAST COLUMN OR ROW.
 0946  REF   59  LAST 1039      7371  26 116 0           ADS      ADDRWD

 0947  REF    3  LAST 1039      7372  0 7156 1           TC       DOTSUB
 0948  REF   15  LAST 1039      7373  52 134 0           DXCH     BUF2              ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0949  REF  453  LAST 1039      7374  52 155 1           DXCH     MPAC              PROPER MPAC REGISTERS.
 0950  REF  454  LAST 1039      7375  52 162 0           DXCH     MPAC +5
 0951  REF   42  LAST 1039      7376  52 125 0           DXCH     VBUF +2
 0952  REF  455  LAST 1039      7377  52 160 1           DXCH     MPAC +3
 0953  REF   13  LAST 1030      7400  1 6061 1           TCF      DANZIG            EXIT.
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P0954             VXSC - VECTOR TIMES SCALAR.

 0955   REF  27  LAST 1032      7401  10 163 1  VXSC      CCS      MODE             TEST PRESENT MODE.
 0956   REF   1                 7402   1 7430 0           TCF      DVXSC            SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
 0957   REF   2  LAST 1040      7403   1 7430 0           TCF      DVXSC

 0958   REF   5  LAST 1035      7404   0 7107 0  VVXSC     TC       DMPSUB           COMPUTE X COMPONENT
 0959   REF   1                 7405   0 7140 0           TC       VROUND           AND ROUND IT.
 0960   REF 456  LAST 1039      7406  52 160 1            DXCH     MPAC +3          PUT Y COMPONENT INTO MPAC SAVING MPAC IN
 0961   REF 457  LAST 1040      7407  52 155 1            DXCH     MPAC             MPAC +3.
 0962   REF 458  LAST 1040      7410  52 160 1            DXCH     MPAC +3

 0963   REF   6  LAST 1040      7411   0 7107 0           TC       DMPSUB           DO SAME FOR Y AND Z COMPONENTS.
 0964   REF   2  LAST 1040      7412   0 7140 0           TC       VROUND
 0965   REF 459  LAST 1040      7413  52 162 0            DXCH     MPAC +5
 0966   REF 460  LAST 1040      7414  52 155 1            DXCH     MPAC
 0967   REF 461  LAST 1040      7415  52 162 0            DXCH     MPAC +5

 0968   REF   7  LAST 1040      7416   0 7107 0           TC       DMPSUB
 0969   REF   3  LAST 1040      7417   0 7140 0           TC       VROUND
 0970   REF 462  LAST 1040      7420  52 155 1  VROTATEX  DXCH     MPAC             EXIT USED TO RESTORE MPAC AFTER THIS
 0971   REF 463  LAST 1040      7421  52 162 0            DXCH     MPAC +5          TYPE OF ROTATION. CALLED BY VECTOR SHIFT
 0972   REF 464  LAST 1040      7422  52 160 1            DXCH     MPAC +3          RIGHT, V/SC, ETC.
 0973   REF 465  LAST 1040      7423  52 155 1            DXCH     MPAC
 0974   REF  14  LAST 1039      7424   1 6061 1           TCF      DANZIG
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P0975             DP VECTOR PROJECTION ROUTINE.

 0976   REF   2  LAST 1038      7425  0 7154 0  VPROJ    TC      PREDOT        (MPAC.X)MPAC IS COMPUTED AND LEFT IN
 0977   REF  21  LAST  920      7426  4 4751 1           CS      FOUR          MPAC. DO DOT AND FALL INTO DVXSC.
 0978   REF  60  LAST 1039      7427  26 116 0           ADS     ADDRWD

R0979             VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

 0980                           7430  0 0006 1  DVXSC    EXTEND                SAVE SCALAR IN MPAC +3 AND GET X
 0981   REF 466  LAST 1040      7431  3 0155 0           DCA     MPAC          COMPONENT OF ANSWER.
 0982   REF 467  LAST 1041      7432  52 150 1           DXCH    MPAC +3
 0983   REF   8  LAST 1040      7433  0 7107 0           TC      DMPSUB
 0984   REF   4  LAST 1040      7434  0 7140 0           TC      VROUND

 0985   REF  67  LAST 1038      7435  3 4752 0           CAF     TWO           ADVANCE ADDRWD TO Y COMPONENT OF X.
 0986   REF  61  LAST 1041      7436  26 116 0           ADS     ADDRWD
 0987                           7437  0 0006 1           EXTEND
 0988   REF 468  LAST 1041      7440  3 0160 0           DCA     MPAC +3       PUT SCALAR BACK INTO MPAC AND SAVE
 0989   REF 469  LAST 1041      7441  52 155 1           DXCH    MPAC          X RESULT IN MPAC +5.
 0990   REF 470  LAST 1041      7442  52 162 0           DXCH    MPAC +5
 0991   REF   9  LAST 1041      7443  0 7107 0           TC      DMPSUB
 0992   REF   5  LAST 1041      7444  0 7140 0           TC      VROUND

 0993   REF  68  LAST 1041      7445  3 4752 0           CAF     TWO
 0994   REF  62  LAST 1041      7446  26 116 0           ADS     ADDRWD        TO Z COMPONENT.
 0995   REF 471  LAST 1041      7447  52 160 1           DXCH    MPAC +3       BRING SCALAR BACK, PUTTING Y RESULT IN
 0996   REF 472  LAST 1041      7450  52 155 1           DXCH    MPAC          THE PROPER PLACE.
 0997   REF 473  LAST 1041      7451  52 160 1           DXCH    MPAC +3
 0998   REF  10  LAST 1041      7452  0 7107 0           TC      DMPSUB
 0999   REF   6  LAST 1041      7453  0 7140 0           TC      VROUND

 1000   REF 474  LAST 1041      7454  52 155 1           DXCH    MPAC          PUT Z COMPONENT IN PROPER PLACE, ALSO
 1001   REF 475  LAST 1041      7455  52 162 0           DXCH    MPAC +5       POSITIONING X.
 1002   REF 476  LAST 1041      7456  52 155 1           DXCH    MPAC

 1003   REF   1                 7457  1 6521 0           TCF     VMODE         MODE HAS CHANGED TO VECTOR.
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P1004              THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M ) WHERE M IS THE VECTOR IN
R1006                                                            3 2  2 3  1 3  3 1  2 1  1 2
R1009     MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.


 1009                               7460  0 0006 1   VXV      EXTEND
 1010     REF 477  LAST 1041        7461  3 0162 1            DCA      MPAC +5            FORM UP M3X1, LEAVING M1 IN VBUF.
 1011     REF 478  LAST 1042        7462  52 155 1            DXCH     MPAC
 1012     REF  43  LAST 1039        7463  52 123 0            DXCH     VBUF
 1013     REF  11  LAST 1041        7464  0 7107 0            TC       DMPSUB             BY X1.

 1014                               7465  0 0006 1            EXTEND
 1015     REF 479  LAST 1042        7466  4 0160 1            DCS      MPAC +3            CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
 1016     REF 480  LAST 1042        7467  52 155 1            DXCH     MPAC
 1017     REF  44  LAST 1042        7470  52 125 0            DXCH     VBUF +2
 1018     REF  12  LAST 1042        7471  0 7107 0            TC       DMPSUB

 1019     REF  69  LAST 1041        7472  3 4752 0            CAF      TWO                ADVANCE ADDRWD TO X2.
 1020     REF  63  LAST 1041        7473  26 116 0            ADS      ADDRWD
 1021                               7474  0 0006 1            EXTEND
 1022     REF 481  LAST 1042        7475  4 0162 0            DCS      MPAC +5            PREPARE TO GET -X2M3, SAVING -X1M2 IN
 1023     REF 482  LAST 1042        7476  52 155 1            DXCH     MPAC               MPAC +5.
 1024     REF 483  LAST 1042        7477  52 162 0            DXCH     MPAC +5
 1025     REF  13  LAST 1042        7500  0 7107 0            TC       DMPSUB

 1026                               7501  0 0006 1            EXTEND
 1027     REF  45  LAST 1042        7502  3 0123 1            DCA      VBUF               GET X2M1, SAVING -X2M3 IN VBUF +4.
 1028     REF 484  LAST 1042        7503  52 155 1            DXCH     MPAC
 1029     REF  46  LAST 1042        7504  52 127 1            DXCH     VBUF +4
 1030     REF  14  LAST 1042        7505  0 7107 0            TC       DMPSUB

 1031     REF  70  LAST 1042        7506  3 4752 0            CAF      TWO                ADVANCE ADDRWD TO X3.
 1032     REF  64  LAST 1042        7507  26 116 0            ADS      ADDRWD
 1033                               7510  0 0006 1            EXTEND
 1034     REF  47  LAST 1042        7511  4 0123 0            DCS      VBUF               GET -X3M1, ADDING X2M1 TO MPAC +5 TO
 1035     REF 485  LAST 1042        7512  52 155 1            DXCH     MPAC               COMPLETE THE Z COMPONENT OF THE ANSWER.
 1036     REF 486  LAST 1042        7513  20 162 0            DAS      MPAC +5

 1037                               7514  0 0006 1            EXTEND
 1038                               7515  1 7517 1            BZF      +2
 1039     REF   3  LAST 102[illegible]        7516  0 7011 0            TC       OVERFLWZ

 1040     REF  15  LAST 1042        7517  0 7107 0            TC       DMPSUB
 1041     REF  48  LAST 1042        7520  52 125 0            DXCH     VBUF +2            MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
 1042     REF 487  LAST 1042        7521  52 160 1            DXCH     MPAC +3            AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
 1043     REF 488  LAST 1042        7522  52 155 1            DXCH     MPAC               Y COMPONENT OF THE RESULT.
 1044     REF 489  LAST 1042        7523  20 160 1            DAS      MPAC +3

 1045                               7524  0 0006 1            EXTEND
 1046                               7525  1 7527 1            BZF      +2
 1047   REF   3  LAST 1028     7526  0 7014 0               TC      OVERFLWY

 1048   REF  16  LAST 1042     7527  0 7107 0               TC      DMPSUB
 1049   REF  49  LAST 1042     7530  52 127 1               DXCH    VBUF +4         GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
 1050   REF   4  LAST 1029     7531  1 7000 1               TCF     ENDVXV          COMPONENT (TAIL END OF DAD).

R1051           THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

 1053                          7532  0 0006 1   MPACVBUF EXTEND                     CALLED BY MXV, VXM, AND UNIT.
 1054   REF 490  LAST 1042     7533  3 0155 0               DCA     MPAC
 1055   REF  50  LAST 1043     7534  52 123 0               DXCH    VBUF
 1056                          7535  0 0006 1               EXTEND
 1057   REF 491  LAST 1043     7536  3 0160 0               DCA     MPAC +3
 1058   REF  51  LAST 1043     7537  52 125 0               DXCH    VBUF +2
 1059                          7540  0 0006 1               EXTEND
 1060   REF 492  LAST 1043     7541  3 0162 1               DCA     MPAC +5
 1061   REF  52  LAST 1043     7542  52 127 1               DXCH    VBUF +4
 1062   REF 270  LAST 1037     7543  0 0002 0               TC      Q               RETURN TO CALLER.


R1063           DOUBLE PRECISION SIGN AGREE ROUTINE. ARRIVE WITH INPUT IN A+L. OUTPUT IS IN A + L.

 1065   REF 331  LAST 1036     7544  10 000 0   ALSIGNAG CCS     A               TEST UPPER PART.
 1066   REF   1                7545  1 7551 0               TCF     UPPOS           IT IS POSITIVE
 1067   REF 271  LAST 1043     7546  0 0002 0               TC      Q               ZERO
 1068   REF   1                7547  1 7561 0               TCF     UPNEG           NEGATIVE
 1069   REF 272  LAST 1043     7550  0 0002 0               TC      Q               ZERO

 1070   REF 187  LAST 1037     7551  56 001 0   UPPOS       XCH     L               SAVE DECREMENTED UPPER PART.
 1071   REF  10  LAST  922     7552  6 4736 1               AD      HALF
 1072   REF  11  LAST 1043     7553  6 4736 1               AD      HALF
 1073   REF 332  LAST 1043     7554  54 000 0               TS      A               SKIPS ON OVERFLOW
 1074                          7555  1 7557 0               TCF     +2
 1075   REF 188  LAST 1043     7556  24 001 0               INCR    L               RESTORE UPPER TO ORIGINAL VALUE
 1076   REF 189  LAST 1043     7557  56 001 0               XCH     L               SWAP A + L BACK.
 1077   REF 273  LAST 1043     7560  0 0002 0               TC      Q

 1078   REF 190  LAST 1043     7561  56 001 0   UPNEG       XCH     L               SAVE COMPLEMENTED + DECREMENTED UPPER PT
 1079   REF   6  LAST  922     7562  6 4735 1               AD      NEGMAX
 1080   REF   7  LAST 1014     7563  6 7747 1               AD      NEGONE
 1081   REF 333  LAST 1043     7564  54 000 0               TS      A
 1082                          7565  1 7567 0               TCF     +2              DONT INCREMENT IF NO OVERFLOW.
 1083   REF 191  LAST 1043     7566  24 001 0               INCR    L
 1084   REF 192  LAST 1043     7567  56 001 0               XCH     L
 1085                          7570  4 0000 0               COM                     MAKE NEGATIVE AGAIN.
 1086   REF 274  LAST 1043     7571  0 0002 0               TC      Q
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P1087           INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

 1089   REF  17  LAST 1043        7572  0 7107 0  DMP1       TC      DMPSUB            DMP INSTRUCTION.
 1090   REF  15  LAST 1040        7573  1 6061 1             TCF     DANZIG

 1091   REF  18  LAST 1044        7574  0 7107 0  DMPR       TC      DMPSUB
 1092   REF   1                   7575  0 7137 0             TC      ROUNDSUB +1       (C(A) = +0).
 1093   REF  16  LAST 1044        7576  1 6061 1             TCF     DANZIG

 1094                             7577  0 0006 1  DDV        EXTEND
 1095   REF  65  LAST 1042        7600  5 0116 1             INDEX   ADDRWD            MOVE DIVIDEND INTO BUF.
 1096                             7601  3 0001 0             DCA     0
 1097   REF   2  LAST 1011        7602  1 7607 0             TCF     BDDV +4

 1098                             7603  0 0006 1  BDDV       EXTEND                    MOVE DIVISOR INTO MPAC SAVING MPAC, THE
 1099   REF  66  LAST 1044        7604  5 0116 1             INDEX   ADDRWD            DIVIDEND, IN BUF.
 1100                             7605  3 0001 0             DCA     0
 1101   REF 493  LAST 1043        7606  52 155 1             DXCH    MPAC
 1102   REF  91  LAST 1033        7607  52 131 0    +4       DXCH    BUF
 1103   REF 196  LAST 1038        7610  3 4755 1             CAF     ZERO              DIVIDE ROUTINES IN BANK 0.
 1104   REF  20  LAST 1024        7611  54 004 1             TS      FBANK
 1105   REF   2  LAST  824        7612  1 2353 1             TCF     DDV/BDDV

 1106   REF  67  LAST 1044        7613  3 0116 1  SETPD      CA      ADDRWD            MUST SET TO WORK AREA, OR EBANK TROUBLE.
 1107   REF  22  LAST 1021        7614  54 156 1             TS      PUSHLOC
 1108   REF   1                   7615  1 6063 0             TCF     NOIBNKSW          NO FBANK SWITCH REQUIRED.

 1109   REF 197  LAST 1044        7616  3 4755 1  TSLC       CAF     ZERO              SHIFTING ROUTINES LOCATED IN BANK 00.
 1110   REF  21  LAST 1044        7617  54 004 1             TS      FBANK
 1111   REF   1                   7620  1 2172 0             TCF     TSLC2

 1112   REF   7  LAST 1003        7621  3 6074 1  GSHIFT     CAF     LOW7              USED AS MASK AT GENSHIFT. THIS PROCESSES
 1113   REF  22  LAST 1044        7622  54 004 1             TS      FBANK             ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
 1114   REF   1                   7623  1 2214 0             TCF     GENSHIFT          AN ADDRESS (ROUTINES IN BANK 0).
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P1115           THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1117     AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1119     THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.


 1120    REF  28  LAST 1040       7624  10 163 1  V/SC       CCS     MODE
 1121    REF   1                  7625  1 7636 1             TCF     DV/SC             MOVE VECTOR INTO MPAC.
 1122    REF   2  LAST 1045       7626  1 7636 1             TCF     DV/SC

 1123                             7627  0 0006 1  VV/SC      EXTEND
 1124    REF  68  LAST 1044       7630  5 0116 1             INDEX   ADDRWD
 1125                             7631  3 0001 0             DCA     0
 1126    REF  92  LAST 1044       7632  52 131 0  V/SC1      DXCH    BUF               IN BOTH CASES, VECTOR IS NOW IN MPAC AND
 1127    REF 198  LAST 1044       7633  3 4755 1             CAF     ZERO              SCALAR IN BUF.
 1128    REF  23  LAST 1044       7634  54 004 1             TS      FBANK
 1129    REF   1                  7635  1 2654 0             TCF     V/SC2

 1130                             7636  0 0006 1  DV/SC      EXTEND
 1131    REF  69  LAST 1045       7637  5 0116 1             INDEX   ADDRWD
 1132                             7640  3 0003 1             DCA     2
 1133    REF 494  LAST 1044       7641  52 160 1             DXCH    MPAC +3
 1134                             7642  0 0006 1             EXTEND
 1135    REF  70  LAST 1045       7643  5 0116 1             INDEX   ADDRWD
 1136                             7644  3 0005 1             DCA     4
 1137    REF 495  LAST 1045       7645  52 162 0             DXCH    MPAC +5

 1138    REF 108  LAST 1019       7646  4 4753 0             CS      ONE               CHANGE MODE TO VECTOR.
 1139    REF  29  LAST 1045       7647  54 163 1             TS      MODE

 1140                             7650  0 0006 1             EXTEND
 1141    REF  71  LAST 1045       7651  5 0116 1             INDEX   ADDRWD
 1142                             7652  3 0001 0             DCA     0
 1143    REF 496  LAST 1045       7653  52 155 1             DXCH    MPAC
 1144    REF   1                  7654  1 7632 0             TCF     V/SC1             FINISH PROLOGUE AT COMMON SECTION.
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P1145              SIGN AND COMPLEMENT INSTRUCTIONS.

 1146   REF  72  LAST 1045        7655  50 116 1  SIGN       INDEX   ADDRWD              CALL COMP INSTRUCTION IF WORD AT X IS
 1147                             7656  10 000 0             CCS     0                   NEGATIVE NON-ZERO.
 1148   REF  17  LAST 1044        7657  1 6061 1             TCF     DANZIG
 1149                             7660  1 7662 0             TCF     +2
 1150   REF   2  LAST 1013        7661  1 7670 0             TCF     COMP                DO THE COMPLEMENT.

 1151   REF  73  LAST 1046        7662  50 116 1             INDEX   ADDRWD
 1152                             7663  10 001 1  CCSL       CCS     1
 1153   REF  18  LAST 1046        7664  1 6061 1             TCF     DANZIG
 1154   REF  19  LAST 1046        7665  1 6061 1             TCF     DANZIG
 1155   REF   3  LAST 1046        7666  1 7670 0             TCF     COMP
 1156   REF  20  LAST 1046        7667  1 6061 1             TCF     DANZIG
 1157                             7670  0 0006 1  COMP       EXTEND                      COMPLEMENT DP MPAC IN EVERY CASE.
 1158   REF 497  LAST 1045        7671  4 0155 1             DCS     MPAC
 1159   REF 498  LAST 1046        7672  52 155 1             DXCH    MPAC

 1160   REF  30  LAST 1045        7673  10 163 1             CCS     MODE                EITHER COMPLEMENT MPAC +3 OR THE REST OF
 1161   REF   1                   7674  1 7705 0             TCF     DCOMP               THE VECTOR ACCUMULATOR.
 1162   REF   2  LAST 1046        7675  1 7705 0             TCF     DCOMP

 1163                             7676  0 0006 1             EXTEND                      VECTOR COMPLEMENT.
 1164   REF 499  LAST 1046        7677  4 0160 1             DCS     MPAC +3
 1165   REF 500  LAST 1046        7700  52 160 1             DXCH    MPAC +3
 1166                             7701  0 0006 1             EXTEND
 1167   REF 501  LAST 1046        7702  4 0162 0             DCS     MPAC +5
 1168   REF 502  LAST 1046        7703  52 162 0             DXCH    MPAC +5
 1169   REF  21  LAST 1046        7704  1 6061 1             TCF     DANZIG

 1170   REF 503  LAST 1046        7705  4 0156 1  DCOMP      CS      MPAC +2
 1171   REF 504  LAST 1046        7706  54 156 1             TS      MPAC +2
 1172   REF  22  LAST 1046        7707  1 6061 1             TCF     DANZIG
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R1173              THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1174              1.   SR1 TO SR4          SCALAR SHIFT RIGHT.
R1175              2.   SR1R TO SR4R        SCALAR SHIFT RIGHT AND ROUND.
R1176              3.   SL1 TO SL4          SCALAR SHIFT LEFT.
R1177              4.   SL1R TO SL4R        SCALAR SHIFT LEFT AND ROUND.

R1178              5.   VSR1 TO VSR8        VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1179              6.   VSL1 TO VSL8        VECTOR SHIFT LEFT (NEVER ROUNDS).

R1180              THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1181              1.   SR                  SCALAR SHIFT RIGHT.
R1182              2.   SRR                 SCALAR SHIFT RIGHT AND ROUND.
R1183              3.   SL                  SCALAR SHIFT LEFT.
R1184              4.   SLR                 SCALAR SHIFT LEFT AND ROUND.

R1185              5.   VSR                 VECTOR SHIFT RIGHT.
R1186              6.   VSL                 VECTOR SHIFT LEFT.

R1187    *  IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1189    ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.


 1190                        00,2017                        BANK     00

 1191    REF    1                                           COUNT*  $$/INTER
 1192    REF   20  LAST 1038  00,2017   3 6242 0  SHORTT    CAF      SIX              SCALAR SHORT SHIFTS COME HERE. THE SHIFT
 1193    REF   29  LAST 1018  00,2020   7 0020 1            MASK     CYR              COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
 1194    REF   11  LAST  923  00,2021  54 021 0             TS       SR               ROUNDING BIT IS IN BIT1 AT THIS POINT.

 1195    REF   30  LAST 1047  00,2022  10 020 1             CCS      CYR              SEE IF RIGHT OR LEFT SHIFT DESIRED.
 1196    REF    1             00,2023   1 2101 1            TCF      TSSL             SHIFT LEFT.

 1197                         00,2024    00024 1  SRDDV     DEC      20               MPTEMP SETTING FOR SR BEFORE DDV.

 1198    REF   12  LAST 1047  00,2025  50 021 1   TSSR      INDEX    SR               GET SHIFTING BIT.
 1199    REF   58  LAST  911  00,2026   3 4736 1            CAF      BIT14
 1200    REF   14  LAST 1036  00,2027  54 135 1             TS       MPTEMP

 1201    REF   31  LAST 1047  00,2030  10 020 1             CCS      CYR              SEE IF A ROUND IS DESIRED.
 1202    REF    1             00,2031   0 2050 0  RIGHTR    TC       MPACSRND         YES - SHIFT RIGHT AND ROUND.
 1203    REF    4  LAST 1038  00,2032   1 6060 0            TCF      NEWMODE          SET MODE TO DP (C(A) = 0).
 1204    REF   15  LAST 1047  00,2033   3 0135 0  MPACSHR   CA       MPTEMP           DO A TRIPLE PRECISION SHIFT RIGHT.
 1205                         00,2034   0 0006 1            EXTEND
 1206    REF  505  LAST 1046  00,2035   7 0156 1            MP       MPAC +2
 1207    REF  506  LAST 1047  00,2036  54 156 1    +3       TS       MPAC +2          (EXIT FROM SQRT AND ABVAL).
 1208    REF   16  LAST 1047  00,2037   3 0135 0            CA       MPTEMP
 1209                         00,2040   0 0006 1            EXTEND
 1210    REF  507  LAST 1047  00,2041   7 0154 0            MP       MPAC             SHIFT MAJOR PART INTO A,L AND PLACE IN
 1211   REF 508  LAST 1047   00,2042  52 155 1             DXCH    MPAC            MPAC,+1.
 1212   REF  17  LAST 1047   00,2043  3 0135 0             CA      MPTEMP
 1213                        00,2044  0 0006 1             EXTEND
 1214   REF 193  LAST 1043   00,2045  7 0001 1             MP      L               ORIGINAL C(MPAC +1).
 1215   REF 509  LAST 1048   00,2046  20 156 1             DAS     MPAC +1         GUARANTEED NO OVERFLOW.
 1216   REF  23  LAST 1046   00,2047  1 6061 1             TCF     DANZIG

R1217            MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

 1218   REF 510  LAST 1048   00,2050  3 0156 0  MPACSRND CA      MPAC +2         WE HAVE TO DO ALL THREE MULTIPLIES SINCE
 1219                        00,2051  0 0006 1             EXTEND                  MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
 1220   REF  18  LAST 1048   00,2052  7 0135 1             MP      MPTEMP          DISAGREEMENT WITH A SHIFT RIGHT OF 1.
 1221   REF 511  LAST 1048   00,2053  56 155 0             XCH     MPAC +1
 1222                        00,2054  0 0006 1             EXTEND
 1223   REF  19  LAST 1048   00,2055  7 0135 1             MP      MPTEMP
 1224   REF 512  LAST 1048   00,2056  56 155 0             XCH     MPAC +1         TRIAL MINOR PART.
 1225   REF 194  LAST 1048   00,2057  6 0001 0             AD      L

 1226                        00,2060  5 0000 1  VSHR2      DOUBLE                  (FINISH VECTOR COMPONENT SHIFT RIGHT
 1227   REF 513  LAST 1048   00,2061  54 156 1             TS      MPAC +2         AND ROUND.
 1228                        00,2062  1 2064 0             TCF     +2
 1229   REF 514  LAST 1048   00,2063  26 155 1             ADS     MPAC +1         GUARANTEED NO OVERFLOW.

 1230   REF 199  LAST 1045   00,2064  3 4755 1             CAF     ZERO
 1231   REF 515  LAST 1048   00,2065  54 156 1             TS      MPAC +2
 1232   REF 516  LAST 1048   00,2066  56 154 1             XCH     MPAC            SETTING TO ZERO SO FOLLOWING DAS WORKS.
 1233                        00,2067  0 0006 1             EXTEND
 1234   REF  20  LAST 1048   00,2070  7 0135 1             MP      MPTEMP
 1235   REF 517  LAST 1048   00,2071  20 155 1             DAS     MPAC            AGAIN NO OVERFLOW.
 1236   REF 275  LAST 1043   00,2072  0 0002 0             TC      Q

 1237   REF  21  LAST 1048   00,2073  3 0135 0  VSHREND    CA      MPTEMP          ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
 1238                        00,2074  0 0006 1             EXTEND                  MPAC CONTAINS A VECTOR COMPONENT.
 1239   REF 518  LAST 1048   00,2075  7 0155 1             MP      MPAC +1
 1240   REF 519  LAST 1048   00,2076  54 155 1             TS      MPAC +1
 1241   REF 195  LAST 1048   00,2077  56 001 0             XCH     L
 1242   REF   1              00,2100  1 2060 1             TCF     VSHR2           GO ADD ONE IF NECESSARY AND FINISH.
```

```
P1243                 ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

 1244  REF  13  LAST 1047  00,2101   3 0021 1  TSSL       CA        SR                  GET SHIFT COUNT FOR SR.
 1245  REF  22  LAST 1048  00,2102  54  135 1    +1       TS        MPTEMP

 1246                      00,2103   0 0006 1    +2       EXTEND                        ENTRY HERE FROM SL FOR SCALARS.
 1247  REF 520  LAST 1048  00,2104   3 0156 0             DCA       MPAC +1             SHIFTING LEFT ONE PLACE AT A TIME IS
 1248  REF 521  LAST 1049  00,2105  20  156 1             DAS       MPAC +1             FASTER THAN DOING THE WHOLE SHIFT WITH
 1249  REF 522  LAST 1049  00,2106   6 0154 1             AD        MPAC                MULTIPLIES ASSUMING THAT FREQUENCY OF
 1250  REF 523  LAST 1049  00,2107   6 0154 1             AD        MPAC                SHIFT COUNTS GOES DOWN RAPIDLY AS A
 1251  REF 524  LAST 1049  00,2110  54  154 0             TS        MPAC                FUNCTION OF THEIR MAGNITUDE.
 1252                      00,2111   1 2113 1             TCF       +2
 1253  REF   4  LAST 1033  00,2112  54  121 1             TS        OVFIND              OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1254                                                                                   RESULT ANYWAY).
 1255  REF  23  LAST 1049  00,2113  10  135 1             CCS       MPTEMP              LOOP ON DECREMENTED SHIFT COUNT.
 1256  REF   2  LAST 1047  00,2114   1 2102 1             TCF       TSSL +1

 1257  REF  32  LAST 1047  00,2115  10  020 1             CCS       CYR                 SEE IF ROUND WANTED.
 1258  REF   2  LAST 1044  00,2116   0 7136 1  ROUND      TC        ROUNDSUB            YES - ROUND AND EXIT.
 1259  REF  24  LAST 1048  00,2117   1 6061 1             TCF       DANZIG              SL LEAVES A ZERO IN CYR FOR NO ROUND.
 1260  REF  25  LAST 1049  00,2120   1 6061 1             TCF       DANZIG              NO - EXIT IMMEDIATL
```

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P1261   VECTOR SHIFTING ROUTINES.

 1262   REF   2  LAST  232   00,2121  3 4757 0  SHORTV    CAF     LOW3          SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
 1263   REF  33  LAST 1049   00,2122  7 0020 1            MASK    CYR           EDITING CYR.
 1264   REF  24  LAST 1049   00,2123  54 135 1            TS      MPTEMP
 1265   REF  34  LAST 1050   00,2124  10 020 1            CCS     CYR           SEE IF LEFT OR RIGHT SHIFT.
 1266   REF   1              00,2125  1 2145 1            TCF     VSSL          VECTOR SHIFT LEFT.
 1267                        00,2126   00176 1  OCT176    OCT     176           USED IN PROCESSED SHIFTS WITH - COUNT.

 1268   REF  25  LAST 1050   00,2127  50 135 0  VSSR      INDEX   MPTEMP        (ENTRY FROM SR). PICK UP SHIFTING BIT.
 1269   REF  59  LAST 1047   00,2130  3 4736 1            CAF     BIT14         MPTEMP CONTAINS THE SHIFT COUNT - 1.
 1270   REF  26  LAST 1050   00,2131  54 135 1            TS      MPTEMP
 1271   REF   1              00,2132  0 2073 1            TC      VSHRRND       SHIFT X COMPONENT.

 1272   REF 525  LAST 1049   00,2133  52 155 1            DXCH    MPAC          SWAP X AND Y COMPONENTS.
 1273   REF 526  LAST 1050   00,2134  52 160 1            DXCH    MPAC +3
 1274   REF 527  LAST 1050   00,2135  52 155 1            DXCH    MPAC
 1275   REF   2  LAST 1050   00,2136  0 2073 1            TC      VSHRRND       SHIFT Y COMPONENT.

 1276   REF 528  LAST 1050   00,2137  52 155 1            DXCH    MPAC          SWAP Y AND Z COMPONENTS.
 1277   REF 529  LAST 1050   00,2140  52 162 0            DXCH    MPAC +5
 1278   REF 530  LAST 1050   00,2141  52 155 1            DXCH    MPAC
 1279   REF   3  LAST 1050   00,2142  0 2073 1            TC      VSHRRND       SHIFT Z COMPONENT.

 1280   REF   1              00,2143  1 7420 1            TCF     VROTATEX      RESTORE COMPONENTS TO PROPER PLACES.
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P1281   VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

 1282   REF  27  LAST 1050  00,2144  54 135 1    -1       TS       MPTEMP          SHIFTING LOOP.

 1283                       00,2145  0 0006 1  VSSL       EXTEND
 1284   REF 531  LAST 1050  00,2146  3 0155 0             DCA      MPAC
 1285   REF 532  LAST 1051  00,2147  20 155 1             DAS      MPAC
 1286                       00,2150  0 0006 1             EXTEND
 1287                       00,2151  1 2153 0             BZF      +2
 1288   REF   3  LAST 1033  00,2152  0 7017 0             TC       OVERFLOW

 1289                       00,2153  0 0006 1             EXTEND
 1290   REF 533  LAST 1051  00,2154  3 0160 0             DCA      MPAC +3
 1291   REF 534  LAST 1051  00,2155  20 160 1             DAS      MPAC +3
 1292                       00,2156  0 0006 1             EXTEND
 1293                       00,2157  1 2161 1             BZF      +2
 1294   REF   4  LAST 1043  00,2160  0 7014 0             TC       OVERFLWY

 1295                       00,2161  0 0006 1             EXTEND
 1296   REF 535  LAST 1051  00,2162  3 0162 1             DCA      MPAC +5
 1297   REF 536  LAST 1051  00,2163  20 162 0             DAS      MPAC +5
 1298                       00,2164  0 0006 1             EXTEND
 1299                       00,2165  1 2167 1             BZF      +2
 1300   REF   4  LAST 1042  00,2166  0 7011 0             TC       OVERFLWZ

 1301   REF  28  LAST 1051  00,2167  10 135 1             CCS      MPTEMP          LOOP ON DECREMENTED SHIFT COUNTER.
 1302   REF   2  LAST 1050  00,2170  1 2144 0             TCF      VSSL -1
 1303   REF  26  LAST 1049  00,2171  1 6061 1             TCF      DANZIG          EXIT.
```

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P1304             TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1306    THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

 1307    REF  29  LAST 1051    00,2172  54 135 1  TSLC2     TS      MPTEMP            START BY ZEROING SHIFT COUNT (IN A NOW).
 1308    REF   5  LAST 1036    00,2173  0 6723 1            TC      BRANCH            EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
 1309                          00,2174  1 2176 1            TCF     +2
 1310    REF   1               00,2175  1 2212 0            TCF     ENDTSLC           STORES ZERO SHIFT COUNT IN THIS CASE.

 1311    REF  12  LAST  852    00,2176  0 7257 0            TC      TPAGREE           MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.

 1312    REF 537  LAST 1051    00,2177  3 0154 1            CA      MPAC              BEGIN NORMALIZATION LOOP.
 1313    REF   1               00,2200  1 2207 1            TCF     TSLCTEST

 1314    REF  30  LAST 1052    00,2201  24 135 0  TSLCLOOP  INCR    MPTEMP            INCREMENT SHIFT COUNTER.
 1315                          00,2202  0 0006 1            EXTEND
 1316    REF 538  LAST 1052    00,2203  3 0156 0            DCA     MPAC +1
 1317    REF 539  LAST 1052    00,2204  20 156 1            DAS     MPAC +1
 1318    REF 540  LAST 1052    00,2205  6 0154 1            AD      MPAC
 1319    REF 541  LAST 1052    00,2206  26 154 0            ADS     MPAC
 1320                          00,2207  6 0000 1  TSLCTEST  DOUBLE                    SEE IF (ANOTHER) SHIFT IS REQUIRED.
 1321                          00,2210  54 000 0            OVSK
 1322    REF   1               00,2211  1 2201 1            TCF     TSLCLOOP          YES - INCREMENT COUNT AND SHIFT AGAIN.

 1323    REF  31  LAST 1052    00,2212  4 0135 1  ENDTSLC   CS      MPTEMP
 1324    REF   1               00,2213  1 6623 1            TCF     STORE1            STORE SHIFT COUNT AND RETURN TO DANZIG.
```

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P1325             THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1327    THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1328             BITS 1-7     SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1329             BIT 8        PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1331             BIT 9        0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1332             BIT 10       1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1333             BITS 11-13   0.
R1334             BIT 14       1.
R1335             BIT 15       0.

R1336    THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.


 1337    REF  74  LAST 1046   00,2214  7 0116 0  GENSHIFT MASK    ADDRWD            GET SHIFT COUNT, TESTING FOR ZERO.
 1338    REF 334  LAST 1043   00,2215  10 000 0           CCS     A                 (ARRIVES WITH C(A) = LOW7).
 1339    REF   1              00,2216  1 2224 0           TCF     GENSHFT2          IF NON-ZERO, PROCEED WITH DECREMENTED CT

 1340    REF  33  LAST  911   00,2217  3 4742 1           CAF     BIT10             ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
 1341    REF  75  LAST 1053   00,2220  7 0116 0           MASK    ADDRWD            WE MIGHT HAVE TO ROUND MPAC ON SLR AND
 1342    REF 335  LAST 1053   00,2221  10 000 0           CCS     A                 SRR (SCALAR ONLY).
 1343    REF   3  LAST 1049   00,2222  0 7136 1           TC      ROUNDSUB
 1344    REF  27  LAST 1051   00,2223  1 6061 1           TCF     DANZIG

 1345    REF  32  LAST 1052   00,2224  54 135 1  GENSHFT2 TS      MPTEMP            DECREMENTED SHIFT COUNT TO MPTEMP.
 1346    REF  34  LAST 1000   00,2225  3 4744 1           CAF     BIT8              TEST MEANING OF LOW SEVEN BIT COUNT IN
 1347                         00,2226  0 0006 1           EXTEND                    MPTEMP NOW.
 1348    REF  76  LAST 1053   00,2227  7 0116 0           MP      ADDRWD
 1349    REF   1              00,2230  7 6245 0           MASK    LOW2              JUMPS ON SHIFT DIRECTION (BIT8) AND
 1350    REF 336  LAST 1053   00,2231  50 000 1           INDEX   A
 1351                         00,2232  1 2233 0           TCF     +1                ORIGINAL SHIFT DIRECTION (BIT 9).
 1352    REF   1              00,2233  1 2332 0           TCF     RIGHT-            NEGATIVE SHIFT COUNT FOR SL OR SLR.
 1353    REF   1              00,2234  1 2342 1           TCF     LEFT              SL OR SLR.
 1354    REF   1              00,2235  1 2336 1           TCF     LEFT-             NEGATIVE SHIFT COUNT WITH SR OR SRR.
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P1355               GENERAL SHIFT RIGHT.

 1356   REF  31  LAST 1046   00,2236  10 163 1  RIGHT    CCS     MODE            SEE IF VECTOR OR SCALAR.
 1357   REF   1              00,2237  1 2277 0           TCF     GENSCR
 1358   REF   2  LAST 1054   00,2240  1 2277 0           TCF     GENSCR

 1359   REF  33  LAST 1053   00,2241  3 0135 0           CA      MPTEMP          SEE IF SHIFT COUNT LESS THAN 14D.
 1360   REF   1              00,2242  6 3733 0  VRIGHT2  AD      NEG12
 1361                        00,2243  0 0006 1           EXTEND
 1362   REF   1              00,2244  6 2127 1           BZMF    VSSR            IF SO, BRANCH AND SHIFT IMMEDIATELY.

 1363   REF [illegible]  LAST 1043   00,2245  6 7747 1           AD      NEGONE          IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
 1364   REF  34  LAST 1054   00,2246  54 135 1           TS      MPTEMP          AND DO A SHIFT RIGHT AND ROUND BY 14.
 1365   REF 200  LAST 1048   00,2247  3 4755 1           CAF     ZERO            THE ROUND AT THIS STAGE MAY INTRODUCE A
 1366   REF 196  LAST 1048   00,2250  54 001 1           TS      L               ONE BIT ERROR IN A SHIFT RIGHT 15D.
 1367   REF 542  LAST 1052   00,2251  56 154 1           XCH     MPAC
 1368   REF 543  LAST 1054   00,2252  56 155 0           XCH     MPAC +1
 1369   REF   1              00,2253  0 2272 1           TC      SETROUND        X COMPONENT NOW SHIFTED, SO MAKE UP THE
 1370   REF 544  LAST 1054   00,2254  20 155 1           DAS     MPAC            ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1371                                                                            IN L).
 1372   REF 545  LAST 1054   00,2255  56 157 1           XCH     MPAC +3         REPEAT THE ABOVE PROCESS FOR Y AND Z.
 1373   REF 546  LAST 1054   00,2256  56 160 0           XCH     MPAC +4
 1374   REF   2  LAST 1054   00,2257  0 2272 1           TC      SETROUND
 1375   REF 547  LAST 1054   00,2260  20 160 1           DAS     MPAC +3         NO OVERFLOW ON THESE ADDS.

 1376   REF 548  LAST 1054   00,2261  56 161 1           XCH     MPAC +5
 1377   REF 549  LAST 1054   00,2262  56 162 1           XCH     MPAC +6
 1378   REF   3  LAST 1054   00,2263  0 2272 1           TC      SETROUND
 1379   REF 550  LAST 1054   00,2264  20 162 0           DAS     MPAC +5

 1380   REF  35  LAST 1054   00,2265  10 135 1           CCS     MPTEMP          SEE IF DONE, DOING FINAL DECREMENT.
 1381   REF  36  LAST 1054   00,2266  54 135 1           TS      MPTEMP
 1382   REF   1              00,2267  1 2242 0           TCF     VRIGHT2
 1383                        00,2270   04604 1  BIASLO   DEC     .2974 B-1       SQRT CONSTANT

 1384   REF  28  LAST 1053   00,2271  1 6061 1           TCF     DANZIG


 1385                        00,2272  6 0000 1  SETROUND DOUBLE                  MAKES UP ROUNDING QUANTITY FROM ARRIVING
 1386   REF 551  LAST 1054   00,2273  54 156 1           TS      MPAC +2         C(A). L IS ZERO INITIALLY.
 1387   REF 201  LAST 1054   00,2274  3 4755 1           CAF     ZERO
 1388   REF 197  LAST 1054   00,2275  56 001 0           XCH     L
 1389   REF 276  LAST 1048   00,2276  0 0002 0           TC      Q               RETURN AND DO THE DAS, RESETTING L TO 0.
```

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P1390              PROCESS SR AND SRR FOR SCALARS.

 1391   REF  37  LAST 1054   00,2277  3 0135 0  GENSCR   CA      MPTEMP         SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
 1392   REF   2  LAST 1054   00,2300  6 3733 0   +1      AD      NEG12          THAN 14D.
 1393                        00,2301  0 0006 1           EXTEND
 1394   REF   1              00,2302  6 2322 0           BZMF    DOSSHFT        DO THE SHIFT IMMEDIATELY IF SO.

 1395   REF   9  LAST 1054   00,2303  5 7747 1   +4      AD      NEGONE         IF NOT, DECREMENT SHIFT COUNT BY 14D AND
 1396   REF  38  LAST 1055   00,2304  54 135 1           TS      MPTEMP         SHIFT MPAC RIGHT 14 PLACES.
 1397   REF 202  LAST 1054   00,2305  3 4755 1           CAF     ZERO
 1398   REF 552  LAST 1054   00,2306  56 154 1           XCH     MPAC
 1399   REF 553  LAST 1055   00,2307  56 155 0           XCH     MPAC  +1
 1400   REF 554  LAST 1055   00,2310  54 156 1           TS      MPAC  +2
 1401   REF  39  LAST 1055   00,2311  10 135 1           CCS     MPTEMP         SEE IF FINISHED, DO FINAL DECREMENT.
 1402   REF  40  LAST 1055   00,2312  54 135 1           TS      MPTEMP
 1403   REF   3  LAST 1054   00,2313  0 2300 0           TC      GENSCR +1
 1404                        00,2314   22650 1  SLOPEHI  DEC     .5884          SQRT CONSTANT.
 1405   REF  34  LAST 1053   00,2315  3 4742 1           CAF     BIT10          FINISHED WITH SHIFT. SEE IF ROUND
 1406   REF  77  LAST 1053   00,2316  7 0116 0           MASK    ADDRWD         WANTED.
 1407   REF 337  LAST 1053   00,2317  10 000 0           CCS     A
 1408   REF   4  LAST 1053   00,2320  0 7136 1           TC      ROUNDSUB
 1409   REF  29  LAST 1054   00,2321  1 6061 1           TCF     DANZIG         DO SO AND/OR EXIT.

 1410   REF  41  LAST 1055   00,2322  50 135 0  DOSSHFT  INDEX   MPTEMP         PICK UP SHIFTING BIT.
 1411   REF  60  LAST 1050   00,2323  3 4736 1           CAF     BIT14
 1412   REF  42  LAST 1055   00,2324  54 135 1           TS      MPTEMP
 1413   REF  35  LAST 1055   00,2325  3 4742 1           CAF     BIT10          SEE IF TERMINAL ROUND DESIRED.
 1414   REF  78  LAST 1055   00,2326  7 0116 0           MASK    ADDRWD
 1415   REF  33  LAST 1055   00,2327  10 000 0           CCS     A
 1416   REF   1              00,2330  1 2031 0           TCF     RIGHTR         YES.
 1417   REF   1              00,2331  1 2033 1           TCF     MPACSHR        JUST SHIFT RIGHT.
```

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P1418             PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

 1420   REF  43  LAST 1055   00,2332   4 0135 1  RIGHT-     CS       MPTEMP          GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
 1421   REF   1              00,2333   6 2126 0             AD       OCT176          UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
 1422   REF  44  LAST 1056   00,2334  54 135 1              TS       MPTEMP          WAS 1 INITIALLY.
 1423   REF   1              00,2335   1 2236 0             TCF      RIGHT           DO NORMAL SHIFT RIGHT.

 1424   REF   2  LAST 1056   00,2336   4 2126 1  LEFT-      CS       OCT176          SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
 1425   REF  45  LAST 1056   00,2337   6 0135 0             AD       MPTEMP          SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
 1426                        00,2340   4 0000 0             COM
 1427   REF  46  LAST 1056   00,2341  54 135 1              TS       MPTEMP

 1428   REF  32  LAST 1054   00,2342  10 163 1   LEFT       CCS      MODE            SINCE LEFT SHIFTING IS SONE ONE PLACE AT
 1429   REF   1              00,2343   1 2346 0             TCF      GENSCL          A TIME, NO COMPARISON WITH 14 NEED BE
 1430   REF   2  LAST 1056   00,2344   1 2346 0             TCF      GENSCL          DONE. FOR SCALARS, SEE IF TERMINAL ROUND
 1431   REF   3  LAST 1051   00,2345   1 2145 1             TCF      VSSL            DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

 1432   REF  79  LAST 1055   00,2346   4 0116 0  GENSCL     CS       ADDRWD          PUT ROUNDING BIT (BIT 10 OF ADDRWD)INTO
 1433                        00,2347   0 0006 1             EXTEND                   BIT 15 OF CYR WHERE THE ROUNDING BIT OF
 1434   REF  44  LAST  900   00,2350   7 4746 1             MP       BIT6            A SHORT SHIFT LEFT WOULD BE
 1435   REF  35  LAST 1050   00,2351  54 020 1              TS       CYR
 1436   REF   3  LAST 1049   00,2352   1 2103 0             TCF      TSSL +2         DO THE SHIFT.
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P1437              SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1439     AND THE DIVISOR IN BUF.

 1440     REF 109  LAST 1045    00,2353   4 4753 0  DDV/BDDV CS      ONE               INITIALIZATION.
 1441     REF   1               00,2354  54 136 1            TS      DVSIGN            +-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
 1442     REF   1               00,2355  54 137 0            TS      DVNORMCT          DIVIDEND NORMALIZATION COUNT.
 1443     REF   1               00,2356  54 140 0            TS      MAXDVSW           NEAR-ONE DIVIDE FLAG.

 1444     REF  93  LAST 1045    00,2357  10 130 1            CCS     BUF               FORCE BUF POSITIVE WITH THE MAJOR PART
 1445     REF   1               00,2360   1 2516 0           TCF     BUFPOS            NON-ZERO.
 1446                           00,2361   1 2363 1           TCF     +2
 1447     REF   1               00,2362   1 2531 0           TCF     BUFNEG

 1448     REF 555  LAST 1055    00,2363  54 156 1  BUFZERO   TS      MPAC +2           ZERO THIS.
 1449     REF  13  LAST 1052    00,2364   0 7257 0           TC      TPAGREE           FORCE SIGN AGREEMENT BEFORE OVERFLOW

 1450     REF 556  LAST 1057    00,2365  10 154 0            CCS     MPAC              TEST TO SEE IF MPAC NON-ZERO.  (TOO BIG)
 1451     REF   1               00,2366   1 2414 0           TCF     OVF+              MAJOR PART OF DIVIDEND IS POSITIVE NON-0
 1452                           00,2367   1 2371 1           TCF     +2
 1453     REF   2  LAST 1057    00,2370   1 2413 1           TCF     OVF+  -1          MAJOR PART OF DIVIDEND IS NEG. NON-ZERO

 1454     REF  94  LAST 1057    00,2371  56 131 1            XCH     BUF +1            SHIFT DIVIDEND AND DIVISOR LEFT 14.
 1455     REF  95  LAST 1057    00,2372  56 130 0            XCH     BUF
 1456     REF 557  LAST 1057    00,2373  56 155 0            XCH     MPAC +1
 1457     REF 558  LAST 1057    00,2374  56 154 1            XCH     MPAC
 1458     REF  96  LAST 1057    00,2375  10 130 1            CCS     BUF               TRY AGAIN ON FORMER MINOR PART.
 1459     REF   1               00,2376   1 2422 0           TCF     BUF+
 1460                           00,2377   1 2401 1           TCF     +2                OVERFLOW ON ZERO DIVISOR.
 1461     REF   1               00,2400   1 2416 1           TCF     BUF-

 1462     REF 559  LAST 1057    00,2401   4 0154 0           CS      MPAC              SIGN OF MPAC DETERMINES SIGN OF RESULT.
 1463                           00,2402   0 0006 1  SGNDVOVF EXTEND
 1464                           00,2403   6 2405 1           BZMF    +2
 1465     REF   2  LAST 1057    00,2404  24 136 0            INCR    DVSIGN            NEGMAX IN MPAC PERHAPS.
 1466     REF  25  LAST 1036    00,2405   3 4733 1  DVOVF    CAF     POSMAX            ON DIVISION OVERFLOW OF ANY SORT, SET
 1467     REF 560  LAST 1057    00,2406  54 154 0            TS      MPAC              SET DP MPAC TO +-POSMAX.
 1468     REF   1               00,2407   0 2630 0           TC      FINALDV +3
 1469     REF 110  LAST 1057    00,2410   3 4753 1           CAF     ONE               SET OVERFLOW INDICATOR AND EXIT.
 1470     REF   5  LAST 1049    00,2411  54 121 1            TS      OVFIND
 1471     REF  30  LAST 1055    00,2412   0 6061 0           TC      DANZIG


 1472     REF   3  LAST 1057    00,2413  24 136 0  -1        INCR    DVSIGN
 1473     REF  97  LAST 1057    00,2414   4 0131 0  OVF+     CS      BUF +1            LOAD LOWER ORDER PART OF DIVISOR.
 1474     REF   1               00,2415   1 2402 1           TCF     SGNDVOVF          GET SIGN OF RESULT.

 1475                           00,2416   0 0006 1  BUF-     EXTEND                    IF BUF IS NEGATIVE, COMPLEMENT IT AND
 1476     REF  98  LAST 1057    00,2417   4 0131 0           DCS     BUF               MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
 1477     REF  99  LAST 1057    00,2420  52 131 0            DXCH    BUF
 1478     REF   4  LAST 1057    00,2421  24 136 0            INCR    DVSIGN            NOW -0.
 1479   REF 561  LAST 1057   00,2422  10 154 0  BUF+     CCS     MPAC           FORCE MPAC POSITIVE, CHECKING FOR ZERO
 1480   REF   1              00,2423   1 2437 1           TCF     MPAC+          DIVIDEND IN THE PROCESS.
 1481                        00,2424   1 2426 1           TCF     +2
 1482   REF   1              00,2425   1 2433 0           TCF     MPAC-
 1483   REF 562  LAST 1058   00,2426  10 155 1           CCS     MPAC +1
 1484   REF   2  LAST 1058   00,2427   1 2437 1           TCF     MPAC+
 1485   REF  31  LAST 1057   00,2430   1 6061 1           TCF     DANZIG         EXIT IMMEDIATELY ON ZERO DIVIDEND.
 1486   REF   2  LAST 1058   00,2431   1 2433 0           TCF     MPAC-
 1487   REF  32  LAST 1058   00,2432   1 6061 1           TCF     DANZIG

 1488                        00,2433   0 0006 1  MPAC-    EXTEND                 FORCE MPAC POSITIVE AS BUF IN BUF-.
 1489   REF 563  LAST 1058   00,2434   4 0155 1           DCS     MPAC
 1490   REF 564  LAST 1058   00,2435  52 155 1           DXCH    MPAC
 1491   REF   5  LAST 1057   00,2436  24 136 0           INCR    DVSIGN         NOW +1 OR -0.
 1492  REF 565  LAST 1058  00,2437  4 0154 0  MPAC+    CS      MPAC         CHECK FOR DIVISION OVERFLOW. IF THE
 1493  REF  10  LAST 1055  00,2440  6 7747 1           AD      NEGONE       MAJOR PART OF THE DIVIDEND IS LESS THAN
 1494  REF 100  LAST 1057  00,2441  6 0130 0           AD      BUF          THE MAJOR PART OF THE DIVISOR BY AT
 1495  REF 339  LAST 1055  00,2442 10 000 0            CCS     A            LEAST TWO, WE CAN PROCEED IMMEDIATELY
 1496  REF   1             00,2443  1 2505 1           TCF     DVNORM       WITHOUT NORMALIZATION PRODUCING A DVMAX.
 1497                      00,2444   60001 0  -1/2+2   OCT     60001        USED IN SORTSUB.

 1498                      00,2445  1 2446 1           TCF     +1           IF THE ABOVE DOES NOT HOLD, FORCE SIGN
 1499  REF  12  LAST 1043  00,2446  3 4736 1           CAF     HALF         AGREEMENT IN NUMERATOR AND DENOMINATOR
 1500                      00,2447  6 0000 1           DOUBLE               TO FACILITATE OVERFLOW AND NEAR-ONE
 1501  REF 566  LAST 1059  00,2450  6 0155 0           AD      MPAC +1      CHECKING.
 1502  REF 567  LAST 1059  00,2451 54 155 1            TS      MPAC +1
 1503  REF 203  LAST 1055  00,2452  3 4755 1           CAF     ZERO
 1504  REF  26  LAST 1057  00,2453  6 4733 1           AD      POSMAX
 1505  REF 568  LAST 1059  00,2454 26 154 0            ADS     MPAC

 1506  REF  13  LAST 1059  00,2455  3 4736 1           CAF     HALF         SAME FOR BUF.
 1507                      00,2456  6 0000 1           DOUBLE
 1508  REF 101  LAST 1059  00,2457  6 0131 1           AD      BUF +1
 1509  REF 102  LAST 1059  00,2460 54 131 0            TS      BUF +1
 1510  REF 204  LAST 1059  00,2461  3 4755 1           CAF     ZERO
 1511  REF  27  LAST 1059  00,2462  6 4733 1           AD      POSMAX
 1512  REF 103  LAST 1059  00,2463 26 130 1            ADS     BUF

 1513  REF 569  LAST 1059  00,2464  4 0154 0           CS      MPAC         CHECK MAGNITUDE OF SIGN-CORRECTED
 1514  REF 104  LAST 1059  00,2465  6 0130 0           AD      BUF          OPERANDS.
 1515  REF 340  LAST 1059  00,2466 10 000 0            CCS     A
 1516  REF   2  LAST 1059  00,2467  1 2505 1           TCF     DVNORM       DIVIDE OK - WILL NOT BECOME MAXDV CASE.
 1517  REF  16  LAST 1039  00,2470   00133 0  LBUF2    ADRES   BUF2
 1518  REF   1             00,2471  1 2405 0           TCF     DVOVF        DIVISOR NOT LESS THAN DIVIDEND - OVF.

 1519  REF   2  LAST 1057  00,2472 54 140 0            TS      MAXDVSW      IF THE MAJOR PARTS OF THE DIVIDEND AND
 1520  REF 570  LAST 1059  00,2473  4 0155 1           CS      MPAC +1      DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
 1521  REF 105  LAST 1059  00,2474  6 0131 1           AD      BUF +1       TION IS USED (PROVIDED THE DIVISION IS
 1522                      00,2475  0 0006 1           EXTEND               POSSIBLE, OF COURSE).
 1523  REF   2  LAST 1059  00,2476  6 2405 1           BZMF    DVOVF
 1524  REF   3  LAST 1059  00,2477  1 2505 1           TCF     DVNORM       IF NO OVERFLOW.
 1525                           00,2500  0 0006 1  BUFNORM   EXTEND                    ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
 1526   REF   2  LAST 1057      00,2501 24  137 1            AUG      DVNORMCT         LEFT ONE PLACE.
 1527                           00,2502  0 0006 1            EXTEND
 1528   REF 106  LAST 1059      00,2503  3 0131 1            DCA      BUF
 1529   REF 107  LAST 1060      00,2504 20  131 0            DAS      BUF

 1530   REF 108  LAST 1060      00,2505  3 0130 0  DVNORM    CA       BUF              SEE IF DIVISOR NORMALIZED YET.
 1531                           00,2506  6 0000 1            DOUBLE
 1532                           00,2507 54  000 0            OVSK
 1533   REF   1                 00,2510  1 2500 1            TCF      BUFNORM          NO - SHIFT LEFT ONE AND TRY AGAIN.

 1534   REF 571  LAST 1059      00,2511 52  155 1            DXCH     MPAC             CALL DIVIDEND NORMALIZATION SEQUENCE
 1535   REF   3  LAST 1060      00,2512 50  137 1            INDEX    DVNORMCT         PRIOR TO DOING THE DIVIDE.
 1536   REF   1                 00,2513  0 2565 0            TC       MAXTEST

 1537   REF 572  LAST 1060      00,2514 54  156 1            TS       MPAC +2          RETURNS WITH DIVISION DONE AND C(A) = 0.
 1538   REF  33  LAST 1058      00,2515  1 6061 1            TCF      DANZIG

 1539   REF 341  LAST 1059      00,2516 10  000 0  BUFPOS    CCS      A
 1540   REF   2  LAST 1057      00,2517  1 2422 0            TCF      BUF+             TO BUF+ IF BUF IS GREATER THAN +1.

 1541   REF 109  LAST 1060      00,2520  4 0131 0            CS       BUF +1           IF BUF IS +1, FORCING SIGN AGREEMENT
 1542                           00,2521  0 0006 1            EXTEND                    MAY CAUSE BUF TO BECOME ZERO.
 1543   REF   3  LAST 1060      00,2522  6 2422 1            BZMF     BUF+             BRANCH IF SIGNS AGREE.

 1544   REF  14  LAST 1059      00,2523  3 4736 1            CA       HALF             SIGNS DISAGREE.  FORCE AGREEMENT.
 1545                           00,2524  6 0000 1    +6      DOUBLE
 1546   REF 110  LAST 1060      00,2525 26  131 0            ADS      BUF +1
 1547   REF 205  LAST 1059      00,2526  3 4755 1            CA       ZERO
 1548   REF 111  LAST 1060      00,2527 54  130 1            TS       BUF
 1549   REF   1                 00,2530  1 2363 1            TCF      BUFZERO


 1550   REF 342  LAST 1060      00,2531 10  000 0  BUFNEG    CCS      A
 1551   REF   2  LAST 1057      00,2532  1 2416 1            TCF      BUF-             TO BUF- IF BUF IS LESS THAN -1.

 1552   REF 112  LAST 1060      00,2533  3 0131 1            CA       BUF +1           IF BUF IS -1, FORCING SIGN AGREEMENT
 1553                           00,2534  0 0006 1            EXTEND                    MAY CAUSE BUF TO BECOME ZERO.
 1554   REF   3  LAST 1060      00,2535  6 2416 0            BZMF     BUF-             BRANCH IF SIGNS AGREE.

 1555   REF  14  LAST 1060      00,2536  4 4736 0            CS       HALF             SIGNS DISAGREE.  FORCE AGREEMENT.
 1556   REF   2  LAST 1057      00,2537  1 2524 1            TCF      BUFPOS +6
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P1557              THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

 1559   REF  14  LAST 1049   00,2540  22 021 1   -21D    LXCH    SR              SPECIAL PROLOGUE FOR UNIT WHEN THE
 1560                        00,2541   0 0006 1          EXTEND                  LENGTH OF THE ARGUMENT WAS NOT LESS THAN
 1561   REF  16  LAST 1060   00,2542   7 4736 0          MP      HALF            .5. IN THIS CASE, EACH COMPONENT MUST BE
 1562   REF 198  LAST 1054   00,2543  56 001 0           XCH     L               SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
 1563   REF  15  LAST 1061   00,2544   6 0021 1          AD      SR              VECTOR.
 1564   REF 199  LAST 1061   00,2545  56 001 0           XCH     L
 1565   REF   1              00,2546   1 2571 1          TCF     GENDDV +1       WITH DP DIVIDEND IN A,L.

 1566                        00,2547  20 001 1           DDOUBL                  PROLOGUE WHICH NORMALIZES THE DIVIDEND
 1567                        00,2550  20 001 1           DDOUBL                  WHEN IT IS KNOWN THAT NO DIVISION
 1568                        00,2551  20 001 1           DDOUBL                  OVERFLOW WILL OCCUR.
 1569                        00,2552  20 001 1           DDOUBL
 1570                        00,2553  20 001 1           DDOUBL
 1571                        00,2554  20 001 1           DDOUBL
 1572                        00,2555  20 001 1           DDOUBL
 1573                        00,2556  20 001 1           DDOUBL
 1574                        00,2557  20 001 1           DDOUBL
 1575                        00,2560  20 001 1           DDOUBL
 1576                        00,2561  20 001 1           DDOUBL
 1577                        00,2562  20 001 1           DDOUBL
 1578                        00,2563  20 001 1           DDOUBL
 1579   REF 573  LAST 10[illegible]   00,2564  52 155 1           DXCH    MPAC

 1580   REF   3  LAST 1059   00,2565  10 140 0  MAXTEST  CCS     MAXDVSW         0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
 1581                        00,2566   06552 0  BIASHI   DEC     .4192 B-1       SQRT CONSTANTS

 1582   REF   1              00,2567   1 2642 1          TCF     MAXDV           CHECK TO SEE IF THEY ARE NOW EQUAL.
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P1583           THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1585     THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1586           1.  THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1587           2.  THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1589     (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1591           UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1593     TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1595     ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1597           A + SB .        (R - QD)                                                        A + SB
R1599           ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R1601           C + SD          (  C   )                                                          C


  1603  REF 574  LAST 1061   00,2570  52 155 1  GENDDV    DXCH    MPAC            WE NEED A AND B ONLY FOR FIRST DV.
  1604                       00,2571  0 0006 1   +1       EXTEND                  (SPECIAL UNIT PROLOGUE ENTERS HERE).
  1605  REF 113  LAST 1060   00,2572  10 130 1            DV      BUF             A NOW CONTAINS Q AND L, R.
  1606  REF 575  LAST 1062   00,2573  52 155 1            DXCH    MPAC

  1607  REF 576  LAST 1062   00,2574  4 0154 0            CS      MPAC            FORM DIVIDEND FOR MINOR PART OF RESULT.
  1608                       00,2575  0 0006 1            EXTEND
  1609  REF 114  LAST 1062   00,2576  7 0131 0            MP      BUF +1
  1610  REF 577  LAST 1062   00,2577  6 0155 0            AD      MPAC +1         OVERFLOW AT THIS POINT IS POSITIVE SINCE
  1611                       00,2600  54 000 0            OVSK                    R IS POSITIVE IN EVERY CASE.
  1612                       00,2601  1 2606 1            TCF     +5

  1613                       00,2602  0 0006 1            EXTEND                  OVERFLOW CAN BE REMOVED BY SUBTRACTING C
  1614  REF 115  LAST 1062   00,2603  60 130 0            SU      BUF             (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
  1615  REF 578  LAST 1062   00,2604  24 154 1            INCR    MPAC            IN THIS CASE. INCR COMPENSATES SUBTRACT.
  1616  REF   1              00,2605  1 2610 0            TCF     +DOWN           (SINCE C(A) IS STILL POSITIVE).

  1617                       00,2606  0 0006 1   +5       EXTEND                  C(A) CAN BE MADE LESS THAN C IN MAGNI-
  1618  REF   1              00,2607  6 2620 1            BZMF    -UP             TUDE BY DIMINISHING IT BY C (SINCE C IS
A1619                                                                             NOT LESS THAN .5) UNLESS C(A) = 0.
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 1620                          00,2610  0 0006 1  +DOWN     EXTEND                   
 1621   REF 116  LAST 1062     00,2611 60 130 0             SU       BUF              IF POSITIVE, REDUCE ONLY IF NECESSARY
 1622                          00,2612  0 0006 1            EXTEND                    SINCE THE COMPENSATING INCR MIGHT CAUSE
 1623                          00,2613  1 2616 0            BZF      +3               OVERFLOW.
 1624                          00,2614  0 0006 1            EXTEND                    DONT SUBTRACT UNLESS RESULT IS POSITIVE
 1625   REF   1                00,2615  6 2624 0            BZMF     ENDMAXDV         OR ZERO.

 1626   REF 579  LAST 1062     00,2616 24 154 1    +3       INCR     MPAC             KEEP SUBTRACT HERE AND COMPENSATE.
 1627   REF   2  LAST 1057     00,2617  1 2625 0            TCF      FINALDV

 1628                          00,2620  0 0006 1  -UP       EXTEND                    IF ZERO, SET MINOR PART OF RESULT TO
 1629   REF   3  LAST 1063     00,2621  1 2630 1            BZF      FINALDV +3       ZERO.

 1630                          00,2622  0 0006 1            EXTEND                    IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
 1631   REF 580  LAST 1063     00,2623 26 154 0             DIM      MPAC             TO COMPENSATE. DIM IS OK HERE SINCE THE
 1632   REF 117  LAST 1063     00,2624  6 0130 0  ENDMAXDV  AD       BUF              MAJOR PART NEVER GOES NEGATIVE.
 1633                           00,2625  22 007 0  FINALDV  ZL                        DO DV TO OBTAIN MINOR PART OF RESULT.
 1634                           00,2626  0 0006 1           EXTEND
 1635   REF 118   LAST 1063     00,2627  10 130 1           DV       BUF
 1636   REF 581   LAST 1063     00,2630  54 155 1    +3     TS       MPAC +1

 1637   REF   6   LAST 1058     00,2631  10 136 1           CCS      DVSIGN           LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
 1638   REF 277   LAST 1054     00,2632  0 0002 0           TC       Q                -0.
 1639   REF 278   LAST 1064     00,2633  0 0002 0           TC       Q
 1640   REF 279   LAST 1064     00,2634  0 0002 0           TC       Q

 1641                           00,2635  0 0006 1           EXTEND
 1642   REF 582   LAST 1064     00,2636  4 0155 1           DCS      MPAC
 1643   REF 583   LAST 1064     00,2637  52 155 1           DXCH     MPAC
 1644   REF 206   LAST 1060     00,2640  3 4755 1           CAF      ZERO             SO WE ALWAYS RETURN WITH C(A) = 0.
 1645   REF 280   LAST 1064     00,2641  0 0002 0           TC       Q
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P1646          IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1648    DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1650    ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

R1652                      C + SB .          (C + B - D)
R1653                      ------ = 37777 + S(---------)
R1654                      C + SD            (    C    )

R1655          THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.

 1657   REF 584  LAST 1064   00,2642   4 0154 0  MAXDV    CS      MPAC             SEE IF MAXDV CASE STILL HOLDS AFTER
 1658   REF 119  LAST 1064   00,2643   6 0130 0           AD      BUF              NORMALIZATION.
 1659                        00,2644   0 0006 1           EXTEND
 1660                        00,2645   1 2647 1           BZF     +2
 1661   REF   2  LAST 1061   00,2646   1 2570 0           TCF     GENDDV           MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

 1662   REF  28  LAST 1059   00,2647   3 4733 1   +2      CAF     POSMAX           SET MAJOR PART OF RESULT.
 1663   REF 585  LAST 1065   00,2650  54  154 0           TS      MPAC

 1664   REF 120  LAST 1065   00,2651   4 0131 0           CS      BUF +1           FORM DIVIDEND OF MINOR PART OF RESULT.
 1665   REF 586  LAST 1065   00,2652   6 0155 0           AD      MPAC +1
 1666   REF   2  LAST 1063   00,2653   1 2624 1           TCF     ENDMAXDV         GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1667                                                                              BEFORE EXITING.
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P1668            VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

 1670   REF 111  LAST 1057   00,2654  4 4753 0  V/SC2    CS      ONE            INITIALIZE DIVIDEND NORMALIZATION COUNT
 1671   REF   4  LAST 1060   00,2655  54 137 0           TS      DVNORMCT       AND DIVISION SIGN REGISTER.
 1672   REF  53  LAST 1043   00,2656  54 127 1           TS      VBUF +5

 1673   REF   1              00,2657  0 3010 0           TC      VECAGREE       FORCE SIGN AGREEMENT IN VECTOR

 1674   REF 121  LAST 1065   00,2660  52 131 0           DXCH    BUF
 1675   REF   2  LAST  885   00,2661  0 7544 0           TC      ALSIGNAG       SIGN AGREE BUF
 1676   REF 122  LAST 1066   00,2662  52 131 0           DXCH    BUF
 1677   REF 123  LAST 1066   00,2663  10 130 1           CCS     BUF            FORCE DIVISOR POSITIVE WITH MAJOR PART
 1678   REF   1              00,2664  1 2721 0           TCF     /BUF+          NON-ZERO (IF POSSIBLE).
 1679                        00,2665  1 2667 0           TCF     +2
 1680   REF   1              00,2666  1 2715 1           TCF     /BUF-

 1681   REF 124  LAST 1066   00,2667  56 131 1           XCH     BUF +1         SHIFT VECTOR AND SCALAR LEFT 14.
 1682   REF 125  LAST 1066   00,2670  56 130 0           XCH     BUF
 1683   REF 587  LAST 1065   00,2671  56 155 0           XCH     MPAC +1
 1684   REF 588  LAST 1066   00,2672  56 154 1           XCH     MPAC
 1685                        00,2673  0 0006 1           EXTEND                 CHECK FOR OVERFLOW IN EACH CASE.
 1686                        00,2674  1 2676 0           BZF     +2
 1687   REF   3  LAST 1059   00,2675  1 2405 0           TCF     DVOVF

 1688   REF 589  LAST 1066   00,2676  56 160 0           XCH     MPAC +4
 1689   REF 590  LAST 1066   00,2677  56 157 1           XCH     MPAC +3
 1690                        00,2700  0 0006 1           EXTEND
 1691                        00,2701  1 2703 0           BZF     +2
 1692   REF   4  LAST 1066   00,2702  1 2405 0           TCF     DVOVF

 1693   REF 591  LAST 1066   00,2703  56 162 1           XCH     MPAC +6
 1694   REF 592  LAST 1066   00,2704  56 161 1           XCH     MPAC +5
 1695                        00,2705  0 0006 1           EXTEND
 1696                        00,2706  1 2710 1           BZF     +2
 1697   REF   5  LAST 1066   00,2707  1 2405 0           TCF     DVOVF

 1698   REF 126  LAST 1066   00,2710  10 130 1           CCS     BUF
 1699   REF   2  LAST 1066   00,2711  1 2721 0           TCF     /BUF+
 1700   REF   6  LAST 1066   00,2712  1 2405 0           TCF     DVOVF          ZERO DIVISOR - OVERFLOW.
 1701   REF   2  LAST 1066   00,2713  1 2715 1           TCF     /BUF-
 1702   REF   7  LAST 1066   00,2714  1 2405 0           TCF     DVOVF

 1703                        00,2715  0 0006 1  /BUF-    EXTEND                 ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
 1704   REF 127  LAST 1066   00,2716  4 0131 0           DCS     BUF            DVSIGN IN VBUF +5.
 1705   REF 128  LAST 1066   00,2717  52 131 0           DXCH    BUF
 1706   REF  54  LAST 1066   00,2720  24 127 0           INCR    VBUF +5
 1707                            00,2721  0 0006 1  /BUF+    EXTEND
 1708   REF 129  LAST 1066       00,2722  3 0131 1           DCA      BUF              LEAVE ABS(ORIG DIVISOR) IN BUF2
 1709   REF  17  LAST 1059       00,2723  52 134 0           DXCH     BUF2             FOR OVERFLOW TESTING
 1710   REF   1                  00,2724  1 2732 1           TCF      /NORM            NORMALIZE DIVISOR IN BUF.

 1711                            00,2725  0 0006 1  /NORM2   EXTEND                    IF LESS THAN .5, AUGMENT DVNORMCT AND
 1712   REF   5  LAST 1066       00,2726  24 137 1           AUG      DVNORMCT         DOUBLE DIVISOR.
 1713                            00,2727  0 0006 1           EXTEND
 1714   REF 130  LAST 1067       00,2730  3 0131 1           DCA      BUF
 1715   REF 131  LAST 1067       00,2731  20 131 0           DAS      BUF

 1716   REF 132  LAST 1067       00,2732  3 0130 0  /NORM    CA       BUF              SEE IF DIVISOR NORMALIZED.
 1717                            00,2733  6 0000 1           DOUBLE
 1718                            00,2734  54 000 0           OVSK
 1719   REF   1                  00,2735  1 2725 1           TCF      /NORM2           DOUBLE AND TRY AGAIN IF NOT.

 1720   REF   1                  00,2736  0 2750 1           TC       V/SCDV           DO X COMPONENT DIVIDE.
 1721   REF 593  LAST 1066       00,2737  52 160 1           DXCH     MPAC +3          SUPPLY ARGUMENTS IN USUAL SEQUENCE.
 1722   REF 594  LAST 1067       00,2740  52 155 1           DXCH     MPAC
 1723   REF 595  LAST 1067       00,2741  52 160 1           DXCH     MPAC +3

 1724   REF   2  LAST 1067       00,2742  0 2750 1           TC       V/SCDV           Y COMPONENT.
 1725   REF 596  LAST 1067       00,2743  52 162 0           DXCH     MPAC +5
 1726   REF 597  LAST 1067       00,2744  52 155 1           DXCH     MPAC
 1727   REF 598  LAST 1067       00,2745  52 162 0           DXCH     MPAC +5

 1728   REF   3  LAST 1067       00,2746  0 2750 1           TC       V/SCDV           Z COMPONENT.
 1729   REF   2  LAST 1050       00,2747  1 7420 1           TCF      VROTATEX         GO RE-ARRANGE COMPONENTS BEFORE EXIT.
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P1730              SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

 1732   REF  55  LAST 1066   00,2750   3 0127 0  V/SCDV   CA      VBUF +5          REFLECTS SIGN OF SCALAR.
 1733   REF   7  LAST 1064   00,2751  54 136 1            TS      DVSIGN

 1734   REF 599  LAST 1067   00,2752  10 154 0            CCS     MPAC             FORCE MPAC POSITIVE, EXITING ON ZERO.
 1735   REF   1              00,2753   1 2767 1           TCF     /MPAC+
 1736                        00,2754   1 2756 0           TCF     +2
 1737   REF   1              00,2755   1 2763 0           TCF     /MPAC-

 1738   REF 600  LAST 1068   00,2756  10 155 1            CCS     MPAC +1
 1739   REF   2  LAST 1068   00,2757   1 2767 1           TCF     /MPAC+
 1740   REF 281  LAST 1064   00,2760   0 0002 0           TC      Q
 1741   REF   2  LAST 1068   00,2761   1 2763 0           TCF     /MPAC-
 1742   REF 282  LAST 1068   00,2762   0 0002 0           TC      Q

 1743                        00,2763   0 0006 1  /MPAC-   EXTEND                   USUAL COMPLEMENTING AND SETTING OF SIGN.
 1744   REF 601  LAST 1068   00,2764   4 0155 1           DCS     MPAC
 1745   REF 602  LAST 1068   00,2765  52 155 1            DXCH    MPAC
 1746   REF   8  LAST 1068   00,2766  24 136 0            INCR    DVSIGN

 1747   REF 112  LAST 1066   00,2767   4 4753 0  /MPAC+   CS      ONE              INITIALIZE NEAR-ONE SWITCH.
 1748   REF   4  LAST 1061   00,2770  54 140 0            TS      MAXDVSW

 1749   REF 603  LAST 1068   00,2771   4 0154 0           CS      MPAC             CHECK POSSIBLE OVERFLOW.
 1750   REF  18  LAST 1067   00,2772   6 0133 0           AD      BUF2             UNNORMALIZED INPUT DIVISOR.
 1751   REF 343  LAST 1060   00,2773  10 000 0            CCS     A
 1752   REF   1              00,2774   1 3004 1           TCF     DDVCALL          NOT NEAR-ONE
 1753                        00,2775   1 2777 0           TCF     +2               +0 IS JUST POSSIBLE
 1754   REF   8  LAST 1066   00,2776   1 2405 0           TCF     DVOVF            NO HOPE
 1755   REF   5  LAST 1068   00,2777  54 140 0            TS      MAXDVSW          SIGNAL POSSIBLE NEAR-ONE CASE
 1756   REF 604  LAST 1068   00,3000   4 0155 1           CS      MPAC +1          SEE IF DIVISION CAN BE DONE
 1757   REF  19  LAST 1068   00,3001   6 0134 1           AD      BUF2 +1
 1758                        00,3002   0 0006 1           EXTEND
 1759   REF   9  LAST 1068   00,3003   6 2405 1           BZMF    DVOVF

 1760   REF 605  LAST 1068   00,3004  52 155 1  DDVCALL   DXCH    MPAC             CALL PRE-DIVIDE NORMALIZATION.
 1761   REF   6  LAST 1067   00,3005  50 137 1            INDEX   DVNORMCT
 1762   REF   2  LAST 1060   00,3006   1 2565 1           TCF     MAXTEST
 1763                            00,3007   32506 0  SLOPELO   DEC     .8324

 1764   REF 283  LAST 1068   00,3010   56 002 0  VECAGREE  XCH     Q                      SAVE Q IN A
 1765   REF 606  LAST 1069   00,3011   52 155 1            DXCH    MPAC
 1766   REF   3  LAST 1066   00,3012   0 7544 0            TC      ALSIGNAG               SIGNAGREE MPAC
 1767   REF 607  LAST 1069   00,3013   52 155 1            DXCH    MPAC
 1768   REF 608  LAST 1069   00,3014   52 160 1            DXCH    MPAC +3
 1769   REF   4  LAST 1069   00,3015   0 7544 0            TC      ALSIGNAG               SIGN AGREE MPAC +3
 1770   REF 609  LAST 1069   00,3016   52 160 1            DXCH    MPAC +3
 1771   REF 610  LAST 1069   00,3017   52 162 0            DXCH    MPAC +5
 1772   REF   5  LAST 1069   00,3020   0 7544 0            TC      ALSIGNAG               SIGNAGREE MPAC +5
 1773   REF 611  LAST 1069   00,3021   52 162 0            DXCH    MPAC +5
 1774   REF 344  LAST 1068   00,3022   0 0000 1            TC      A
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P1775               THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

 1777   REF   2  LAST 1066   00,3023  0 3010 0  UNIT       TC       VECAGREE       FORCE SIGN AGREEMENT IN VECTOR
 1778   REF   3  LAST 1039   00,3024  0 7532 1             TC       MPACVBUF       SAVE ARGUMENT IN VBUF
 1779   REF 207  LAST 1064   00,3025  3 4755 1             CAF      ZERO           MUST SENSE OVERFLOW IN FOLLOWING DOT.
 1780   REF   5  LAST 1057   00,3026  56 121 0             XCH      OVFIND
 1781   REF  20  LAST  924   00,3027  54 141 1             TS       TEM1
 1782   REF   1              00,3030  0 3317 1             TC       VSQSUB         DOT MPAC WITH ITSELF.
 1783   REF  21  LAST 1070   00,3031  3 0141 0             CA       TEM1
 1784   REF   7  LAST 1070   00,3032  56 121 0             XCH      OVFIND
 1785                        00,3033  0 0006 1             EXTEND
 1786                        00,3034  1 3036 0             BZF      +2
 1787   REF  10  LAST 1068   00,3035  1 2405 0             TCF      DVOVF
 1788                        00,3036  0 0006 1             EXTEND
 1789   REF 612  LAST 1069   00,3037  3 0155 0             DCA      MPAC           LEAVE THE SQUARE OF THE LENGTH OF THE
 1790   REF  46  LAST 1024   00,3040  50 120 1             INDEX    FIXLOC         ARGUMENT IN LVSQUARE.
 1791   REF   1              00,3041  52 043 1             DXCH     LVSQUARE

 1792   REF   1              00,3042  0 3343 0             TC       SQRTSUB        GO TAKE THE NORMALIZED SQUARE ROOT.

 1793   REF 613  LAST 1070   00,3043  10 154 0             CCS      MPAC           CHECK FOR UNIT OVERFLOW.
 1794                        00,3044  1 3051 1             TCF      +5             MPAC IS NOT LESS THAN .5 UNLESS
 1795   REF 200  LAST 1061   00,3045  54 001 1             TS       L
 1796   REF  47  LAST 1070   00,3046  50 120 1             INDEX    FIXLOC
 1797   REF   1              00,3047  52 045 1             DXCH     LV
 1798   REF  11  LAST 1070   00,3050  1 2405 0             TCF      DVOVF          INPUT TO SQRTSUB WAS 0.

 1799   REF   2  LAST  562   00,3051  4 4317 1             CS       FOURTEEN       SEE IF THE INPUT WAS SO SMALL THE THE
 1800   REF  47  LAST 1056   00,3052  6 0135 0             AD       MPTEMP         FIRST TWO REGISTERS OF THE SQUARE WERE 0
 1801   REF 345  LAST 1069   00,3053  10 000 0             CCS      A
 1802                        00,3054  4 0000 0             COM                     IF SO, SAVE THE NEGATIVE OF THE SHIFT
 1803   REF   1              00,3055  1 3133 1             TCF      SMALL          COUNT -15D.

 1804   REF   1              00,3056  1 3065 0             TCF      LARGE          (THIS IS USUALLY THE CASE.)

 1805   REF   1              00,3057  4 4761 1             CS       THIRTEEN       IF THE SHIFT COUNT WAS EXACTLY 14, SET
 1806   REF  48  LAST 1070   00,3060  54 135 1             TS       MPTEMP         THE PRE-DIVIDE NORM COUNT TO -13D.

 1807   REF 614  LAST 1070   00,3061  3 0154 1             CA       MPAC           SHIFT THE LENGTH RIGHT 14 BEFORE STORING
 1808   REF 201  LAST 1070   00,3062  54 001 1  SMALL2     TS       L              (SMALL EXITS TO THIS POINT).
 1809   REF 208  LAST 1070   00,3063  3 4755 1             CAF      ZERO
 1810   REF   1              00,3064  1 3112 1             TCF      LARGE2         GO TO STORE LENGTH AND PROCEED.

 1811   REF  49  LAST 1070   00,3065  10 135 1  LARGE      CCS      MPTEMP         MOST ALL CASES COME HERE.
 1812   REF   1              00,3066  1 3074 0             TCF      LARGE3         SEE IF NO NORMALIZATION WAS REQUIRED BY

 1813   REF   1              00,3067  4 2024 1             CS       SRDDV          SQRT, AND IF SO, SET UP FOR A SHIFT
 1814   REF  50  LAST 1070   00,3070  54 135 1             TS       MPTEMP         RIGHT 1 BEFORE DIVIDING TO PRODUCE
 1815                        00,3071  0 0006 1             EXTEND                  THE DESIRED HALF UNIT VECTOR.
 1816   REF 615  LAST 1070   00,3072  3 0155 0             DCA      MPAC
 1817   REF    2  LAST 1070    00,3073  1 3112 1            TCF     LARGE2
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1818                        00,3074  4 0000 0  LARGE3  COM                 LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
1819  REF  51  LAST 1070    00,3075  54 135 1          TS      MPTEMP      PREDIVIDE LEFT SHIFT.

1820                        00,3076  4 0000 0          COM                 PICK UP REQUIRED SHIFTING BIT TO UNNORM-
1821  REF 346  LAST 1070    00,3077  50 000 1          INDEX   A           ALIZE THE SQRT RESULT.
1822  REF  61  LAST 1055    00,3100  3 4736 1          CAF     BIT14
1823  REF 133  LAST 1067    00,3101  54 130 1          TS      BUF
1824                        00,3102  0 0006 1          EXTEND
1825  REF 616  LAST 1070    00,3103  7 0155 1          MP      MPAC +1
1826  REF 134  LAST 1072    00,3104  56 130 0          XCH     BUF
1827                        00,3105  0 0006 1          EXTEND              (UNNORMALIZE THE SQRT FOR LV).
1828  REF 617  LAST 1072    00,3106  7 0154 0          MP      MPAC
1829  REF 202  LAST 1070    00,3107  56 001 0          XCH     L
1830  REF 135  LAST 1072    00,3110  6 0130 0          AD      BUF
1831  REF 203  LAST 1072    00,3111  56 001 0          XCH     L

1832  REF  48  LAST 1070    00,3112  50 120 1  LARGE2  INDEX   FIXLOC
1833  REF   2  LAST 1070    00,3113  52 045 1          DXCH    LV          LENGTH NOW STORED IN WORK AREA.

1834  REF 113  LAST 1068    00,3114  4 4753 0          CS      ONE
1835  REF   6  LAST 1068    00,3115  54 140 0          TS      MAXDVSW     NO MAXDV CASES IN UNIT.

1836  REF  56  LAST 1068    00,3116  52 123 0          DXCH    VBUF        PREPARE X COMPONENT FOR DIVIDE, SETTING
1837  REF 618  LAST 1072    00,3117  52 155 1          DXCH    MPAC        LENGTH OF VECTOR AS DIVISOR IN BUF.
1838  REF 136  LAST 1072    00,3120  52 131 0          DXCH    BUF
1839  REF   1               00,3121  0 3151 1          TC      UNITDV

1840  REF  57  LAST 1072    00,3122  52 125 0          DXCH    VBUF +2     DO Y AND Z IN USUAL FASHION SO WE CAN
1841  REF 619  LAST 1072    00,3123  52 155 1          DXCH    MPAC        EXIT THROUGH VROTATEX.
1842  REF 620  LAST 1072    00,3124  52 160 1          DXCH    MPAC +3
1843  REF   2  LAST 1072    00,3125  0 3151 1          TC      UNITDV

1844  REF  58  LAST 1072    00,3126  52 127 1          DXCH    VBUF +4
1845  REF 621  LAST 1072    00,3127  52 155 1          DXCH    MPAC
1846  REF 622  LAST 1072    00,3130  52 162 0          DXCH    MPAC +5
1847  REF   3  LAST 1072    00,3131  0 3151 1          TC      UNITDV
1848  REF   3  LAST 1067    00,3132  1 7420 1          TCF     VROTATEX    AND EXIT.
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P1849            IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1851     14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

 1853     REF  52  LAST 1072   00,3133  54 135 1  SMALL     TS       MPTEMP             NEGATIVE OF PRE-DIVIDE SHIFT COUNT.

 1854     REF 209  LAST 1070   00,3134   3 4755 1           CAF      ZERO               SHIFT EACH COMPONENT LEFT 14.
 1855     REF  59  LAST 1072   00,3135  56 123 1            XCH      VBUF +1
 1856     REF  60  LAST 1073   00,3136  56 122 0            XCH      VBUF
 1857     REF  61  LAST 1073   00,3137  56 125 1            XCH      VBUF +3
 1858     REF  62  LAST 1073   00,3140  56 124 0            XCH      VBUF +2
 1859     REF  63  LAST 1073   00,3141  56 127 0            XCH      VBUF +5
 1860     REF  64  LAST 1073   00,3142  56 126 1            XCH      VBUF +4

 1861     REF  53  LAST 1073   00,3143   4 0135 1           CS       MPTEMP
 1862     REF 347  LAST 1072   00,3144  50 000 1            INDEX    A
 1863     REF  62  LAST 1072   00,3145   3 4736 1           CAF      BIT14
 1864                          00,3146   0 0006 1           EXTEND
 1865     REF 623  LAST 1072   00,3147   7 0154 0           MP       MPAC
 1866     REF   1              00,3150   1 3062 1           TCF      SMALL2

 1867     REF   4  LAST  950      4761            THIRTEEN  =        OCT15
 1868     REF   1                 4317            FOURTEEN  =        OCT16
 1869     REF  13  LAST  457      4317            OCT16     =        R1D1
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P1870              THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

 1871   REF 624  LAST 1073   00,3151  10 154 0  UNITDV    CCS     MPAC               FORCE MPAC POSITIVE IF POSSIBLE, SETTING
 1872   REF   1              00,3152   1 3170 0            TCF     UMPAC+             DVSIGN ACCORDING TO THE SIGN OF MPAC
 1873                        00,3153   1 3155 1            TCF     +2                 SINCE THE DIVISOR IS ALWAYS POSITIVE
 1874   REF   1              00,3154   1 3162 0            TCF     UMPAC-             HERE.

 1875   REF 625  LAST 1074   00,3155  10 155 1            CCS     MPAC +1
 1876   REF   2  LAST 1074   00,3156   1 3170 0            TCF     UMPAC+
 1877   REF 284  LAST 1069   00,3157   0 0002 0            TC      Q                  EXIT IMMEDIATELY ON ZERO.
 1878   REF   2  LAST 1074   00,3160   1 3162 0            TCF     UMPAC-
 1879   REF 285  LAST 1074   00,3161   0 0002 0            TC      Q

 1880   REF 210  LAST 1073   00,3162   4 4755 0  UMPAC-    CS      ZERO               IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
 1881   REF   9  LAST 1068   00,3163  54 136 1            TS      DVSIGN             COMPLEMENT.
 1882                        00,3164   0 0006 1            EXTEND
 1883   REF 626  LAST 1074   00,3165   4 0155 1            DCS     MPAC               PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
 1884   REF  54  LAST 1073   00,3166  50 135 0            INDEX   MPTEMP
 1885   REF   3  LAST 1068   00,3167   1 2564 0            TCF     MAXTEST -1

 1886   REF  10  LAST 1074   00,3170  54 136 1  UMPAC+    TS      DVSIGN             SET DVSIGN FOR POSITIVE QUOTIENT.
 1887   REF 627  LAST 1074   00,3171  52 155 1            DXCH    MPAC
 1888   REF  55  LAST 1074   00,3172  50 135 0            INDEX   MPTEMP
 1889   REF   4  LAST 1074   00,3173   1 2564 0            TCF     MAXTEST -1
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P1890             MISCELLANEOUS UNARY OPERATIONS.

 1891   REF    1                00,3174  0 3300 1  DSQ       TC      DSQSUB          SQUARE THE DP CONTENTS OF MPAC.
 1892   REF   34  LAST 1060     00,3175  1 6061 1            TCF     DANZIG

 1893   REF   33  LAST 1056     00,3176  10 163 1  ABVALABS  CCS     MODE            ABVAL OR ABS INSTRUCTION.
 1894   REF    3  LAST  824     00,3177  1 3226 0            TCF     ABS             DO ABS ON SCALAR.
 1895   REF    4  LAST 1075     00,3200  1 3226 0            TCF     ABS

 1896   REF    2  LAST 1070     00,3201  0 3317 1  ABVAL     TC      VSQSUB          DOT MPAC WITH ITSELF.
 1897   REF   34  LAST 1075     00,3202  22 163 0            LXCH    MODE            MODE IS NOW DP (L ZERO AFTER DAS).

 1898                           00,3203  0 0006 1            EXTEND                  STORE SQUARE OF LENGTH IN WORK AREA.
 1899   REF  628  LAST 1074     00,3204  3 0155 0            DCA     MPAC
 1900   REF   49  LAST 1072     00,3205  50 120 1            INDEX   FIXLOC
 1901   REF    2  LAST 1070     00,3206  52 043 1            DXCH    LVSQUARE
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P1902   PROGRAM DESCRIPTION- SUBROUTINE SQRT
R1903   FUNCTIONAL DESCRIPTION-DOUBLE PRECISION SQUARE ROOT ROUTINE
R1904       THIS PROGRAM TAKES THE SQUARE ROOT OF THE 27 OR 28 MOST SIGNIFICANT BITS IN THE TRIPLE PRECISION SET OF
R1906       NUMBERS-MPAC,MPAC+1,AND MPAC+2.  THE ROOT IS RETURNED DOUBLE          PRECISION IN MPAC AND MPAC+1.
R1908   WARNING- THIS SUBROUTINE USES A TRIPLE PRECISION INPUT. THE PROGRAMMER  MUST ASSURE THE CONTENTS OF MPAC+2
R1910       ESPECIALLY IF THE CONTENTS OF MPAC IS SMALL OR ZERO.  FOR DETAILS SEE STG MEMO NO.949.
R1912   CALLING SEQUENCE- IN INTERPRETIVE MODE I.E., FOLLOWING TC   INTPRET,SQRT   NO ADDRESS IS ALLOWED
R1914   INPUT SCALING  THE BINARY POINT IS ASSUMED TO THE RIGHT OF BIT 15. THE  ANSWER IS RETURNED WITH THE SAME SCALING
R1916   SUBROUTINES- GENSCR,MPACSHR, SQRTSUB,ABORT
R1917   ABORT EXIT MODE- ABORTS ON NEGATIVE INPUT -1.2X10E-4 (77775  OCTAL)      OR LESS.
R1919       DISPLAYS ERROR CODE 1302
R1920                     TC    ABORT
R1921                     OCT   1302
R1922   DEBRIS -  LOCATIONS BUF,MPTEMP,ADDRWD ARE USED
 1923   REF   2  LAST 1070   00,3207   0 3343 0  SQRT      TC      SQRTSUB          TAKE THE SQUARE ROOT OF MPAC.
 1924   REF  56  LAST 1074   00,3210  10  135 1            CCS     MPTEMP           RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1925                        00,3211   1 3213 0            TCF     +2               ANY UN-NORMALIZATION REQUIRED AND EXIT
 1926   REF  35  LAST 1075   00,3212   1 6061 1            TCF     DANZIG           IF NOT.

 1927   REF   3  LAST 1055   00,3213   6 3733 0            AD      NEG12            A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1928                        00,3214   0 0006 1            EXTEND                   REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1929   REF   1              00,3215   6 3221 0            BZMF    SQRTSHFT         GOES HERE IN MOST CASES.
 1930                        00,3216  22  007 0            ZL                       IF A LONG SHIFT IS REQUIRED, GO TO
 1931   REF  80  LAST 1056   00,3217  22  116 1            LXCH    ADDRWD           GENERAL RIGHT SHIFT ROUTINES.
 1932   REF   4  LAST 1055   00,3220   1 2303 1            TCF     GENSCR +4        ADDRWD WAS ZERO TO PREVENT ROUND.

 1933   REF  57  LAST 1076   00,3221  50  135 0  SQRTSHFT  INDEX   MPTEMP           SELECT SHIFTING BIT AND EXIT THROUGH
 1934   REF  36  LAST 1026   00,3222   3 4735 1            CAF     BIT15            SHIFT ROUTINES.
 1935   REF  58  LAST 1076   00,3223  54  135 1            TS      MPTEMP
 1936   REF 211  LAST 1074   00,3224   3 4755 1            CAF     ZERO             TO ZERO MPAC +2 IN THE PROCESS.
 1937   REF   2  LAST 1055   00,3225   1 2036 1            TCF     MPACSHR +3

 1938   REF   6  LAST 1052   00,3226   0 6723 1  ABS       TC      BRANCH           TEST SIGN OF MPAC AND COMPLEMENT IF
 1939   REF  36  LAST 1076   00,3227   1 6061 1            TCF     DANZIG
 1940   REF  37  LAST 1076   00,3230   1 6061 1            TCF     DANZIG
 1941   REF   4  LAST 1046   00,3231   1 7670 0            TCF     COMP
 1942  REF  22  LAST 1041  00,3232  4 4751 1  VDEF   CS      FOUR          VECTOR DEFINE - ESSENTIALLY TREATS
 1943  REF  23  LAST 1044  00,3233  26 166 1         ADS     PUSHLOC       SCALAR IN MPAC AS X COMPONENT, PUSHES UP
 1944                      00,3234  0 0006 1         EXTEND                FOR Y AND THEN AGAIN FOR Z.
 1945  REF 348  LAST 1073  00,3235  5 0000 1         INDEX   A
 1946                      00,3236  3 0003 1         DCA     2
 1947  REF 629  LAST 1075  00,3237  52 160 1         DXCH    MPAC +3
 1948                      00,3240  0 0006 1         EXTEND
 1949  REF  24  LAST 1077  00,3241  5 0166 0         INDEX   PUSHLOC
 1950                      00,3242  3 0001 0         DCA     0
 1951  REF 630  LAST 1077  00,3243  52 162 0         DXCH    MPAC +5
 1952  REF   2  LAST 1041  00,3244  1 6521 0         TCF     VMODE         MODE IS NON VECTOR.

 1953  REF   3  LAST 1075  00,3245  0 3317 1  VSQ    TC      VSQSUB        DOT MPAC WITH ITSELF.
 1954  REF   1             00,3246  1 7332 0         TCF     DMODE         MODE IS NOW DP.

 1955                      00,3247  0 0006 1  PUSH   EXTEND                PUSH DOWN MPAC LEAVING IT LOADED.
 1956  REF 631  LAST 1077  00,3250  3 0155 0         DCA     MPAC
 1957  REF  25  LAST 1077  00,3251  50 166 0         INDEX   PUSHLOC       PUSH DOWN FIRST TWO REGISTERS IN EACH
 1958                      00,3252  52 001 1         DXCH    0

 1959  REF  35  LAST 1075  00,3253  50 163 0         INDEX   MODE          INCREMENT PUSHDOWN POINTER.
 1960  REF   5  LAST 1021  00,3254  3 6244 0         CAF     NO.WDS
 1961  REF  26  LAST 1077  00,3255  26 166 1         ADS     PUSHLOC

 1962  REF  36  LAST 1077  00,3256  10 163 1         CCS     MODE
 1963  REF   1             00,3257  1 3272 1         TCF     TPUSH         PUSH DOWN MPAC +2.
 1964  REF  38  LAST 1076  00,3260  1 6061 1         TCF     DANZIG        DONE FOR DP.

 1965                      00,3261  0 0006 1         EXTEND                ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
 1966  REF 632  LAST 1077  00,3262  3 0160 0         DCA     MPAC +3
 1967  REF  27  LAST 1077  00,3263  50 166 0         INDEX   PUSHLOC
 1968                      00,3264  51'775 0         DXCH    0 -4
 1969                      00,3265  0 0006 1         EXTEND
 1970  REF 633  LAST 1077  00,3266  3 0162 1         DCA     MPAC +5
 1971  REF  28  LAST 1077  00,3267  50 166 0         INDEX   PUSHLOC
 1972                      00,3270  51'777 1         DXCH    0 -2
 1973  REF  39  LAST 1077  00,3271  1 6061 1         TCF     DANZIG

 1974  REF 634  LAST 1077  00,3272  3 0156 0  TPUSH  CA      MPAC +2
 1975  REF   2  LAST 1020  00,3273  1 6554 1         TCF     ENDTPUSH +2

 1976  REF  50  LAST 1075  00,3274  50 120 1  RVQ    INDEX   FIXLOC        RVQ - RETURN IVA QPRET.
 1977  REF  11  LAST 1023  00,3275  3 0052 0         CA      QPRET
 1978  REF  22  LAST 1035  00,3276  54 117 1         TS      POLISH
 1979  REF   5  LAST 1024  00,3277  1 6652 1         TCF     GOTO +4       (ASSUME QPRET POINTS TO FIXED ONLY.)
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P1980          THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1982   SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

 1983   REF 635  LAST 1077   00,3300  3 0155 0  DSQSUB   CA      MPAC +1         SQUARES THE SCALAR CONTENTS OF MPAC.
 1984                        00,3301  0 0006 1           EXTEND
 1985                        00,3302  7 0000 0           SQUARE
 1986   REF 636  LAST 1078   00,3303  54 156 1           TS      MPAC +2
 1987   REF 212  LAST 1076   00,3304  3 4755 1           CAF     ZERO            FORM 2(CROSS TERM).
 1988   REF 637  LAST 1078   00,3305  56 155 0           XCH     MPAC +1
 1989                        00,3306  0 0006 1           EXTEND
 1990   REF 638  LAST 1078   00,3307  7 0154 0           MP      MPAC
 1991                        00,3310  20 001 1           DDOUBL                  AND MAYBE OVERFLOW.
 1992   REF 639  LAST 1078   00,3311  20 156 1           DAS     MPAC +1         AND SET A TO NET OVERFLOW.
 1993   REF 640  LAST 1078   00,3312  56 154 1           XCH     MPAC
 1994                        00,3313  0 0006 1           EXTEND
 1995                        00,3314  7 0000 0           SQUARE
 1996   REF 641  LAST 1078   00,3315  20 155 1           DAS     MPAC
 1997   REF 286  LAST 1074   00,3316  0 0002 0           TC      Q

 1998                        00,3317  0 0006 1  VSQSUB   EXTEND                  DOTS THE VECTOR IN MPAC WITH ITSELF.
 1999   REF   9  LAST 1033   00,3320  22 137 1           QXCH    DOTRET
 2000   REF   2  LAST 1075   00,3321  0 3300 1           TC      DSQSUB          SQUARE THE X COMPONENT.
 2001   REF 642  LAST 1078   00,3322  52 160 1           DXCH    MPAC +3
 2002   REF 643  LAST 1078   00,3323  52 155 1           DXCH    MPAC
 2003   REF 137  LAST 1072   00,3324  52 131 0           DXCH    BUF             SO WE CAN END IN DOTSUB.
 2004   REF 644  LAST 1078   00,3325  3 0156 0           CA      MPAC +2
 2005   REF 138  LAST 1078   00,3326  54 132 0           TS      BUF +2

 2006   REF   3  LAST 1078   00,3327  0 3300 1           TC      DSQSUB          SQUARE Y COMPONENT.
 2007   REF 645  LAST 1078   00,3330  52 156 1           DXCH    MPAC +1
 2008   REF 139  LAST 1078   00,3331  20 132 0           DAS     BUF +1
 2009   REF 646  LAST 1078   00,3332  6 0154 1           AD      MPAC
 2010   REF 140  LAST 1078   00,3333  6 0130 0           AD      BUF
 2011   REF 141  LAST 1078   00,3334  54 130 1           TS      BUF
 2012                        00,3335  1 3337 1           TCF     +2
 2013   REF   8  LAST 1076   00,3336  54 121 1           TS      OVFIND          IF OVERFLOW.

 2014   REF 647  LAST 1078   00,3337  52 162 0           DXCH    MPAC +5
 2015   REF 648  LAST 1078   00,3340  52 155 1           DXCH    MPAC
 2016   REF   4  LAST 1078   00,3341  0 3300 1           TC      DSQSUB          SQUARE Z COMPONENT.
 2017   REF   1              00,3342  1 7205 0           TCF     ENDDOT          END AS IN DOTSUB.
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P2018            DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R2020     IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R2022     .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.


 2023     REF 213  LAST 1078   00,3343  3 4755 1  SQRTSUB  CAF     ZERO              START BY ZEROING RIGHT SHIFT COUNT.
 2024     REF  59  LAST 1076   00,3344  54 135 1           TS      MPTEMP

 2025     REF 649  LAST 1078   00,3345  10 154 0           CCS     MPAC              CHECK FOR POSITIVE ARGUMENT, SHIFTING
 2026     REF   1              00,3346  1 3405 1           TCF     SMPAC+            FIRST SIGNIFICANT MPAC REGISTER INTO
 2027                          00,3347  1 3351 1           TCF     +2                MPAC ITSELF.
 2028     REF   1              00,3350  1 3373 1           TCF     SQRTNEG           SEE IF MAG OF ARGUMENT LESS THAN 10(-4).

 2029     REF 650  LAST 1079   00,3351  56 156 0           XCH     MPAC +2           MPAC IS ZERO - SHIFT LEFT 14.
 2030     REF 651  LAST 1079   00,3352  56 155 0           XCH     MPAC +1
 2031     REF 652  LAST 1079   00,3353  54 154 0           TS      MPAC
 2032     REF  14  LAST  960   00,3354  3 4757 0           CAF     SEVEN             AUGMENT RIGHT SHIFT COUNTER.
 2033     REF  60  LAST 1079   00,3355  54 135 1           TS      MPTEMP

 2034     REF 653  LAST 1079   00,3356  10 154 0           CCS     MPAC              SEE IF MPAC NOW PNZ.
 2035     REF   2  LAST 1079   00,3357  1 3405 1           TCF     SMPAC+
 2036                          00,3360  1 3362 1           TCF     +2
 2037     REF   1              00,3361  1 3376 1           TCF     ZEROANS           NEGATIVE BUT LESS THAN 10(-4) IN MAG.

 2038     REF 654  LAST 1079   00,3362  56 155 0           XCH     MPAC +1           ZERO - SHIFT LEFT 14 AGAIN.
 2039     REF 655  LAST 1079   00,3363  54 154 0           TS      MPAC
 2040     REF  15  LAST 1079   00,3364  3 4757 0           CAF     SEVEN             AUGMENT RIGHT SHIFT COUNTER.
 2041     REF  61  LAST 1079   00,3365  26 135 1           ADS     MPTEMP

 2042     REF 656  LAST 1079   00,3366  10 154 0           CCS     MPAC
 2043     REF   3  LAST 1079   00,3367  1 3405 1           TCF     SMPAC+
 2044     REF 287  LAST 1078   00,3370  0 0002 0           TC      Q                 SQRT(0) = 0.
 2045     REF   2  LAST 1079   00,3371  1 3376 1           TCF     ZEROANS
 2046     REF   1              00,3372  1 3453 1           TCF     FIXROOT           DO NOT LEAVE SQRTSUB WITH -0 IN MPAC.


 2047     REF 349  LAST 1077   00,3373  10 000 0  SQRTNEG  CCS     A                 ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
 2048     REF   1              00,3374  1 3402 0           TCF     SQRTABRT          CORRECTED ARGUMENT IS LESS THAN 10(-4)

 2049     REF 657  LAST 1079   00,3375  10 155 1           CCS     MPAC +1           IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
 2050     REF 214  LAST 1079   00,3376  3 4755 1  ZEROANS  CAF     ZERO              FORCE ANSWER TO ZERO HERE.
 2051     REF   2  LAST 1079   00,3377  1 3453 1           TCF     FIXROOT
 2052     REF   2  LAST 1079   00,3400  1 3402 0           TCF     SQRTABRT
 2053     REF   3  LAST 1079   00,3401  1 3453 1           TCF     FIXROOT

 2054     REF  27  LAST 1025   00,3402  52 165 1  SQRTABRT DXCH    LOC
 20541    REF   1              00,3403  0 5726 1           TC      POODOO1
 2055                          00,3404   01302 1           OCT     1302
 2056   REF    1                00,3405  6 2444 1  SMPAC+    AD       -1/2+2          SEE IF ARGUMENT GREATER THAN OR EQUAL TO
 2057                           00,3406  0 0006 1            EXTEND                   .5.
 2058   REF    1                00,3407  6 3456 0            BZMF     SRTEST          IF SO, SEE IF LESS THAN .25.

 2059   REF 658  LAST 1079      00,3410  52 155 1            DXCH     MPAC            WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
 2060   REF  16  LAST 1061      00,3411  22 021 1            LXCH     SR              SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
 2061                           00,3412  0 0006 1            EXTEND
 2062   REF  17  LAST 1061      00,3413  7 4736 0            MP       HALF
 2063   REF 659  LAST 1080      00,3414  52 155 1            DXCH     MPAC
 2064   REF  17  LAST 1080      00,3415  56 021 1            XCH      SR
 2065   REF 660  LAST 1080      00,3416  26 155 1            ADS      MPAC +1         GUARANTEED NO OVERFLOW.

 2066   REF    1                00,3417  3 2314 0  ARGHI     CAF      SLOPEHI         ARGUMENT BETWEEN .25 AND .5. GET A
 2067                           00,3420  0 0006 1            EXTEND                   LINEAR APPROXIMATION FOR THIS RANGE.
 2068   REF 661  LAST 1080      00,3421  7 0154 0            MP       MPAC
 2069   REF    1                00,3422  6 2566 0            AD       BIASHI          X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

 2070   REF 142  LAST 1078      00,3423  54 130 1   +4       TS       BUF             X0/2 (ARGLO ENTERS HERE).
 2071   REF 662  LAST 1080      00,3424  3 0154 1            CA       MPAC            SINGLE-PRECISION THROUGHOUT.
 2072                           00,3425  22 007 0            ZL
 2073                           00,3426  0 0006 1            EXTEND
 2074   REF 143  LAST 1080      00,3427  10 130 1            DV       BUF             (MPAC/2)/(X0/2)
 2075                           00,3430  0 0006 1            EXTEND
 2076   REF  18  LAST 1080      00,3431  7 4736 0            MP       HALF
 2077   REF 144  LAST 1080      00,3432  26 130 1            ADS      BUF             X1 = X0/2 + .5(MPAC/2)/(X0/2).

 2078                           00,3433  0 0006 1            EXTEND
 2079   REF  19  LAST 1080      00,3434  7 4736 0            MP       HALF            FORM UP X1/2.
 2080   REF 663  LAST 1080      00,3435  52 155 1            DXCH     MPAC            SAVE AND BRING OUT ARGUMENT.
 2081                           00,3436  0 0006 1            EXTEND                   TAKE DP QUOTIENT WITH X1.
 2082   REF 145  LAST 1080      00,3437  10 130 1            DV       BUF
 2083   REF 146  LAST 1080      00,3440  54 131 0            TS       BUF +1          SAVE MAJOR PART OF QUOTIENT.
 2084   REF 215  LAST 1079      00,3441  3 4755 1            CAF      ZERO            FORM MINOR PART OF QUOTIENT USING
 2085   REF 204  LAST 1072      00,3442  56 001 0            XCH      L               (REMAINDER,0).
 2086                           00,3443  0 0006 1            EXTEND
 2087   REF 147  LAST 1080      00,3444  10 130 1            DV       BUF
 2088   REF 205  LAST 1080      00,3445  54 001 1            TS       L               IN PREPARATION FOR DAS.
 2089   REF 148  LAST 1080      00,3446  3 0131 1            CA       BUF +1
 2090   REF 664  LAST 1080      00,3447  20 155 1            DAS      MPAC            X2 = X1/2 + (MPAC/2)X1

 2091                           00,3450  0 0006 1            EXTEND                   OVERFLOWS IF ARG. NEAR POSMAX.
 2092   REF    1                00,3451  1 3455 1            BZF      TCQBNKOO
 2093   REF  29  LAST 1065      00,3452  3 4733 1            CAF      POSMAX
 2094   REF 665  LAST 1080      00,3453  54 154 0  FIXROOT   TS       MPAC
 2095   REF 666  LAST 1080      00,3454  54 155 1            TS       MPAC +1
 2096   REF 288  LAST 1079      00,3455  0 0002 0  TCQBNKOO  TC       Q               RETURN TO CALLER TO UNNORMALIZE, ETC.
 2097   REF    1             00,3456  6 4737 0  SRTEST    AD      QUARTER        ARGUMENT WAS LESS THAN .5, SEE IF LESS
 2098                        00,3457  0 0006 1            EXTEND                 THAN .25.
 2099   REF    1             00,3460  6 3502 0            BZMF    SQRTNORM       IF SO, BEGIN NORMALIZATION.

 2100   REF  667  LAST 1080  00,3461  52 155 1            DXCH    MPAC           IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
 2101   REF   18  LAST 1080  00,3462  22 021 1            LXCH    SR             START AT ARGLO.
 2102                        00,3463  0 0006 1            EXTEND
 2103   REF   20  LAST 1080  00,3464  7 4736 0            MP      HALF
 2104   REF  668  LAST 1081  00,3465  52 155 1            DXCH    MPAC
 2105   REF   19  LAST 1081  00,3466  56 021 1            XCH     SR
 2106   REF  669  LAST 1081  00,3467  26 155 1            ADS     MPAC +1        NO OVERFLOW.

 2107   REF    1             00,3470  3 3007 0  ARGLO     CAF     SLOPELO        (NORMALIZED) ARGUMENT BETWEEN .125 AND
 2108                        00,3471  0 0006 1            EXTEND                 .25
 2109   REF  670  LAST 1081  00,3472  7 0154 0            MP      MPAC
 2110   REF    1             00,3473  6 2270 0            AD      BIASLO
 2111   REF    1             00,3474  1 3423 0            TCF     ARGHI +4       BEGIN SQUARE ROOT.

 2112                        00,3475  0 0006 1  SQRTNM2   EXTEND                 SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
 2113   REF  671  LAST 1081  00,3476  3 0156 0            DCA     MPAC +1        COUNT (FOR TERMINAL UNNORMALIZATION).
 2114   REF  672  LAST 1081  00,3477  20 156 1            DAS     MPAC +1
 2115   REF  673  LAST 1081  00,3500  6 0154 1            AD      MPAC
 2116   REF  674  LAST 1081  00,3501  26 154 0            ADS     MPAC           (NO OVERFLOW).

 2117   REF   62  LAST 1079  00,3502  24 135 0  SQRTNORM  INCR    MPTEMP         FIRST TIME THROUGH, JUST SHIFT LEFT 1
 2118                        00,3503  0 0006 1            EXTEND                 (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
 2119   REF  675  LAST 1081  00,3504  3 0156 0            DCA     MPAC +1        WE WANT MPAC/2).
 2120   REF  676  LAST 1081  00,3505  20 156 1            DAS     MPAC +1
 2121   REF  677  LAST 1081  00,3506  6 0154 1            AD      MPAC
 2122   REF  678  LAST 1081  00,3507  26 154 0            ADS     MPAC           (AGAIN NO OVERFLOW).
 2123                        00,3510  6 0000 1            DOUBLE
 2124   REF   19  LAST  461  00,3511  54 022 0            TS      CYL

 2125   REF   20  LAST 1081  00,3512  10 022 0  NORMTEST  CCS     CYL            SEE IF ARGUMENT NOW NORMALIZED AT
 2126   REF   21  LAST 1081  00,3513  10 022 0            CCS     CYL            GREATER THAN .125.
 2127   REF    1             00,3514  1 3475 0            TCF     SQRTNM2        NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
 2128   REF    2  LAST 1081  00,3515  1 3417 1            TCF     ARGHI          YES - NOW BETWEEN .5 AND .25.
 2129   REF    1             00,3516  1 3470 0            TCF     ARGLO          ARGUMENT NOW BETWEEN .25 AND .125.
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P2130    TRIGONOMETRIC FUNCTION PACKAGE.

R2131               THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2133               1.  SIN                 COMPUTES (1/2)SINE(2 PI MPAC).
R2134               2.  COS                 COMPUTES (1/2)COSINE(2 PI MPAC).

R2135               3.  ASIN                COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2136               4.  ACOS                COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2137    SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.


 2138    REF    7  LAST 1076    00,3517  0 6723 1  COSINE   TC      BRANCH          FINDS COSINE USING THE IDENTITY
 2139                           00,3520  1 3523 1           TCF     +3              COS(X) = SIN(PI/2 - ABS(X)).
 2140    REF    1               00,3521  1 3526 1           TCF     PRESINE
 2141    REF    2  LAST 1082    00,3522  1 3526 1           TCF     PRESINE

 2142                           00,3523  0 0006 1   +3      EXTEND
 2143    REF  679  LAST 1081    00,3524  4 0155 1           DCS     MPAC
 2144    REF  680  LAST 1082    00,3525  52 155 1           DXCH    MPAC

 2145    REF    2  LAST 1081    00,3526  3 4737 0  PRESINE  CAF     QUARTER         PI/2 SCALED.
 2146    REF  681  LAST 1082    00,3527  26 154 0           ADS     MPAC


 2147    REF  682  LAST 1082    00,3530  52 155 1  SINE     DXCH    MPAC            DOUBLE ARGUMENT.
 2148                           00,3531  20 001 1           DDOUBL
 2149                           00,3532  54 000 0           OVSK                    SEE IF OVERFLOW PRESENT.
 2150                           00,3533  1 3536 0           TCF     +3              IF NOT, ARGUMENT OK AS IS.

 2151                           00,3534  0 0006 1           EXTEND                  IF SO, WE LOST (OR GAINED) PI, SO
 2152                           00,3535  4 0001 1           DCOM                    COMPLEMENT MPAC USING THE IDENTITY
A2153                                                                               SIN(X-(+)PI) = SIN(-X).
 2154    REF  683  LAST 1082    00,3536  52 155 1   +3      DXCH    MPAC
 2155    REF  684  LAST 1082    00,3537  3 0154 1           CA      MPAC            SEE IF ARGUMENT GREATER THAN .5 IN
 2156                           00,3540  6 0000 1           DOUBLE                  MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
 2157    REF  206  LAST 1080    00,3541  54 001 1           TS      L               .5 (+-PI/2 SCALED) AS FOLLOWS:
 2158    REF    1               00,3542  1 3553 0           TCF     SN1

 2159    REF  350  LAST 1079    00,3543  50 000 1           INDEX   A               IF POSITIVE, FORM PI - X, IF NEGATIVE
 2160    REF    4  LAST  858    00,3544  3 4735 1           CAF     NEG1/2 +1       USE -PI - X.
 2161                           00,3545  6 0000 1           DOUBLE
 2162                           00,3546  0 0006 1           EXTEND
 2163    REF  685  LAST 1082    00,3547  60 154 1           SU      MPAC            GUARANTEED NO OVERFLOW.
 2164    REF  686  LAST 1082    00,3550  54 154 0           TS      MPAC
 2165    REF  687  LAST 1082    00,3551  4 0155 1           CS      MPAC +1
 2166    REF  688  LAST 1082    00,3552  54 155 1           TS      MPAC +1
 2167                         00,3553  0 0006 1  SN1      EXTEND                 SET UP TO EVALUATE HASTINGS POLYNOMIAL
 2168   REF 689  LAST 1082    00,3554  3 0155 0           DCA     MPAC
 2169   REF  20  LAST 1068    00,3555  52 134 0           DXCH    BUF2
 2170   REF   5  LAST 1078    00,3556  0 3300 1           TC      DSQSUB         SQUARE MPAC.

 2171   REF   2  LAST  856    00,3557  0 7222 1           TC      POLY           EVALUATE FOURTH ORDER POLYNOMIAL.
 2172                         00,3560   00003 1           DEC     3
 2173                         00,3561   14441 0           2DEC    +.3926990796
 2173                         00,3562   37325 1
 2174                         00,3563   53250 0           2DEC    -.6459637111
 2174                         00,3564   60764 1
 2175                         00,3565   12146 1           2DEC    +.318758717
 2175                         00,3566   21276 1
 2176                         00,3567   75466 1           2DEC    -.074780249
 2176                         00,3570   71471 0
 2177                         00,3571   00236 0           2DEC    +.009694988
 2177                         00,3572   32757 0

 2178   REF   1               00,3573  3 2470 0           CAF     LBUF2          MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
 2179   REF  19  LAST 1044    00,3574  0 7106 1           TC      DMPSUB -1

 2180                         00,3575  0 0006 1           EXTEND
 2181   REF 690  LAST 1083    00,3576  3 0156 0           DCA     MPAC +1
 2182   REF 691  LAST 1083    00,3577  20 156 1           DAS     MPAC +1
 2183   REF 692  LAST 1083    00,3600  6 0154 1           AD      MPAC
 2184   REF 693  LAST 1083    00,3601  26 154 0           ADS     MPAC           NEITHER SHIFT OVERFLOWS.
 2185                         00,3602  0 0006 1           EXTEND
 2186   REF 694  LAST 1083    00,3603  3 0156 0           DCA     MPAC +1
 2187   REF 695  LAST 1083    00,3604  20 156 1           DAS     MPAC +1
 2188   REF 696  LAST 1083    00,3605  6 0154 1           AD      MPAC
 2189   REF 697  LAST 1083    00,3606  26 154 0           ADS     MPAC
 2190   REF  40  LAST 1077    00,3607  1 6061 1           TCF     DANZIG
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P2191              ARCSIN/ARCCOS ROUTINE.

 2192   REF    1               00,3610  3 3631 0  ARCSIN    CAF     LASINEX          COMPUTE ARCSIN BY USING THE IDENTITY
 2193                          00,3611  1 3613 1            TCF     +2               ARCSIN(X) = PI/2 - ARCCOS(X).

 2194   REF    1               00,3612  3 3713 1  ARCCOS    CAF     LDANZIG          (EXITS IMMEDIATELY).
 2195   REF    1               00,3613  54 136 1            TS      ESCAPE
 2196   REF    8  LAST 1082    00,3614  0 6723 1            TC      BRANCH           TEST SIGN OF INPUT.
 2197   REF    1               00,3615  1 3625 1            TCF     ACOSST           START IMMEDIATELY IF POSITIVE.
 2198   REF    1               00,3616  1 3731 0            TCF     ACOSZERO         ARCCOS(0) = PI/2 = .25.
 2199                          00,3617  0 0006 1            EXTEND                   IF NEGATIVE, USE THE IDENTITY
 2200   REF  698  LAST 1083    00,3620  4 0155 1            DCS     MPAC             ARCCOS(X) = PI - ARCCOS(-X), FORCING
 2201   REF  699  LAST 1084    00,3621  52 155 1            DXCH    MPAC             ARGUMENT POSITIVE.
 2202   REF    1               00,3622  3 3734 1            CAF     TCSUBTR          SET EXIT  TO DO ABOVE BEFORE
 2203   REF    2  LAST 1084    00,3623  56 136 0            XCH     ESCAPE           ARCSIN/ARCCOS CONSIDERATIONS.
 2204   REF    1               00,3624  54 137 0            TS      ESCAPE2

 2205   REF   21  LAST 1081    00,3625  4 4736 0  ACOSST    CS      HALF             TEST MAGNITUDE OF INPUT.
 2206   REF  700  LAST 1084    00,3626  6 0154 1            AD      MPAC
 2207   REF  351  LAST 1082    00,3627  10 000 0            CCS     A
 2208   REF    1               00,3630  1 3721 1            TCF     ACOSOVF          THIS IS PROBABLY AN OVERFLOW CASE.

 2209   REF    1               00,3631  1 3707 0  LASINEX   TCF     ASINEX

 2210   REF    1               00,3632  1 3642 0            TCF     ACOSST2          NO OVERFLOW - PROCEED.

 2211   REF  701  LAST 1084    00,3633  10 155 1            CCS     MPAC +1          IF MAJOR PART IS .5, CALL ANSWER 0
 2212   REF  216  LAST 1080    00,3634  3 4755 1            CAF     ZERO             UNLESS MINOR PART NEGATIVE.
 2213   REF    1               00,3635  1 3637 1            TCF     ACOS=0

 2214   REF    2  LAST 1084    00,3636  1 3642 0            TCF     ACOSST2

 2215   REF  702  LAST 1084    00,3637  54 155 1  ACOS=0    TS      MPAC +1
 2216   REF  703  LAST 1084    00,3640  54 154 0            TS      MPAC
 2217   REF    3  LAST 1084    00,3641  0 0136 0            TC      ESCAPE

 2218                          00,3642  0 0006 1  ACOSST2   EXTEND                   NOW THAT ARGUMENT IS IN PROPER RANGE,
 2219   REF  704  LAST 1084    00,3643  4 0155 1            DCS     MPAC             BEGIN COMPUTATION. USE HASTINGS
 2220   REF   22  LAST 1084    00,3644  6 4736 1            AD      HALF             APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
 2221   REF  705  LAST 1084    00,3645  52 155 1            DXCH    MPAC             IN A SCALED VERSION WHERE P(X) IS A
 2222   REF   21  LAST 1083    00,3646  52 134 0            DXCH    BUF2             SEVENTH ORDER POLYNOMIAL.

 2223   REF    3  LAST 1076    00,3647  0 3343 0            TC      SQRTSUB          RETURNS WITH NORMALIZED SQUARE ROOT.

 2224   REF   63  LAST 1081    00,3650  10 135 1            CCS     MPTEMP           SEE IF UN-NORMALIZATION REQUIRED.
 2225   REF    1               00,3651  1 3714 1            TCF     ACOSSHR          IF SO.
 2226  REF 706  LAST 1084   00,3652  52 155 1  ACOS3    DXCH    MPAC             SET UP FOR POLYNOMIAL EVALUATION.
 2227  REF  22  LAST 1084   00,3653  52 134 0           DXCH    BUF2
 2228  REF 707  LAST 1085   00,3654  52 155 1           DXCH    MPAC

 2229  REF   3  LAST 1083   00,3655  0 7222 1           TC      POLY
 2230                       00,3656   00006 1           DEC     6
 2231                       00,3657   13240 0           2DEC    +.353553385      COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
 2231                       00,3660   23630 0
 2232                       00,3661   74721 0           2DEC*   -.0483017006 B+1*                    I
 2232                       00,3662   47775 1
 2233                       00,3663   02440 0           2DEC*   +.0200273085 B+2*    WHERE C STANDS FOR ORIGINAL COEFFS.
 2233                       00,3664   20237 0
 2234                       00,3665   75067 1           2DEC*   -.0112931863 B+3*
 2234                       00,3666   70742 1
 2235                       00,3667   03436 0           2DEC*   +.00695311612 B+4*
 2235                       00,3670   26756 1
 2236                       00,3671   74037 0           2DEC*   -.00384617957 B+5*
 2236                       00,3672   57640 1
 2237                       00,3673   03046 0           2DEC*   +.001501297736 B+6*
 2237                       00,3674   07143 0
 2238                       00,3675   76654 1           2DEC*   -.000284160334 B+7*
 2238                       00,3676   42244 0

 2239  REF   2  LAST 1083   00,3677  3 2470 0           CAF     LBUF2            DO FINAL MULTIPLY AND GO TO ANY
 2240  REF  20  LAST 1083   00,3700  0 7106 1           TC      DMPSUB -1        EPILOGUE SEQUENCES.
 2241  REF   4  LAST 1084   00,3701  0 0136 0           TC      ESCAPE

 2242                       00,3702  0 0006 1  SUBTR    EXTEND                   EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
 2243  REF 708  LAST 1085   00,3703  4 0155 1           DCS     MPAC
 2244  REF  23  LAST 1084   00,3704  6 4736 1           AD      HALF             FORMS PI - ARCCOS(-X) = ARCCOS(X).
 2245  REF 709  LAST 1085   00,3705  52 155 1           DXCH    MPAC
 2246  REF   2  LAST 1084   00,3706  0 0137 1           TC      ESCAPE2          GO TO POSSIBLE ARCSIN EPILOGUE.

 2247                       00,3707  0 0006 1  ASINEX   EXTEND
 2248  REF 710  LAST 1085   00,3710  4 0155 1           DCS     MPAC             ARCSIN EPILOGUE - GET ARCSIN(X)
 2249  REF   3  LAST 1082   00,3711  6 4737 0           AD      QUARTER          = PI/2 - ARCCOS(X).
 2250  REF 711  LAST 1085   00,3712  52 155 1           DXCH    MPAC
 2251  REF  41  LAST 1083   00,3713  1 6061 1  LDANZIG  TCF     DANZIG
 2252    REF 352  LAST 1084    00,3714  50 000 1  ACOSSHR   INDEX   A               THE SHIFT RIGHT IS LESS THAN 14 SINCE
 2253    REF  63  LAST 1073    00,3715  3 4736 1            CAF     BIT14           THE INPUT WAS NON-ZERO DP.
 2254    REF  64  LAST 1084    00,3716  54 135 1            TS      MPTEMP
 2255    REF   4  LAST 1050    00,3717  0 2073 1            TC      VSHRRND         DP SHIFT RIGHT AND ROUND.
 2256    REF   1               00,3720  1 3652 1            TCF     ACOS3           PROCEED.

 2257                          00,3721  0 0006 1  ACOSOVF   EXTEND                  IF MAJOR PART WAS ONLY 1 MORE THAN .5,
 2258    REF   2  LAST 1084    00,3722  1 3637 1            BZF     ACOS=0          CALL ANSWER ZERO.

 2259                          00,3723  0 0006 1  ACOSABRT  EXTEND                  IF OVERFLOW, CALL ANSWER ZERO BUT
 22591   REF  28  LAST 1079    00,3724  3 0165 0            DCA     LOC             SOUND AN ALARM.
 22592   REF   1               00,3725  0 5732 1            TC      ALARM1
 22593                         00,3726   01301 1            OCT     1301

 2260    REF 217  LAST 1084    00,3727  3 4755 1            CAF     ZERO
 22601   REF   3  LAST 1086    00,3730  1 3637 1            TCF     ACOS=0

 2261    REF   4  LAST 1085    00,3731  3 4737 0  ACOSZERO  CAF     QUARTER         ACOS(0) = PI/2.
 2262    REF   4  LAST 1086    00,3732  1 3640 1            TCF     ACOS=0 +1       SET MPAC AND EXIT VIA ESCAPE.

 2263                          00,3733   77763 0  NEG12     DEC     -12
 2264    REF   1               00,3734  1 3702 0  TCSUBTR   TCF     SUBTR
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P2265             THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2267              1.  AXT                 ADDRESS TO INDEX TRUE.
R2268              1.  AXC                 ADDRESS TO INDEX COMPLEMENTED.
R2269              3.  LXA                 LOAD INDEX FROM ERASABLE.
R2270              4.  LXC                 LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2271              5.  SXA                 STORE INDEX IN ERASABLE.
R2272              6.  XCHX                EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2273              7.  INCR                INCREMENT INDEX REGISTER.
R2274              8.  XAD                 ERASABLE ADD TO INDEX REGISTER.
R2275              9.  XSU                 ERASABLE SUBTRACT FROM INDEX REGISTER.

R2276             10.  TIX                 BRANCH ON INDEX REGISTER AND DECREMENT.


 2277                          01,2344                          BANK    01

 2278   REF   1                                                 COUNT*  $$/INTER
 2279   REF   1                01,2344  0 2441 1   AXT          TC      TAGSUB           SELECT APPROPRIATE INDEX REGISTER.
 2280   REF  23   LAST 1077    01,2345  3 0117 0                CA      POLISH
 2281   REF   4   LAST 1006    01,2346  50 130 0   XSTORE       INDEX   INDEXLOC         CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2282   REF  30   LAST 1016    01,2347  54 046 1                TS      X1
 2283   REF  42   LAST 1065    01,2350  1 6061 1                TCF     DANZIG

 2284   REF   2   LAST 1087    01,2351  0 2441 1   AXC          TC      TAGSUB
 2285   REF  24   LAST 1087    01,2352  4 0117 1                CS      POLISH
 2286   REF   1                01,2353  0 2346 1                TC      XSTORE

 2287   REF   1                01,2354  0 2427 1   LXA          TC      15ADRERS         LOAD INDEX REGISTER FROM ERASABLE.
 2288   REF  25   LAST 1087    01,2355  50 117 0                INDEX   POLISH
 2289                          01,2356  3 0000 1                CA      0
 2290   REF   2   LAST 1087    01,2357  1 2346 0                TCF     XSTORE

 2291   REF   2   LAST 1087    01,2360  0 2427 1   LXC          TC      15ADRERS         LOAD NDX REG FROM ERASABLE COMPLEMENTED.
 2292   REF  26   LAST 1087    01,2361  50 117 0                INDEX   POLISH
 2293                          01,2362  4 0000 0                CS      0
 2294   REF   3   LAST 1087    01,2363  1 2346 0                TCF     XSTORE

 2295   REF   3   LAST 1087    01,2364  0 2427 1   SXA          TC      15ADRERS         STORE INDEX REGISTER IN ERASABLE.
 2296   REF   5   LAST 1087    01,2365  50 130 0                INDEX   INDEXLOC
 2297   REF  31   LAST 1087    01,2366  3 0046 0                CA      X1
 2298   REF  27   LAST 1087    01,2367  50 117 0   MSTORE1      INDEX   POLISH
 2299                          01,2370  54 000 0                TS      0
 2300   REF  43   LAST 1087    01,2371  1 6061 1                TCF     DANZIG
 2301   REF   4  LAST 1087   01,2372  0 2427 1  XCHX      TC      15ADRERS       EXCHANGE INDEX REGISTER WITH ERASABLE.
 2302   REF  28  LAST 1037   01,2373  50 117 0            INDEX   POLISH
 2303                        01,2374  3 0000 1            CA      0
 2304   REF   6  LAST 1087   01,2375  50 130 0            INDEX   INDEXLOC
 2305   REF  32  LAST 1087   01,2376  56 046 0            XCH     X1
 2306   REF   1              01,2377  1 2367 0            TCF     MSTOFF1

 2307   REF   5  LAST 1088   01,2400  0 2427 1  XAD       TC      15ADRERS       ADD ERASABLE TO INDEX REGISTER.
 2308   REF  29  LAST 1088   01,2401  50 117 0            INDEX   POLISH
 2309                        01,2402  3 0000 1            CA      0
 2310   REF   7  LAST 1088   01,2403  50 130 0  XAD2      INDEX   INDEXLOC
 2311   REF  33  LAST 1088   01,2404  26 046 1            ADS     X1             IGNORING OVERFLOWS.
 2312   REF  44  LAST 1087   01,2405  1 6061 1            TCF     DANZIG

 2313   REF   3  LAST 1087   01,2406  0 2441 1  INCR      TC      TAGSUB         INCREMENT INDEX REGISTER.
 2314   REF  30  LAST 1088   01,2407  3 0117 0            CA      POLISH
 2315   REF   1              01,2410  1 2403 0            TCF     XAD2

 2316   REF   6  LAST 1088   01,2411  0 2427 1  XSU       TC      15ADRERS       SUBTRACT ERASABLE FROM INDEX REGISTER.
 2317   REF  31  LAST 1088   01,2412  50 117 0            INDEX   POLISH
 2318                        01,2413  4 0000 0            CS      0
 2319   REF   2  LAST 1088   01,2414  1 2403 0            TCF     XAD2


 2320   REF   4  LAST 1088   01,2415  0 2441 1  TIX       TC      TAGSUB         BRANCH AND DECREMENT ON INDEX.
 2321   REF   8  LAST 1088   01,2416  50 130 0            INDEX   INDEXLOC
 2322   REF  12  LAST  964   01,2417  4 0050 0            CS      S1
 2323   REF   9  LAST 1088   01,2420  50 130 0            INDEX   INDEXLOC
 2324   REF  34  LAST 1088   01,2421  6 0046 0            AD      X1
 2325                        01,2422  0 0006 1            EXTEND                 NO OPERATION IF DECREMENTED INDEX IS
 2326   REF  45  LAST 1088   01,2423  6 6061 0            BZMF    DANZIG         NEGATIVE OR ZERO.

 2327   REF  10  LAST 1088   01,2424  50 130 0  DOTIXBR   INDEX   INDEXLOC
 2328   REF  35  LAST 1088   01,2425  56 046 0            XCH     X1             IGNORING OVERFLOWS.

 2329   REF   6  LAST 1077   01,2426  1 6646 1            TCF     GOTO           DO THE BRANCH USING THE CADR IN POLISH.
```

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P2330          SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

 2332  REF  32  LAST 1088   01,2427  4 0117 1  15ADRERS CS    POLISH
 2333  REF   2  LAST 1016   01,2430  6 4772 1           AD    DEC45
 2334  REF 353  LAST 1086   01,2431  10 000 0           CCS   A               DOES THE ADDRESS POINT TO THE WORK AREA?
 2335  REF  51  LAST 1077   01,2432  3 0120 1           CA    FIXLOC          YES.  ADD FIXLOC.  EBANK OK AS IS.
 2336                       01,2433  1 2440 1           TCF   +5

 2337  REF   6  LAST 1016   01,2434  3 5007 0           CA    OCT1400         NO.  SET EBANK & MAKE UP SUBADDRESS.
 2338  REF  33  LAST 1089   01,2435  56 117 0           XCH   POLISH
 2339  REF  61  LAST 1024   01,2436  54 003 0           TS    EBANK
 2340  REF  14  LAST 1024   01,2437  7 4357 0           MASK  LOW8
 2341  REF  34  LAST 1089   01,2440  26 117 1   +5      ADS   POLISH          FALL INTO TAGSUB, AND RETURN VIA Q.

R2342          SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

 2344  REF  52  LAST 1089   01,2441  3 0120 1  TAGSUB   CA    FIXLOC
 2345  REF  11  LAST 1098   01,2442  54 130 1           TS    INDEXLOC

 2346  REF  36  LAST 1056   01,2443  10 020 1           CCS   CYR             BIT 15 SPECIFIES INDEX.
 2347  REF  12  LAST 1089   01,2444  24 130 0           INCR  INDEXLOC        0 MEANS USE X2.
 2348  REF 289  LAST 1080   01,2445  0 0002 0           TC    Q
 2349  REF 290  LAST 10[illegible] 01,2446  0 0002 0           TC    Q               1 FOR X1.
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P2350              MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2352              1.  ITA                 STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2354              2.  CALL                CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2356              3.  RTB                 RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2358              4.  BHIZ                BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2360              5.  BOV                 BRANCH ON OVERFLOW.
R2361              6.  GOTO                SIMPLE SEQUENCE CHANGE.

 2362  REF  37  LAST 1089   01,2447  10 020 1  RTB/BHIZ CCS    CYR
 2363  REF  35  LAST 1089   01,2450  3 0117 0  RTB      CA     POLISH
 2364  REF   5  LAST  940   01,2451  0 4621 0           TC     SWCALL   -1      SO A "TC Q" FROM ROUTINE LEADS TO DANZIG

 2365  REF 712  LAST 1085   01,2452  10 154 0  BHIZ     CCS    MPAC
 2366  REF  46  LAST 1088   01,2453  1 6061 1           TCF    DANZIG
 2367  REF   7  LAST 1088   01,2454  1 6646 1           TCF    GOTO
 2368  REF  47  LAST 1090   01,2455  1 6061 1           TCF    DANZIG
 2369  REF   8  LAST 1090   01,2456  1 6646 1           TCF    GOTO

 2370  REF   9  LAST 1078   01,2457  10 121 1  BOV(B)   CCS    OVFIND           BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2371                       01,2460  1 2462 1           TCF    +2
 2372  REF  48  LAST 1090   01,2461  1 6061 1           TCF    DANZIG
 2373  REF  10  LAST 1090   01,2462  54 121 1           TS     OVFIND
 2374  REF  38  LAST 1090   01,2463  10 020 1           CCS    CYR
 2375  REF   1              01,2464  1 2450 0           TCF    RTB              IF BASIC.
 2376                       01,2465   00360 1  B5TOB8   OCT    360
 2377  REF   9  LAST 1090   01,2466  1 6646 1           TCF    GOTO
 2378   REF  39  LAST 1090   01,2467  10 020 1  BZE/GOTO CCS     CYR              SEE WHICH OP-CODE IS DESIRED.
 2379   REF   9  LAST 1084   01,2470   0 6723 1           TC      BRANCH           DO BZE.
 2380   REF  49  LAST 1090   01,2471   1 6061 1           TCF     DANZIG
 2381   REF  10  LAST 1090   01,2472   1 6646 1           TCF     GOTO             DO GOTO.
 2382   REF  50  LAST 1091   01,2473   1 6061 1           TCF     DANZIG

 2383   REF  40  LAST 1091   01,2474  10 020 1  BPL/BMN   CCS     CYR
 2384   REF   1              01,2475   1 2503 1           TCF     BPL
 2385                        01,2476    12000 1  5B10     DEC     5 B+10           SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

 2386   REF  10  LAST 1091   01,2477   0 6723 1           TC      BRANCH           DO BMN.
 2387   REF  51  LAST 1091   01,2500   1 6061 1           TCF     DANZIG
 2388   REF  52  LAST 1091   01,2501   1 6061 1           TCF     DANZIG
 2389   REF  11  LAST 1091   01,2502   1 6646 1           TCF     GOTO             ONLY IF NNZ.

 2390   REF  11  LAST 1091   01,2503   0 6723 1  BPL      TC      BRANCH
 2391   REF  12  LAST 1091   01,2504   1 6646 1           TCF     GOTO             IF POSITIVE OR ZERO.
 2392   REF  13  LAST 1091   01,2505   1 6646 1           TCF     GOTO
 2393   REF  53  LAST 1091   01,2506   1 6061 1           TCF     DANZIG

 2394   REF  41  LAST 1091   01,2507  10 020 1  CALL/ITA  CCS     CYR
 2395   REF   1              01,2510   1 6640 1           TCF     CALL

 2396   REF   7  LAST  445   01,2511   0 5705 0           TC      CCSHOLE
 2397   REF   7  LAST 1088   01,2512   0 2427 1           TC      15ADRERS         STORE QPRET. (TAGSUB AFTER 15ADRERS IS
 2398   REF  53  LAST 1089   01,2513  50 120 1            INDEX   FIXLOC           SLOW IN THIS CASE, BUT SAVES STORAGE.)
 2399   REF  12  LAST 1077   01,2514   3 0052 0           CA      QPRET
 2400   REF   2  LAST 1088   01,2515   1 2367 0           TCF     MSTORE1
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R2401              THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2403    00        BONSET                    SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2404    01        SETGO                     SET A SWITCH AND DO A GOTO.
R2405    02        BOFSET                    SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2406    03        SET                       SET A SWITCH.

R2407    04        BONINV                    INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2408    05        INVGO                     INVERT A SWITCH AND DO A GOTO.
R2409    06        BOFINV                    INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2410    07        INVERT                    INVERT A SWITCH.

R2411    10        BONCLR                    CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2412    11        CLRGO                     CLEAR A SWITCH AND DO A GOTO.
R2413    12        BOFCLR                    CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2414    13        CLEAR                     CLEAR A SWITCH.

R2415    14        BON                       BRANCH IF A SWITCH WAS ON.
R2416    16        BOFF                      BRANCH IF A SWITCH WAS OFF.

R2417              THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2419              BITS 1-4     SWITCH BIT NUMBER (1-15).
R2420              BITS 5-8     SWITCH OPERATION NUMBER.
R2421              BITS 9-      SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2422              THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2424    ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.

 2426    REF   2  LAST  745   01,2516  3 4762 0  SWITCHES CAF     LOW4              LEAVE THE SWITCH BIT IN  SWBIT  .
 2427    REF  36  LAST 1090   01,2517  7 0117 1           MASK    POLISH
 2428    REF 354  LAST 108[illegible]   01,2520  50 000 1           INDEX   A
 2429    REF  37  LAST 1077   01,2521  3 4735 1           CAF     BIT15             (NUMBER FROM LEFT TO RIGHT.)
 2430    REF   1              01,2522  54 131 0           TS      SWBIT

 2431    REF  39  LAST  997   01,2523  3 4745 0           CAF     BIT7              LEAVE THE SWITCH NUMBER IN SWWORD.
 2432                         01,2524  0 0006 1           EXTEND
 2433    REF  37  LAST 1092   01,2525  7 0117 1           MP      POLISH
 2434    REF   1              01,2526  54 130 1           TS      SWWORD

 2435                         01,2527  0 0004 0           INHINT                    DURING SWITCH CHANGE SO RUPT CAN USE TOO
 2436    REF 355  LAST 1092   01,2530  50 000 1           INDEX   A                 LEAVE THE SWITCH WORD ITSELF IN L.
 2437    REF  43  LAST  598   01,2531  3 0074 1           CA      STATE
 2438    REF 291  LAST 1089   01,2532  54 002 1           TS      Q                 Q WILL BE USED AS A CHANNEL.
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  2439   REF  23  LAST  918   01,2533  3 4741 1             CAF     BIT11
  2440                        01,2534  0 0006 1             EXTEND              DISPATCH SWITCH BIT OPERATION AS IN BITS
  2441   REF  38  LAST 1092   01,2535  7 0117 1             MP      POLISH      7-8 OF POLISH.
  2442   REF   1              01,2536  7 2576 0             MASK    B3TCB4      GETS 4X2-BIT CODE.
  2443   REF 356  LAST 1092   01,2537  50 000 1             INDEX   A
  2444                        01,2540  1 2541 1             TCF     +1

  2445   REF   2  LAST 1092   01,2541  3 0131 1   +1        CA      SWBIT       00 - SET SWITCH IN QUESTION.
  2446                        01,2542  0 0006 1             EXTEND
  2447   REF   1              01,2543  04 002 1             ROR     QCHAN
  2448   REF   1              01,2544  1 2553 1             TCF     SWSTORE

  2449   REF   3  LAST 1093   01,2545  3 0131 1   +5        CA      SWBIT       01 - INVERT SWITCH.
  2450                        01,2546  0 0006 1             EXTEND
  2451   REF   2  LAST 1093   01,2547  06 002 0             RXOR    QCHAN
  2452   REF   2  LAST 1093   01,2550  1 2553 1             TCF     SWSTORE

  2453   REF   4  LAST 1093   01,2551  4 0131 0   +9D       CS      SWBIT       10 - CLEAR.
  2454   REF 292  LAST 1092   01,2552  7 0002 1             MASK    Q
  2455   REF   2  LAST 1092   01,2553  50 130 0  SWSTORE   INDEX   SWWORD
  2456   REF  44  LAST 1092   01,2554  54 074 0             TS      STATE       NEW SWITCH WORD.
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 2457                          01,2555  0 0003 1   +13D     RELINT              11 - NOOP.
 2458   REF  38  LAST  958     01,2556  3 4737 0            CAF      BIT13
 2459                          01,2557  0 0006 1            EXTEND              DISPATCH SEQUCE CHANGING OR BRANCHING
 2460   REF  39  LAST 1093     01,2560  7 0117 1            MP       POLISH     CODE.
 2461   REF   2  LAST 1093     01,2561  7 2576 0            MASK     B3TOB4
 2462   REF 357  LAST 1093     01,2562  50 000 1            INDEX    A
 2463                          01,2563  1 2564 0            TCF      +1         ORIGINALLY STORED IN BITS 5-6.

 2464   REF 293  LAST 1093     01,2564  4 0002 1   +1       CS       Q          00 - BRANCH IF ON.
 2465   REF   5  LAST 1093     01,2565  7 0131 0  TEST      MASK     SWBIT
 2466   REF 358  LAST 1094     01,2566  10 000 0            CCS      A
 2467   REF   1                01,2567  1 2577 1            TCF      SWSKIP

 2468   REF   1                01,2570  1 6715 0   +5       TCF      SWBRANCH   01 - GO TO.

 2469   REF   2  LAST 1094     01,2571  1 2577 1            TCF      SWSKIP     HERE ONLY ON BIT 15.

 2470   REF   8  LAST 1091     01,2572  0 5705 0            TC       CCSHOLE
 2471   REF   9  LAST 1094     01,2573  0 5705 0            TC       CCSHOLE

 2472   REF 294  LAST 1094     01,2574  3 0002 0   +9D      CA       Q          10 - BRANCH IF OFF.
 2473   REF   1                01,2575  1 2565 1            TCF      TEST

 2474                          01,2576   00014 1  B3TOB4    OCT      0014
 2475   REF  29  LAST 1086     01,2577  24 164 1  SWSKIP    INCR     LOC

 2476   REF   1                01,2516            SW/       EQUALS SWITCHES

 2477   REF  54  LAST 1091     01,2600  1 6061 1   +13D     TCF      DANZIG     11 - NOOP.
 0001                         4732                          BLOCK   02

 00015 REF    1                                             COUNT*  $$/FCONS
R00016   THE FOLLOWING TABLE OF 18 VALUES IS INDEXED. DO NOT INSERT OR REMOVE ANY QUANTITIES.

 0002                         4732    37777 1  DPOSMAX      OCT     37777             MUST PRECEDE POSMAX
 0003                         4733    37777 1  POSMAX       OCT     37777

 0004  REF    5  LAST 1082    4734             LIMITS       =       NEG1/2

 0007                         4734    57777 1  NEG1/2       OCT     -20000            USED BY SIN ROUTINE (MUST BE TWO
A0008                                                                                 LOCATIONS IN FRONT OF BIT14)
R0009           BIT TABLE

 0010                         4735    40000 0  BIT15        OCT     40000
 0011                         4736    20000 0  BIT14        OCT     20000
 0012                         4737    10000 0  BIT13        OCT     10000
 0013                         4740    04000 0  BIT12        OCT     04000
 0014                         4741    02000 0  BIT11        OCT     02000
 0015                         4742    01000 0  BIT10        OCT     01000
 0016                         4743    00400 0  BIT9         OCT     00400
 0017                         4744    00200 0  BIT8         OCT     00200
 0018                         4745    00100 0  BIT7         OCT     00100
 0019                         4746    00040 0  BIT6         OCT     00040
 0020                         4747    00020 0  BIT5         OCT     00020
 0021                         4750    00010 0  BIT4         OCT     00010
 0022                         4751    00004 0  BIT3         OCT     00004
 0023                         4752    00002 0  BIT2         OCT     00002
 0024                         4753    00001 0  BIT1         OCT     00001


R0025   DO NOT DESTROY THIS COMBINATION, SINCE IT IS USED IN DOUBLE PRECISION INSTRUCTIONS.
 0027                         4754    77777 0  NEG0         OCT     -0                MUST PRECEDE ZERO
 0028                         4755    00000 1  ZERO         OCT     0                 MUST FOLLOW NEG0
A0029                                          BIT1         OCT     00001
A0030                                          NO.WDS       OCT     2                 INTERPRETER
A0031                                          OCTAL3       OCT     3                 INTERPRETER
A0032                                          R3D1         OCT     4                 PINBALL
 0033                         4756    00005 1  FIVE         OCT     5
A0034                                          REVCNT       OCT     6                 INTERPRETER
 0035                         4757    00007 0  SEVEN        OCT     7
A0036                                          BIT4         OCT     00010
A0037                                          R2D1         OCT     11                PINBALL
 00375 REF    6  LAST  457    4320             OCT11        =       R2D1              P20S
A0038                                          BINCON       DEC     10                PINBALL           (OCTAL 12)
 0039                         4760    00013 0  ELEVEN       DEC     11
A0040                                          OCT14        OCT     14                ALARM AND ABORT (FILLER)
 00401                        4761    00015 0  OCT15        OCT     15
A0041                                          S1D1         OCT     16                PINBALL
 0043                         4762    00017 1  LOW4         OCT     17
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A0044                                          BIT5      OCT     00020
A0045                                          ND1       OCT     21            PINBALL
A0046                                          VD1       OCT     23            PINBALL
A0047                                          OCT24     OCT     24            SERVICE ROUTINES
A0048                                          MD1       OCT     25            PINBALL
 00485                        4763  00030 1    BITS4&5   OCT     30
A0049                                          OCT31     OCT     31            SERVICE ROUTINES
 00491                        4764  00033 1    OCT33     OCT     33
 00492  REF   3  LAST  865    4764             DEC27     =       OCT33
 00493                        4765  00035 1    OCT35     OCT     35
 00494  REF   2  LAST  745    4765             DEC29     =       OCT35
 0050                         4766  00032 0    CALLCODE  OCT     00032
A0051                                          LOW5      OCT     37            PINBALL
A0052                                          33DEC     DEC     33            PINBALL                (OCTAL 41)
A0053                                          34DEC     DEC     34            PINBALL                (OCTAL 42)
 0054                         4767  00045 0    TBUILDFX  DEC     37            BUILDUP FOR CONVIENCE IN DAPTESTING
 0055                         4770  00046 0    TDECAYFX  DEC     38            CONVENIENCE FOR DAPTESTING
A0056                                          BIT6      OCT     00040
 0057                         4771  00050 1    OCT50     OCT     50
 0058                         4772  00055 1    DEC45     DEC     45
 0059                         4773  00060 1    SUPER011  OCT     60            BITS FOR SUPERBNK SETTING 011.
 0060                         4774  00062 0    .5SEC     DEC     50
A0061                                          BIT7      OCT     00100

 0062   REF  40  LAST 1092    4745             SUPER100  =       BIT7          BITS FOR SUPERBNK SETTING 100
A0063                                                                          (LAST 4K OF ROPE)
 0064                         4775  00120 1    SUPER101  OCT     120           BITS FOR SUPERBNK SETTING 101
A0065                                          OCT121    OCT     121           SERVICE ROUTINES
A0066                                                                          (FIRST 8K OF ACM)
 0067                         4776  00140 1    SUPER110  OCT     140           BITS FOR SUPERBNK SETTING 110.
A0068                                                                          (LAST 8K OF ACM)
 0069                         4777  00144 0    1SEC      DEC     100
A0070                                          LOW7      OCT     177           INTERPRETER
A0071                                          BIT8      OCT     00200
A0072                                          OT215     OCT     215           ALARM AND ABORT
A0073                                          8,5       OCT     00220         P20-P25 SUNDANCE
 0074                         5000  00310 0    2SECS     DEC     200
A0075                                          LOW8      OCT     377           PINBALL
A0076                                          BIT9      OCT     00400
 0077                         5001  00401 1    GN/CCODE  OCT     00401         SET S/C CONTROL SWITCH TO G/N
 0079                         5002  00454 1    3SECS     DEC     300
 0080                         5003  00620 0    4SECS     DEC     400
 00801                        5004  00777 0    LOW9      OCT     777
A0081                                          BIT10     OCT     01000
A0082                                          5.5DEGS   DEC     .03056        P20-P25 SUNDANCE       (OCTAL 00765)
A0083                                          OCT1103   OCT     1103          ALARM AND ABORT
 0084                         5005  01124 1    C5/2      DEC     .0363551                             (OCTAL 01124)
 0085                         5006  01211 1    V05N09    VN      0509          (SAME AS OCTAL 1211)
 0086                         5007  01400 1    OCT1400   OCT     01400
 00865                        5010  01426 0    V06N22    VN      0622
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A0087                                                    MID5       OCT      1740                PINBALL
 00875                                  5011    01776 0  PITS2-10   OCT      1776
 0088                                   5012    01777 1  LOW10      OCT      1777
A0089                                                    BIT11      OCT      02000
A0090                                                    2K+3       OCT      2003                PINBALL
 0091                                   5013    02177 1  LOW7+2K    OCT      2177                OP CODE MASK + BANK 1 FBANK SETTING.
 0092                                   5014    02400 1  EBANK5     OCT      02400
 0093                                   5015    03000 1  PRIO3      OCT      03000
 0094                                   5016    03400 0  EBANK7     OCT      03400
A0095                                                    LOW11      OCT      3777                PINBALL
A0096                                                    BIT12      OCT      04000
A0097                                                    RELTAB     OCT      04025               T4RUPT
 0098                                   5017    05000 1  PRIO5      OCT      05000
 0099                                   5020    06000 1  PRIO6      OCT      06000
 0100                                   5021    07000 0  PRIO7      OCT      07000

A0102                                                    BIT13      OCT      10000
A0103                                                               OCT      10003               T4RUPT      RELTAB +1D
A0104                                                    13,7,2     OCT      10102               P20-P25 SUNDANCE
 0105                                   5022    11000 1  PRIO11     OCT      11000
A0106                                                    PRIO12     OCT      12000               BANKCALL
 0107                                   5023    13000 0  PRIO13     OCT      13000
 0108                                   5024    14000 1  PRIO14     OCT      14000
A0109                                                               OCT      14031               T4RUPT      RELTAB +2D
 0110                                   5025    15000 0  PRIO15     OCT      15000
 0111                                   5026    16000 0  PRIO16     OCT      16000
A0112                                                    85DEGS     DEC      .45556              P20-P25 SUNDANCE   (OCTAL 16450)
 0113                                   5027    17000 1  PRIO17     OCT      17000
 0114                                   5030    17770 1  OCT17770   OCT      17770
A0115                                                    BIT14      OCT      20000
A0116                                                               OCT      20033               T4RUPT      RELTAB +3D
 0117                                   5031    21000 1  PRIO21     OCT      21000
 01175                                  7710                        BLOCK    03
 01176   REF     1                                                  COUNT*   $$/FCONS
 0118                                   7710    22000 1  PRIO22     OCT      22000               SERVICE ROUTINES
 0119                                   7711    23000 0  PRIO23     OCT      23000
 0120                                   7712    24000 1  PRIO24     OCT      24000
A0121                                                    5/8+1      OCT      24001               SINGLE PRECISION SUBROUTINES
A0122                                                               OCT      24017               T4RUPT      RELTAB +4D
 0123                                   7713    25000 0  PRIO25     OCT      25000
 0124                                   7714    26000 0  PRIO26     OCT      26000
 0125                                   7715    27000 1  PRIO27     OCT      27000
A0126                                                    CHRPRIO    OCT      30000               PINBALL
A0127                                                               OCT      30036               T4RUPT      RELTAB +5D
 0128                                   7716    31000 0  PRIO31     OCT      31000
 0129                                   7717    31103 1  C1/2       DEC      .7853134                               (OCTAL 31103)
 0130                                   7720    32000 0  PRIO32     OCT      32000
 0131                                   7721    33000 1  PRIO33     OCT      33000
 0132                                   7722    34000 0  PRIO34     OCT      34000
A0133                                                               OCT      34034               T4RUPT      RELTAB +6D
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 0134                                   7723   35000 1  PRIO35    OCT     35000
 0135                                   7724   36000 1  PRIO36    OCT     36000
 0136                                   7725   37000 0  PRIO37    OCT     37000
 0137                                   7726   37401 0  63/64+1   OCT     37401
A0138                                                   MID7      OCT     37600            PINBALL
 0139                                   7727   37766 1  OCT37766  OCT     37766
 0140                                   7730   37774 1  OCT37774  OCT     37774
 0141                                   7731   37776 0  OCT37776  OCT     37776
A01411                                                  DPOSMAX   OCT     37777
A0142                                                   BIT15     OCT     40000
A0143                                                   OCT40001  OCT     40001            INTERPRETER  ( CS   1   INSTRUCTION)
 0144                                   7732   40014 0  DLOADCOD  OCT     40014
 0145                                   7733   40015 1  DLOAD*    OCT     40015
A0146                                                             OCT     40023            T4RUPT      RELTAB +7D
 01465                                  7734   40040 1  BIT15+6   OCT     40040
 01466                                  7735   40200 1  OCT40200  OCT     40200
A0147                                                             OCT     44035            T4RUPT     RELTAB +8D
A0148                                                             OCT     50037            T4RUPT      RELTAB +9D
A0149                                                             OCT     54000            T4RUPT      RELTAB +10D
 01495                                  7736   57777 1  -BIT14    OCT     57777
A0150                                                   RELTAB11  OCT     60000            T4RUPT
 0151                                   7737   65552 0  C3/2      DEC     -.3216147                               (OCTAL 65552)
 0152                                   7740   70000 0  13,14,15  OCT     70000
 0153                                   7741   73777 1  -1/8      OCT     73777
 0154                                   7742   74000 1  HIGH4     OCT     74000
 0155                                   7743   74056 1  -ENDERAS  DEC     -2001                                   (OCTAL 74056)
A0156                                                   HI5       OCT     76000            PINBALL
 0157                                   7744   77700 0  HIGH9     OCT     77700
A0158                                                   -ENDVAC   DEC     -45              INTERPRETER             (OCTAL 77722)
A0159                                                   -OCT10    OCT     -10                                       (OCT 77767)
A0161                                                   NEG4      DEC     -4                                       (OCTAL 77773)
 0162                                   7745   77774 0  NEG3      DEC     -3
 0163                                   7746   77775 1  NEG2      OCT     77775
 0164                                   7747   77776 1  NEGONE    DEC     -1
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PC165    DEFINED BY EQUALS

R0166    IT WOULD BE TO THE USERS ADVANTAGE TO OCCASIONALLY CHECK ANY OF THESE SYMBOLS IN ORDER TO PREVENT ANY
R0168    ACCIDENTAL DEFINITION CHANGES.

 0169    REF   5  LAST  867       7747             MINUS1    =       NEG1
 0170    REF  11  LAST 1059       7747             NEG1      =       NEGONE
 0171    REF  50  LAST 1004       4753             ONE       =       BIT1
 0172    REF  47  LAST  976       4752             TWO       =       BIT2
 0173    REF   1                  6245             THREE     =       OCTAL3
 0174    REF  31  LAST 1028       6245             LOW2      =       THREE
 0175    REF  33  LAST  902       4751             FOUR      =       BIT3
 0176    REF   5  LAST 1008       6242             SIX       =       REVCNT
 0177    REF  16  LAST 1079       4757             LOW3      =       SEVEN
 0178    REF  40  LAST  976       4750             EIGHT     =       BIT4
 0179    REF   7  LAST 1095       4320             NINE      =       R2D1
 0180    REF   2  LAST  470       4363             TEN       =       BINCON
 0181    REF   3  LAST  745       4760             NOUTCON   =       ELEVEN
 0182    REF  15  LAST  456       4360             OCT23     =       VD1
 01825   REF   3  LAST  789       4362             OCT25     =       MD1
 0183    REF  36  LAST 1055       4742             PRIO1     =       BIT10
 0184    REF   7  LAST 1089       5007             EBANK3    =       OCT1400
 0185    REF  24  LAST 1093       4741             PRIO2     =       BIT11
 0186    REF   1                  4775             OCT120    =       SUPER101
 0187    REF   3  LAST  604       4776             OCT140    =       SUPER110
 0188    REF  25  LAST 1099       4741             2K        =       BIT11
 0189    REF  26  LAST 1099       4741             EBANK4    =       BIT11
 0190    REF  31  LAST  827       4740             PRIO4     =       BIT12
 0191    REF  13  LAST  873       5015             EBANK6    =       PRIO3
 0192    REF  39  LAST 1094       4737             QUARTER   =       BIT13
 0193    REF  40  LAST 1099       4737             PRIO10    =       BIT13
 01935   REF   1                  7663             OCT10001  =       CCSL
 0194    REF  24  LAST 1085       4736             POS1/2    =       HALF
 0195    REF  64  LAST 1086       4736             PRIO20    =       BIT14
 0196    REF  65  LAST 1099       4736             HALF      =       BIT14
 0197    REF   3  LAST  468       4355             PRIO30    =       CHRPRIO
 0198    REF  10  LAST 1026       4355             BIT13-14  =       PRIO30         INTERPRETER USES IN PROCESSING STORECODE
 01985   REF   3  LAST 1011       6471             OCT30002  =       TLOAD +1
 0199    REF   2  LAST  996       7722             B12T14    =       PRIO34
 0200    REF  38  LAST 1092       4735             NEGMAX    =       BIT15
 0201    REF  39  LAST [illegible]       4735             VLOADCOD  =       BIT15
 0202    REF   1                  6107             VLOAD*    =       OCT40001
 0203    REF   2  LAST  156       4101             OCT60000  =       RELTAB11
 0204    REF   6  LAST  914       4350             BANKMASK  =       HI5
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L       INTERPRETIVE CONSTANTS                                                      USER'S PAGE NO.   1      EO S3

 0001   REF    1              23,2000                          SETLOC INTPRET1
 0002                         23,2511                          BANK

 0003   REF    1                                               COUNT* $$/ICONS
 0004                         23,2511   10000 0  DP1/4TH  2DEC    .25
 0004                         23,2512   00000 1
 0005                         23,2513   00000 1  UNITZ    2DEC    0
 0005                         23,2514   00000 1
 0006                         23,2515   00000 1  UNITY    2DEC    0
 0006                         23,2516   00000 1
 0007                         23,2517   20000 0  UNITX    2DEC    .5
 0007                         23,2520   00000 1
 0008                         23,2521   00000 1  ZEROVECS 2DEC    0
 0008                         23,2522   00000 1
 0009                         23,2523   00000 1           2DEC    0
 0009                         23,2524   00000 1
 0010                         23,2525   00000 1           2DEC    0
 0010                         23,2526   00000 1
 0011   REF   13  LAST   910  23,2517            DPHALF   =       UNITX
 0012                         23,2527   37777 1  DPPOSMAX OCT     37777
 0013                         23,2530   37777 1           OCT     37777
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P0014    INTERPRETIVE CONSTANTS IN THE OTHER HALF-MEMORY

 0015    REF    1                 12,2000                      SETLOC INTPRET2
 0016                             12,2000                      BANK

 0017    REF    1                                              COUNT* $$/ICONS
 0018                             12,2000    00000 1  ZUNIT    2DEC    0
 0018                             12,2001    00000 1
 0019                             12,2002    00000 1  YUNIT    2DEC    0
 0019                             12,2003    00000 1
 0020                             12,2004    20000 0  XUNIT    2DEC    .5
 0020                             12,2005    00000 1
 0021                             12,2006    00000 1  ZEROVEC  2DEC    0
 0021                             12,2007    00000 1
 0022                             12,2010    00000 1           2DEC    0
 0022                             12,2011    00000 1
 0023                             12,2012    00000 1           2DEC    0
 0023                             12,2013    00000 1
 0024                             12,2014    77777 0           OCT     77777            -0,-6,-12 MUST REMAIN IN THIS ORDER
 0025                             12,2015    77771 0  DEC-6    DEC     -6
 0026                             12,2016    77763 0  DEC-12   DEC     -12
 0027                             12,2017    37777 1  LODPMAX  2OCT    3777737777       THESE TWO CONSTANTS MUST REMAIN
 0027                             12,2020    37777 1
 0028                             12,2021    37777 1  LODPMAX1 2OCT    3777737777       ADJACENT AND THE SAME FOR INTEGRATION
 0028                             12,2022    37777 1
 0029    REF    6  LAST   965     12,2006             ZERODP   =       ZEROVEC
 0030    REF    7  LAST   968     12,2004             HALFDP   =       XUNIT
 0001                                 5032                        BLOCK   02
P0002    SINGLE PRECISION SINE AND COSINE

 00025   REF    1                                                 COUNT*  $$/INTER
 0003    REF   25   LAST 1099         5032   6 4736 1   SPCOS     AD      HALF          ARGUMENTS SCALED AT PI
 0004    REF    1                     5033  55'076 0    SPSIN     TS      TEMK
 0005    REF    1                     5034   1 5036 0             TCF     SPT
 0006    REF    2   LAST 1102         5035   4 1076 0             CS      TEMK
 0007                                 5036   6 0000 1   SPT       DOUBLE
 0008    REF    3   LAST 1102         5037  55'076 0              TS      TEMK
 0009    REF    1                     5040   1 5051 1             TCF     POLLEY
 0010    REF    4   LAST 1102         5041  57'076 1              XCH     TEMK
 0011    REF    5   LAST 1102         5042  51'076 1              INDEX   TEMK
 0012    REF    3   LAST 1028         5043   6 4734 0             AD      LIMITS
 0013                                 5044   4 0000 0             COM
 0014    REF    6   LAST 1102         5045   6 1076 1             AD      TEMK
 0015    REF    7   LAST 1102         5046  55'076 0              TS      TEMK
 0016    REF    2   LAST 1102         5047   1 5051 1             TCF     POLLEY
 0017    REF    1                     5050   1 5067 1             TCF     ARG90
 0018                                 5051   0 0006 1   POLLEY    EXTEND
 0019    REF    8   LAST 1102         5052   7 1076 0             MP      TEMK
 0020    REF    1                     5053  55'077 1              TS      SQ
 0021                                 5054   0 0006 1             EXTEND
 0022    REF    1                     5055   7 5005 0             MP      C5/2
 0023    REF    1                     5056   6 7737 0             AD      C3/2
 0024                                 5057   0 0006 1             EXTEND
 0025    REF    2   LAST 1102         5060   7 1077 1             MP      SQ
 0026    REF    1                     5061   6 7717 1             AD      C1/2
 0027                                 5062   0 0006 1             EXTEND
 0028    REF    9   LAST 1102         5063   7 1076 0             MP      TEMK
 0029                                 5064  20 001 1              DDOUBL
 0030    REF   10   LAST 1102         5065  55'076 0              TS      TEMK
 0031    REF  295   LAST 1094         5066   0 0002 0             TC      Q
 0032    REF  359   LAST 1094         5067  50 000 1    ARG90     INDEX   A
 0033    REF    4   LAST 1102         5070   4 4734 1             CS      LIMITS
 0034    REF  296   LAST 1102         5071   0 0002 0             TC      Q             RESULT SCALED AT 1
 0001                           5072                   BLOCK   02
R0002           TO ENTER  A JOB REQUEST REQUIRING NO VAC AREA:

 00025  REF    1                                       COUNT*  $$/EXEC
 00029                          5072   0 0004 0  NOVAC      INHINT
 0003   REF    1                5073   6 5164 1        AD      FAKEPRET         LOC(MPAC +6) - LOC(QPRET)
 00031  REF    3  LAST  369     5074   54 063 0        TS      NEWPRIO          PRIORITY OF NEW JOB + NOVAC C(FIXLOC)

 0004                           5075   0 0006 1        EXTEND
 0005   REF 297  LAST 1102      5076   5 0002 0        INDEX   Q                Q WILL BE UNDISTURBED THROUGHOUT.
 0006                           5077   3 0001 0        DCA     0                2CADR OF JOB ENTERED.
 0007   REF    1                5100   52 066 0        DXCH    NEWLOC
 0008   REF    1                5101   3 5163 0        CAF     EXECBANK
 0009   REF   24  LAST 1045     5102   56 004 0        XCH     FBANK
 0010   REF    1                5103   54 061 1        TS      EXECTEM1
 0011   REF    1                5104   1 2625 0        TCF     NOVAC2           ENTER EXECUTIVE BANK.

R0012           TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

 0014                           5105   0 0004 0  FINDVAC   INHINT
 00145  REF    4  LAST 1103     5106   54 063 0        TS      NEWPRIO
 0015                           5107   0 0006 1        EXTEND
 0016   REF 298  LAST 1103      5110   5 0002 0        INDEX   Q
 0017                           5111   3 0001 0        DCA     0
 0018   REF    2  LAST 1103     5112   52 066 0  SPVACIN   DXCH    NEWLOC
 0019   REF    2  LAST 1103     5113   3 5163 0        CAF     EXECBANK
 0020   REF   25  LAST 1103     5114   56 004 0        XCH     FBANK
 0021   REF    1                5115   1 2601 0        TCF     FINDVAC2         OFF TO EXECUTIVE SWITCHED-BANK.

R00211          TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPRIO TO THE 2CADR ARRIVING IN A AND L:

R002125         USERS OF SPVAC MUST INHINT BEFORE STORING IN NEWPRIO.

 00213  REF 299  LAST 1103      5116   56 002 0  SPVAC     XCH     Q
 00214  REF    5  LAST  888     5117   6 7746 0        AD      NEG2
 00215  REF 300  LAST 1103      5120   56 002 0        XCH     Q
 00216  REF    1                5121   1 5112 1        TCF     SPVACIN

R0022           TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

 0024   REF 301  LAST 1103      5122   22 002 0  CHANG1    LXCH    Q
 0025   REF    3  LAST 1103     5123   3 5163 0        CAF     EXECBANK
 0026   REF   29  LAST 1025     5124   56 006 1        XCH     BBANK
 0027   REF    1                5125   1 2706 0        TCF     CHANJOB

R0030           TO SUSPEND AN INTERPRETIVE JOB:

 0031   REF   30  LAST 1094     5126   4 0164 0  CHANG2    CS      LOC              NEGATIVE LOC SHOWS JOB = INTERPRETIVE.
R00315          ITRACE (4) REFERS TO "CHANG2".
 0032   REF 207  LAST 1082      5127   54 001 1        TS      L
 0033    REF   4  LAST 1103       5130  3 5163 0    +2        CAF      EXECBANK
 00335   REF  30  LAST 1103       5131  54 006 0              TS       BBANK
 0034    REF   2  LAST 1103       5132  1 2705 0              TCF      CHANJOB -1
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P0036            TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037   REF  31  LAST 1103     5133  54 164 0  JOBSLEEP TS      LOC
 0038   REF   5  LAST 1104     5134  3 5163 0           CAF     EXECBANK
 0039   REF  26  LAST 1103     5135  54 004 1           TS      FBANK
 0040   REF   1                5136  1 2776 1           TCF     JOBSLP1

R0041            TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042                          5137  0 0004 0  JOBWAKE  INHINT
 00421  REF   3  LAST 1103     5140  54 065 0           TS      NEWLOC
 0043   REF  71  LAST 1042     5141  4 4752 1           CS      TWO              EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044   REF 302  LAST 1103     5142  26 002 1           ADS     0
 0045   REF   6  LAST 1105     5143  3 5163 0           CAF     EXECBANK
 0046   REF  27  LAST 1105     5144  56 004 0           XCH     FBANK
 0047   REF   1                5145  1 3023 1           TCF     JOBWAKE2

R0048            TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                          5146  0 0004 0  PRIOCHNG INHINT                   NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050   REF   5  LAST 1103     5147  54 063 0           TS      NEWPRIO          CALLER AS SOON AS NEW JOB PRIORITY IS
 0051   REF   7  LAST 1105     5150  3 5163 0           CAF     EXECBANK         HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052   REF  31  LAST 1104     5151  56 006 1           XCH     BBANK            STYLE CHANGE-JOB.
 0053   REF   9  LAST 1025     5152  54 165 1           TS      BANKSET
 0054   REF 303  LAST 1105     5153  3 0002 0           CA      Q
 0055   REF   1                5154  1 3072 0           TCF     PRIOCH2

R0058            TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059   REF   8  LAST 1105     5155  3 5163 0  ENDOFJOB CAF     EXECBANK
 0060   REF  28  LAST 1105     5156  54 004 1           TS      FBANK
 0061   REF   1                5157  1 3103 1           TCF     ENDJOB1

 0062   REF   2  LAST 1103     5160  3 0061 0  ENDFIND  CA      EXECTEM1         RETURN TO CALLER AFTER JOB ENTRY
 0063   REF  29  LAST 1105     5161  54 004 1           TS      FBANK            COMPLETE.
 0064   REF   2  LAST  521     5162  1 6741 1           TCF     Q+2
 0066   REF   2  LAST 1103     5163   02601 1  EXECBANK CADR    FINDVAC2

 00665  REF 713  LAST 1090     5164   00110 1  FAKEPRET ADRES   MPAC -36D        LOC(MPAC +6) - LOC(QPRET)
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P0067             LOCATE AN AVAILABLE VAC AREA.

 0068                          01,2601                         BANK     01
 00685  REF    1                                               COUNT*   $$/EXEC
 0069   REF    3  LAST 1105    01,2601  54 061 1   FINDVAC2    TS       EXECTEM1        (SAVE CALLER'S BANK FIRST.)
 0070   REF    4  LAST  244    01,2602  10 400 1               CCS      VAC1USE
 0071   REF    1               01,2603   1 2620 0              TCF      VACFOUND
 0072   REF    3  LAST  244    01,2604  10 454 0               CCS      VAC2USE
 0073   REF    2  LAST 1106    01,2605   1 2620 0              TCF      VACFOUND
 0074   REF    3  LAST  244    01,2606  10 530 0               CCS      VAC3USE
 0075   REF    3  LAST 1106    01,2607   1 2620 0              TCF      VACFOUND
 0076   REF    3  LAST  244    01,2610  10 604 1               CCS      VAC4USE
 0077   REF    4  LAST 1106    01,2611   1 2620 0              TCF      VACFOUND
 0078   REF    3  LAST  244    01,2612  10 660 0               CCS      VAC5USE
 0079   REF    5  LAST 1106    01,2613   1 2620 0              TCF      VACFOUND
 00792  REF    4  LAST 1106    01,2614  22 061 0               LXCH     EXECTEM1
 00794  REF  304  LAST 1105    01,2615   3 0002 0              CA       Q
 0080   REF    3  LAST  245    01,2616   0 5716 1              TC       BAILOUT1
 0081                          01,2617    01201 0              OCT      1201            NO VAC AREAS.

 0082   REF   72  LAST 1105    01,2620   6 4752 0  VACFOUND    AD       TWO             RESERVE THIS VAC AREA BY STORING A ZERO
 0083                          01,2621  22 007 0               ZL                       IN ITS VAC USE REGISTER AND STORE THE
 0084   REF  360  LAST 1102    01,2622  50 000 1               INDEX    A               ADDRESS OF THE FIRST WORD OF IT IN THE
 0085                          01,2623  21 777 0               LXCH     0 -1            LOW NINE BITS OF THE PRIORITY WORD.
 0086   REF    6  LAST 1105    01,2624  26 063 0               ADS      NEWPRIO

 0087   REF  218  LAST 1086    01,2625   3 4755 1  NOVAC2      CAF      ZERO            NOVAC ENTERS HERE. FIND A CORE SET.
 0088   REF    5  LAST  458    01,2626  54 064 1               TS       LOCCTR
 0089   REF    1               01,2627   3 2634 1              CAF      NO.CORES        SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090   REF    1               01,2630  54 062 1   NOVAC3      TS       EXECTEM2
 0091   REF    6  LAST 1106    01,2631  50 064 0               INDEX    LOCCTR
 0092   REF   12  LAST  863    01,2632  10 167 0               CCS      PRIORITY        EACH PRIORITY REGISTER CONTAINS -0 IF
 0093   REF    1               01,2633   1 2674 1              TCF      NEXTCORE        THE CORRESPONDING CORE SET IS AVAILABLE.
 0094                          01,2634    00007 0  NO.CORES    DEC      7
 0095   REF    2  LAST 1106    01,2635   1 2674 1              TCF      NEXTCORE        AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                                   BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
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 0097   REF    7  LAST 1106   01,2636  3 0063 1  CORFOUND CA      NEWPRIO     SET THE PRIORITY OF THIS JOB IN THE CORE
 0098   REF    7  LAST 1106   01,2637  50 064 0           INDEX   LOCCTR      SET'S PRIORITY REGISTER AND SET THE
 0099   REF   13  LAST 1106   01,2640  54 167 0           TS      PRIORITY    JOB'S PUSH-DOWN POINTER AT THE BEGINNING
 0100   REF    9  LAST  863   01,2641  7 5004 1           MASK    LOW9        OF THE WORK AREA AND OVERFLOW INDICATOR
 0101   REF    8  LAST 1107   01,2642  50 064 0           INDEX   LOCCTR
 0102   REF   29  LAST 1077   01,2643  54 166 1           TS      PUSHLOC     OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

 0103   REF    9  LAST 1107   01,2644  10 064 1           CCS     LOCCTR      IF CORE SET ZERO IS BEING LOADED, SET UP
 0104   REF    1              01,2645  1 2661 0           TCF     SETLOC      OVFIND AND FIXLOC IMMEDIATELY .
 0105   REF   11  LAST 1090   01,2646  54 121 1           TS      OVFIND
 0106   REF   30  LAST 1107   01,2647  3 0166 0           CA      PUSHLOC
 0107   REF   54  LAST 1091   01,2650  54 120 0           TS      FIXLOC

 0108   REF    6  LAST 1003   01,2651  10 067 1  SPECTEST CCS     NEWJOB      SEE IF ANY ACTIVE JOBS WAITING (RARE).
 0109   REF    2  LAST 1107   01,2652  1 2661 0           TCF     SETLOC      MUST BE AWAKENED BUT UNCHANGED JOB.
 0110   REF   10  LAST 1094   01,2653  0 5705 0           TC      CCSHOLE
 0111   REF   11  LAST 1107   01,2654  0 5705 0           TC      CCSHOLE
 0112   REF    7  LAST 1107   01,2655  54 067 1           TS      NEWJOB      +0 SHOWS ACTIVE JOB ALREADY SET.
 0113   REF    4  LAST 1105   01,2656  52 066 0           DXCH    NEWLOC
 0114   REF   32  LAST 1105   01,2657  52 165 1           DXCH    LOC
 0115   REF    1              01,2660  1 5160 1           TCF     ENDFIND

 0116   REF    5  LAST 1107   01,2661  52 066 0  SETLOC   DXCH    NEWLOC      SET UP THE LOCATION REGISTERS FOR THIS
 0117   REF   10  LAST 1107   01,2662  50 064 0           INDEX   LOCCTR
 0118   REF   33  LAST 1107   01,2663  52 165 1           DXCH    LOC
 0119   REF    8  LAST 1107   01,2664  50 067 0           INDEX   NEWJOB      THIS INDEX INSTRUCTION INSURES THAT THE
 0120   REF   14  LAST 1107   01,2665  4 0167 0           CS      PRIORITY    HIGHEST ACTIVE PRIORITY WILL BE COMPARED
 0121   REF [illegible] LAST 1107 01,2666  6 0063 1       AD      NEWPRIO     WITH THE NEW PRIORITY TO SEE IF NEWJOB
 0122                         01,2667  0 0006 1           EXTEND              SHOULD BE SET TO SIGNAL A SWITCH.
 0123   REF    2  LAST 1107   01,2670  6 5160 0           BZMF    ENDFIND
 0124   REF   11  LAST 1107   01,2671  3 0064 0           CA      LOCCTR      LOCCTR IS LEFT SET AT THIS CORE SET IF
 0125   REF    9  LAST 1107   01,2672  54 067 1           TS      NEWJOB      THE CALLER WANTS TO LOAD ANY MPAC
 0126   REF    3  LAST 1107   01,2673  1 5160 1           TCF     ENDFIND     REGISTERS, ETC.

 0127   REF    1              01,2674  3 3033 1  NEXTCORE CAF     COREINC
 0128   REF   12  LAST 1107   01,2675  26 064 1           ADS     LOCCTR
 0129   REF    2  LAST 1106   01,2676  10 062 1           CCS     EXECTEM2
 0130   REF    1              01,2677  1 2630 1           TCF     NOVAC3
 01302  REF    5  LAST 1106   01,2700  22 061 0           LXCH    EXECTEM1
 01304  REF  305  LAST 1106   01,2701  3 0002 0           CA      Q
 0131   REF    4  LAST 1106   01,2702  0 5716 1           TC      BAILOUT1    NO CORE SETS AVAILABLE.
 0132                         01,2703   01202 0           OCT     1202
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P0133             THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

 01345  REF  34  LAST 1107   01,2704  22 164 1    -2       LXCH    LOC
 0135   REF  10  LAST 1105   01,2705  30 165 0    -1       CAE     BANKSET          BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
 0136                        01,2706  0 0004 0  CHANJOB    INHINT
 01362                       01,2707  0 0006 1             EXTEND
 01364  REF  15  LAST 1001   01,2710  04 007 1             ROR     SUPERBNK         PICK UP CURRENT SBANK FOR BBCON
 01366  REF 208  LAST 1103   01,2711  56 001 0             XCH     L                LOC IN A AND BBCON IN L.
 01368  REF  10  LAST 1107   01,2712  50 067 0    +4       INDEX   NEWJOB           SWAP LOC AND BANKSET.
 0137   REF  35  LAST 1108   01,2713  52 165 1             DXCH    LOC
 0138   REF  36  LAST 1108   01,2714  52 165 1             DXCH    LOC

 01382  REF  11  LAST 1108   01,2715  30 165 0             CAE     BANKSET
 01384                       01,2716  0 0006 1             EXTEND
 01386  REF  16  LAST 1108   01,2717  01 007 1             WRITE   SUPERBNK         SET SBANK FOR NEW JOB.
 0139   REF 714  LAST 1105   01,2720  52 155 1             DXCH    MPAC             SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
 0140   REF  11  LAST 1108   01,2721  50 067 0             INDEX   NEWJOB
 0141   REF 715  LAST 1108   01,2722  52 155 1             DXCH    MPAC
 0142   REF 716  LAST 1108   01,2723  52 155 1             DXCH    MPAC
 0143   REF 717  LAST 1108   01,2724  52 157 0             DXCH    MPAC +2
 0144   REF  12  LAST 1108   01,2725  50 067 0             INDEX   NEWJOB
 0145   REF 718  LAST 1108   01,2726  52 157 0             DXCH    MPAC +2
 0146   REF 719  LAST 1108   01,2727  52 157 0             DXCH    MPAC +2
 0147   REF 720  LAST 1108   01,2730  52 161 0             DXCH    MPAC +4
 0148   REF  13  LAST 1108   01,2731  50 067 0             INDEX   NEWJOB
 0149   REF 721  LAST 1108   01,2732  52 161 0             DXCH    MPAC +4
 0150   REF 722  LAST 1108   01,2733  52 161 0             DXCH    MPAC +4
 0151   REF 723  LAST 1108   01,2734  52 163 1             DXCH    MPAC +6
 0152   REF  14  LAST 1108   01,2735  50 067 0             INDEX   NEWJOB
 0153   REF 724  LAST 1108   01,2736  52 163 1             DXCH    MPAC +6
 0154   REF 725  LAST 1108   01,2737  52 163 1             DXCH    MPAC +6

 0155   REF 219  LAST 1106   01,2740  3 4755 1             CAF     ZERO
 0156   REF  12  LAST 1107   01,2741  56 121 0             XCH     OVFIND           MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
 0157                        01,2742  0 0006 1             EXTEND
 0158                        01,2743  1 2746 1             BZF     +3
 0159   REF  31  LAST 1107   01,2744  4 0166 1             CS      PUSHLOC
 0160   REF  32  LAST 1108   01,2745  54 166 1             TS      PUSHLOC

 0161   REF  33  LAST 1108   01,2746  52 167 0             DXCH    PUSHLOC
 0162   REF  15  LAST 1108   01,2747  50 067 0             INDEX   NEWJOB
 0163   REF  34  LAST 1108   01,2750  52 167 0             DXCH    PUSHLOC
 0164   REF  35  LAST 1108   01,2751  52 167 0             DXCH    PUSHLOC          SWAPS PUSHLOC AND PRIORITY.
 0165   REF  10  LAST 1107   01,2752  3 5004 0             CAF     LOW9             SET FIXLOC TO BASE OF VAC AREA.
 0166   REF  15  LAST 1107   01,2753  7 0167 0             MASK    PRIORITY
 0167   REF  55  LAST 1107   01,2754  54 120 0             TS      FIXLOC

 0168   REF  36  LAST 1108   01,2755  10 166 1             CCS     PUSHLOC          SET OVERFLOW INDICATOR ACCORDING TO
 0169   REF 220  LAST 1108   01,2756  3 4755 1             CAF     ZERO
 0170   REF   1              01,2757  1 2764 1             TCF     ENDPRCHG -1
 0171    REF  37  LAST 1108    01,2760  4 0166 1             CS       PUSHLOC
 0172    REF  38  LAST 1109    01,2761  54 166 1             TS       PUSHLOC
 0173    REF 114  LAST 1072    01,2762  3 4753 1             CAF      ONE
 0174    REF  13  LAST 1108    01,2763  56 121 0             XCH      OVFIND
 0175    REF  16  LAST 1108    01,2764  54 067 1             TS       NEWJOB

 0176                          01,2765  0 0003 1   ENDPRCHG  RELINT
 0177    REF  37  LAST 1108    01,2766  52 165 1             DXCH     LOC                 BASIC JOBS HAVE POSITIVE ADDRESSES, SO
 0178                          01,2767  0 0006 1             EXTEND                       DISPATCH WITH A DTCB.
 0179                          01,2770  6 2772 1             BZMF     +2                  IF INTERPRETIVE, SET UP EBANK, ETC.
 0180                          01,2771  52 006 0             DTCB
 0181                        01,2772  4 0000 0            CCM                 EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
 0182    REF 115  LAST 1109  01,2773  6 4753 1            AD      ONE
 0183    REF  38  LAST 1109  01,2774  54 164 0            TS      LOC         RESUME.
 0186    REF   1             01,2775  1 6050 0            TCF     INTRSM

R0187          COMPLETE JOBSLEEP PREPARATIONS.

 0188                        01,2776  0 0004 0  JOBSLP1   INHINT
 0189    REF  16  LAST 1109  01,2777  4 0167 0            CS      PRIORITY    NNZ PRIORITY SHOWS JOB ASLEEP.
 0190    REF  17  LAST 1110  01,3000  54 167 0            TS      PRIORITY
 0191    REF   8  LAST 1044  01,3001  3 6074 1            CAF     LOW7
 0192    REF  32  LAST 1105  01,3002  7 0006 0            MASK    BBANK
 01921                       01,3003  0 0006 1            EXTEND
 01922   REF  17  LAST 1108  01,3004  04 007 1            ROR     SUPERBNK    SAVE OLD SUPERBANK VALUE.
 0193    REF  12  LAST 1108  01,3005  54 155 1            TS      BANKSET
 0194    REF 221  LAST 1108  01,3006  4 4755 0            CS      ZERO
 0195    REF 149  LAST 1080  01,3007  54 131 0  JOBSLP2   TS      BUF +1      HOLDS - HIGHEST PRIORITY.
 0196    REF   1             01,3010  1 3120 0            TCF     EJSCAN      SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.

 01961                       01,3011  0 0004 0  NUCHANG2  INHINT              QUICK... DONT LET NEWJOB CHANGE TO +0 .
 019611  REF  17  LAST 1109  01,3012  10 067 1            CCS     NEWJOB
 019612                      01,3013  1 3016 1            TCF     +3          NEWJOB STILL PNZ
 019613                      01,3014  0 0003 1            RELINT              NEWJOB HAS CHANGED TO +0. WAKE UP JOB
 019614  REF   1             01,3015  1 3216 0            TCF     ADVAN +2    VIA NUDIRECT. (VERY RARE CASE.)

 01962   REF  73  LAST 1104  01,3016  3 4752 0            CAF     TWO
 01963                       01,3017  0 0006 1            EXTEND
 01964   REF  30  LAST  863  01,3020  05 011 1            WOR     DSALMOUT    TURN ON ACTIVITY LIGHT
 01965   REF  39  LAST 1110  01,3021  52 165 1            DXCH    LOC         AND SAVE ADDRESS INFO FOR BENEFIT OF
 01966   REF   3  LAST 1104  01,3022  1 2712 0            TCF     CHANJOB + 4  POSSIBLE SLEEPING JOB.
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R0197           TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199     LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201     LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

 0202     REF   6  LAST 1107   01,3023  54 061 1  JOBWAKE2 TS      EXECTEM1
 0203     REF 222  LAST 1110   01,3024  3 4755 1           CAF     ZERO                BEGIN CORE SET SCAN.
 0204     REF  13  LAST 1107   01,3025  54 064 1           TS      LOCCTR
 0205     REF   2  LAST 1106   01,3026  3 2634 1           CAF     NO.CORES
 0206     REF   3  LAST 1107   01,3027  54 062 1  JOBWAKE4 TS      EXECTEM2
 0207     REF  14  LAST 1111   01,3030  50 064 0           INDEX   LOCCTR
 0208     REF  18  LAST 1110   01,3031  10 167 0           CCS     PRIORITY
 0209     REF   1              01,3032  1 3035 0           TCF     JOBWAKE3            ACTIVE JOB - CHECK NEXT CORE SET.
 0210                          01,3033   00014 1  COREINC  DEC     12                  12 REGISTERS PER CORE SET.
 0211     REF   1              01,3034  1 3044 0           TCF     WAKETEST            SLEEPING JOB - SEE IF CADR MATCHES.

 0212     REF   2  LAST 1107   01,3035  3 3033 1  JOBWAKE3 CAF     COREINC
 0213     REF  15  LAST 1111   01,3036  26 064 1           ADS     LOCCTR
 0214     REF   4  LAST 1111   01,3037  10 062 1           CCS     EXECTEM2
 0215     REF   1              01,3040  1 3027 0           TCF     JOBWAKE4
 0216     REF 115  LAST 1110   01,3041  4 4753 0           CS      ONE                 EXIT IF SLEEPING JOB NOT FOUND.
 0217     REF  16  LAST 1111   01,3042  54 064 1           TS      LOCCTR
 0218     REF   4  LAST 1107   01,3043  1 '160 1           TCF     ENDFIND

 0219     REF   6  LAST 1107   01,3044  4 0065 0  WAKETEST CS      NEWLOC
 0220     REF  17  LAST 1111   01,3045  50 064 0           INDEX   LOCCTR
 0221     REF  40  LAST 1110   01,3046  6 0164 1           AD      LOC
 0222                          01,3047  0 0006 1           EXTEND
 0223                          01,3050  1 3052 1           BZF     +2                  IF MATCH.
 0224     REF   2  LAST 1111   01,3051  1 3035 0           TCF     JOBWAKE3            EXAMINE NEXT CORE SET IF NO MATCH.

 0225     REF  18  LAST 1111   01,3052  50 064 0           INDEX   LOCCTR              RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
 0226     REF  19  LAST 1111   01,3053  4 0167 0           CS      PRIORITY
 0227     REF   9  LAST 1107   01,3054  54 063 0           TS      NEWPRIO
 0228     REF  19  LAST 1111   01,3055  50 064 0           INDEX   LOCCTR
 0229     REF  20  LAST 1111   01,3056  54 167 0           TS      PRIORITY

 0230     REF   1              01,3057  4 4350 1           CS      FBANKMSK            MAKE UP THE 2CADR OF THE WAKE ADDRESS
 0231     REF   7  LAST 1111   01,3060  7 0065 0           MASK    NEWLOC              USING THE CADR IN NEWLOC AND THE EBANK
 0232     REF   3  LAST 1023   01,3061  6 4741 1           AD      2K                  HALF OF BBANK SAVED IN BANKSET.
 0233     REF   8  LAST 1111   01,3062  56 065 1           XCH     NEWLOC
 0234     REF   2  LAST 1111   01,3063  7 4350 1           MASK    FBANKMSK
 0235     REF  20  LAST 1111   01,3064  50 064 0           INDEX   LOCCTR
 0236     REF  13  LAST 1110   01,3065  6 0165 0           AD      BANKSET
 0237     REF   9  LAST 1111   01,3066  54 066 0           TS      NEWLOC +1

 0238     REF  21  LAST 1111   01,3067  10 064 1           CCS     LOCCTR              SPECIAL TREATMENT IF THIS JOB WAS
 0239     REF   3  LAST 1107   01,3070  1 2661 0           TCF     SETLOC              ALREADY IN THE RUN (0) POSITION.
 0240     REF   1              01,3071  1 2651 0           TCF     SPECTEST
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P0241             PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

 0243   REF  41  LAST 1111   01,3072  54 164 0  PRIOCH2  TS      LOC
 0244   REF 223  LAST 1111   01,3073   3 4755 1          CAF     ZERO             SET FLAG TO TELL ENDJOB SCANNER IF THIS
 0245   REF 150  LAST 1110   01,3074  54 130 1           TS      BUF              JOB IS STILL HIGHEST PRIORITY.
 0246   REF  11  LAST 1108   01,3075   3 5004 0          CAF     LOW9
 0247   REF  21  LAST 1111   01,3076   7 0167 0          MASK    PRIORITY ✓
 0248   REF  10  LAST 1111   01,3077   6 0063 1          AD      NEWPRIO
 0249   REF  22  LAST 1112   01,3100  54 167 0           TS      PRIORITY ✓
 0250                        01,3101   4 0000 0          COM
 0251   REF   1              01,3102   1 3007 1          TCF     JOBSLP2          AND TO EJSCAN.
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P0252             RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

 0254                               01,3103  0 0004 0  ENDJOB1  INHINT
 0255    REF 224  LAST 1112         01,3104  4 4755 0           CS       ZERO
 0256    REF 151  LAST 1112         01,3105  54 131 0           TS       BUF +1
 0257    REF  23  LAST 1112         01,3106  56 167 1           XCH      PRIORITY
 0258    REF  12  LAST 1112         01,3107  7 5004 1           MASK     LOW9
 02581   REF 209  LAST 1108         01,3110  54 001 1           TS       L

 02582   REF   2  LAST 1103         01,3111  4 5164 0           CS       FAKEPRET
 025821  REF 210  LAST 1113         01,3112  6 0001 0           AD       L

 02583                              01,3113  0 0006 1           EXTEND
 02584   REF   2  LAST 1110         01,3114  6 3120 1           BZMF     EJSCAN           NOVAC ENDOFJOB

 0259    REF 211  LAST 1113         01,3115  10 001 1           CCS      L
 0260    REF 361  LAST 1106         01,3116  50 000 1           INDEX    A
 0261                               01,3117  54 000 0           TS       0

 0262    REF  24  LAST 1113         01,3120  10 203 1  EJSCAN   CCS      PRIORITY +12D
 0263    REF   1                    01,3121  0 3171 0           TC       EJ1
 0264    REF  12  LAST 1107         01,3122  0 5705 0           TC       CCSHOLE
 0265                               01,3123  1 3124 1           TCF      +1

 0266    REF  25  LAST 1113         01,3124  10 217 1           CCS      PRIORITY +24D    EXAMINE EACH PRIORITY REGISTER TO FIND
 0267    REF   2  LAST 1113         01,3125  0 3171 0           TC       EJ1              THE JOB OF HIGHEST ACTIVE PRIORITY.
 0268    REF  13  LAST 1113         01,3126  0 5705 0           TC       CCSHOLE
 0269                               01,3127  1 3130 1           TCF      +1

 0270    REF  26  LAST 1113         01,3130  10 233 1           CCS      PRIORITY +36D
 0271    REF   3  LAST 1113         01,3131  0 3171 0           TC       EJ1
 0272    REF  27  LAST 1113         01,3132   67610 1  -CCSPR  -CCS      PRIORITY
 0273                               01,3133  1 3134 0           TCF      +1

 0274    REF  28  LAST 1113         01,3134  10 247 1           CCS      PRIORITY +48D
 0275    REF   4  LAST 1113         01,3135  0 3171 0           TC       EJ1
 0276    REF  14  LAST 1113         01,3136  0 5705 0           TC       CCSHOLE
 0277                               01,3137  1 3140 0           TCF      +1

 0278    REF  29  LAST 1113         01,3140  10 263 1           CCS      PRIORITY +60D
 0279    REF   5  LAST 1113         01,3141  0 3171 0           TC       EJ1
 0280    REF  15  LAST 1113         01,3142  0 5705 0           TC       CCSHOLE
 0281                               01,3143  1 3144 1           TCF      +1

 0282    REF  30  LAST 1113         01,3144  10 277 1           CCS      PRIORITY +72D
 0283    REF   6  LAST 1113         01,3145  0 3171 0           TC       EJ1
 0284    REF  16  LAST 1113         01,3146  0 5705 0           TC       CCSHOLE
 0285                               01,3147  1 3150 1           TCF      +1

 02851   REF  31  LAST 1113         01,3150  10 313 1           CCS      PRIORITY +84D
 02852  REF   7  LAST 1113    01,3151  0 3171 0          TC       FJ1
 02853  REF  17  LAST 1113    01,3152  0 5705 0          TC       CCSHOLE
 02854                        01,3153  1 3154 0          TCF      +1
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P0286                EVALUATE THE RESULTS OF THE SCAN.

 0287  REF 152  LAST 1113    01,3154  10 131 0          CCS      BUF +1           SEE IF THERE ARE ANY ACTIVE JOBS WAITING
 0288  REF  18  LAST 1114    01,3155  0 5705 0          TC       CCSHOLE
 0289  REF  19  LAST 1115    01,3156  0 5705 0          TC       CCSHOLE

 0290                        01,3157  1 3161 0          TCF      +2
 0291  REF   2  LAST  213    01,3160  1 3206 1          TCF      DUMMYJOB
 0292  REF 153  LAST 1115    01,3161  10 130 1          CCS      BUF              BUF IS ZERO IF THIS IS A PRIOCHNG AND
 0293                        01,3162  1 3164 0          TCF      +2               CHANGED PRIORITY IS STILL HIGHEST.
 0294  REF   2  LAST 1108    01,3163  1 2764 1          TCF      ENDPRCHG -1

 0295  REF 362  LAST 1113    01,3164  50 000 1          INDEX    A                OTHERWISE, SET NEWJOB TO THE RELATIVE
 0296                        01,3165  2'7777 0          CAF      0 -1             ADDRESS OF THE NEW JOB'S CORE SET.
 0297  REF   1               01,3166  6 3132 1          AD       -CCSPR
 0298  REF  18  LAST 1110    01,3167  54 067 1          TS       NEWJOB
 0299  REF   4  LAST 1110    01,3170  1 2704 1          TCF      CHANJOB -2

 0300  REF 154  LAST 1115    01,3171  54 132 0   EJ1    TS       BUF +2
 0301  REF 155  LAST 1115    01,3172  6 0131 1          AD       BUF +1           - OLD HIGH PRIORITY.
 0302  REF 363  LAST 1115    01,3173  10 000 0          CCS      A
 0303  REF 156  LAST 1115    01,3174  4 0132 0          CS       BUF +2
 0304  REF   1               01,3175  1 3201 0          TCF      EJ2              NEW HIGH PRIORITY.
 0305                        01,3176  13 177 1          NOOP
 0306  REF 306  LAST 1107    01,3177  50 002 0          INDEX    Q
 0307                        01,3200  0 0002 0          TC       2                PROCEED WITH SEARCH.

 0308  REF 157  LAST 1115    01,3201  54 131 0   EJ2    TS       BUF +1
 0309                        01,3202  0 0006 1          EXTEND
 0310  REF 158  LAST 1115    01,3203  22 130 0          QXCH     BUF              FOR LOCATING CCS PRIORITY + X INSTR.
 0311  REF 159  LAST 1115    01,3204  50 130 0          INDEX    BUF
 0312                        01,3205  0 0002 0          TC       2
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P0314          IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0316    BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

 0318    REF   4  LAST  290        1361                      EBANK= SELFRET              SELF-CHECK STORAGE IN EBANK.

 0319    REF 225  LAST 1113   01,3206  4 4755 0  DUMMYJOB CS     ZERO     2         SET NEWJOB TO -0 FOR IDLING.
 0320    REF  19  LAST 1115   01,3207  54 067 1           TS     NEWJOB 2
 0321                         01,3210  0 0003 1           RELINT          1
 0322    REF  74  LAST 1110   01,3211  4 4752 1           CS     TWO      2         TURN OFF THE ACTIVITY LIGHT.
 0323                         01,3212  0 0006 1           EXTEND          1
 0324    REF  31  LAST 1110   01,3213  03 011 1           WAND   DSALMOUT 2
 0328    REF  20  LAST 1116   01,3214  10 067 1  ADVAN    CCS    NEWJOB             IS A NEWJOB ACTIVE ?
 0329    REF   1              01,3215  1 3011 0           TCF    NUCHANG2           YES... ONE REQUIRING A CHANGE JOB.
 0330    REF  75  LAST 1116   01,3216  3 4752 0           CAF    TWO                NEW JOB ALREADY IN POSITION FOR
 0331    REF   1              01,3217  1 3225 0           TCF    NUDIRECT           EXECUTION.

 03317   REF   5  LAST 1116   01,3220  3 1361 1           CA     SELFRET   2
 03318   REF 212  LAST 1113   01,3221  54 001 1           TS     L         2        PUT RETURN ADDRESS IN L.
 0332    REF   1              01,3222  3 3224 0           CAF    SELFBANK  2
 0333    REF   5  LAST  593   01,3223  1 5166 1           TCF    SUPDXCHZ + 1  1    AND DISPATCH JOB.

 03338   REF   6  LAST 1116        1361                   EBANK= SELFRET
 0334    REF   3  LAST  291   01,3224   66102 1  SELFBANK BBCON  SELFCHK

 0335                         01,3225  0 0006 1  NUDIRECT EXTEND                    TURN THE GREEN LIGHT BACK ON.
 0336    REF  32  LAST 1116   01,3226  05 011 1           WOR    DSALMOUT
 0337    REF  42  LAST 1112   01,3227  52 165 1           DXCH   LOC                JOBS STARTED IN THIS FASHION MUST BE
 03372   REF   6  LAST 1116   01,3230  1 5165 1           TCF    SUPDXCHZ

 03378                             5165                   BLOCK  2                  IN FIXED-FIXED SO OTHERS MAY USE.

 03379   REF   2 LAST 1103 TO 1106:    59    59*          COUNT* $$/EXEC
R033791 SUPDXCHZ - ROUTINE TO TRANSFER TO SUPERBANK.
R033792 CALLING SEQUENCE
A033793                                                   TCF    SUPDXCHZ           WITH 2CADR OF DESIRED LOCATION IN A + L.

 0338    REF 213  LAST 1116        5165  56 001 0  SUPDXCHZ XCH    L          2       BASIC.
 03381                             5166  0 0006 1  +1       EXTEND            1
 03382   REF  18  LAST 1110        5167  01 007 1           WRITE  SUPERBNK 2
 03383   REF  33  LAST 1110        5170  54 006 0           TS     BBANK      2
 03384   REF 214  LAST 1116        5171  0 0001 0           TC     L          1

 0339                              5172   77677 1  NEG100   OCT    77677
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R0001    PROGRAM DESCRIPTION                                                                  DATE - 10 OCTOBER 1966
R0003    MOD NO - 2                                                                           LOG SECTION - WAITLIST
R0005    MOD BY - MILLER    (DTMAX INCREASED TO 162.5 SEC)                                    ASSEMBLY SUNBURST REV 5
R00072   MOD 3 BY KERNAN  (INHINT INSERTED AT WAITLIST)  2/28/68 SKIPPER REV 4

R00073   MOD 4BY KERNAN (TWIDDLE IN 54)  3/28/68 SKIPPER REV 13.
R000799

R0008    FUNCTIONAL DESCRIPTION-
R0009              PART OF A SECTION OF PROGRAMS,-WAITLIST, TASKOVER, T3RUPT, USED  TO CALL A PROGRAM, (CALLED A TASK),
R0011       WHICH IS TO BEGIN IN C(A) CENTISECONDS.  WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS
R0013       FOLLOW.

R0014                      C(TIME3)  = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1-TIME FOR TASK1)
R0016

R0017                                 C(LST1)     = -(T2-T1)+1
R0018                                 C(LST1 +1)  = -(T3-T2)+1
R0019                                 C(LST1 +2)  = -(T4-T3)+1
R0020                                             .
R0021                                             .
R0022                                 C(LST1 +6)  = -(T8-T7)+1
R0023                                 C(LST1 +7)  = -(T9-T8)+1

R0024                                 C(LST2)     = 2CADR OF TASK1
R0025                                 C(LST2 +2)  = 2CADR OF TASK2
R0026                                             .
R0027                                             .
R0028                                 C(LST2 +14)= 2CADR OF TASK8
R0029                                 C(LST2 +16)= 2CADR OF TASK9

R0030    WARNINGS-
R0031    --------
R0032                      1) 1 <= C(A) <= 16250D (1 CENTISECOND TO 162.5 SEC)
R0033                      2) 9 TASKS MAXIMUM
R0034                      3) TASKS CALLED UNDER INTERRUPT INHIBITED
R0035                      4) TASKS END BY TC TASKOVER

R0036    CALLING SEQUENCE-

R0037                      L-1     CA      DELTAT   (TIME IN CENTISECONDS TO TASK START)
R0039                      L       TC      WAITLIST
R0040                      L+1     2CADR   DESIRED TASK
R0041                      L+2     (MINOR OF 2CADR)
R0042                      L+3     RELINT              (RETURNS HERE)

R00421   TWIDDLE-
R00422   -------
R00423                     TWIDDLE IS FOR USE WHEN THE TASK BEING SET UP IS IN THE SAME EBANK AND FBANK AS THE USER.   IN
R00425                     SUCH CASES, IT IMPROVES UPON WAITLIST BY ELIMINATING THE NEED FOR THE BBCON HALF OF THE 2CADR,
R00427               SAVING A WORD.   TWIDDLE IS LIKE WAITLIST IN EVERY RESPECT EXCEPT CALLING SEQUENCE, TO WIT-

R0043                L-1     CA      DELTAT
R00431               L       TC      TWIDDLE
R00432               L+1     ADRES   DESIRED TASK
R00433               L+2     RELINT                  (RETURNS HERE)

R00435    NORMAL EXIT MODES-

R0044                AT L+3 OF CALLING SEQUENCE

R0045     ALARM OR ABORT EXIT MODES-

R0046                TC      ABORT
R0047                OCT     1203    (WAITLIST OVERFLOW - TOO MANY TASKS)

R0048     ERASABLE INITIALIZATION REQUIRED-

R0049                ACCOMPLISHED BY FRESH START,--LST2,..., LST2 +16 =ENDTASK
R0050                                              LST1,..., LST1 +7  =NEG1/2

R0051     OUTPUT--

R0052                LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.
R0053     DEBRIS-

R0054                CENTRALS- A,Q,L
R0055                OTHER    - WAITEXIT, WAITADR, WAITTEMP, WAITBANK
R0056     DETAILED ANALYSIS OF TIMING-

R0057            CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR)   IN EXACTLY DELTA T CENTISECONDS.
R0059        THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS

R0060                LET TO = THE TIME OF THE TC WAITLIST
R0061                LET TS = TO +147U + COUNTER INCREMENTS (SET UP TIME)
R0062                LET X  = TS -(100TS)/100  (VARIANCE FROM COUNTERS)
R0063                LET Y  = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT
R0064                LET Z  = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.
R0066        (Z=0, USUALLY)
R0067                LET DELTD = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR
R0068             THEN    DELTD = TS+DELTA T -X +Y +Z +1.05MS* +COUNTERS*
R0069        *-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.
R0071

R0072            IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK:S
R0074        INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY
R0076        OF OTHER TASKS INHIBITING THE INTERRUPT.

 0077                         5173                    BLOCK  02
 0078    REF  14  LAST  220    E3,1400                        EBANK= LST1               TASK  LISTS IN SWITCHED E BANK.

 0079    REF   1                                              COUNT* $$/WAIT
 00795                            5173  0 0004 0  TWIDDLE   INHINT
 0080    REF 215  LAST 1116       5174  54 001 1            TS       L                  SAVE DELAY TIME IN L
 0081    REF  30  LAST 1080       5175  3 4733 1            CA       POSMAX
 0082    REF 307  LAST 1115       5176  26 002 1            ADS      Q                  CREATING OVERFLOW AND Q-1 IN Q
 0083    REF  34  LAST 1116       5177  3 0006 1            CA       BBANK
 00832                            5200  0 0006 1            EXTEND
 00834   REF  19  LAST 1116       5201  04 007 1            ROR      SUPERBNK
 0084    REF 216  LAST 1119       5202  56 001 0            XCH      L

 00849                            5203  0 0004 0  WAITLIST  INHINT
 0085    REF 308  LAST 1119       5204  56 002 0            XCH      Q                  SAVE DELTA T IN Q AND RETURN IN
 0086    REF   1                  5205  54 061 1            TS       WAITEXIT           WAITEXIT.
 0087                             5206  0 0006 1            EXTEND
 0088    REF   2  LAST 1119       5207  5 0061 0            INDEX    WAITEXIT           IF TWIDDLING, THE TS SKIPS TO HERE
 0089                             5210  3 0001 0            DCA      0                  PICK UP 2CADR OF TASK.
 0090    REF   1                  5211  54 063 0  -1        TS       WAITADR            BBCON WILL REMAIN IN L
 0091    REF   1                  5212  3 5220 1  DLY2      CAF      WAITBB             ENTRY FROM FIXDELAY AND VARDELAY.
 0092    REF  35  LAST 1119       5213  56 006 1            XCH      BBANK
 0093    REF   1                  5214  1 3231 0            TCF      WAIT2

R0094              RETURN TO CALLER AFTER TASK INSERTION:

 0095    REF   3  LAST 1119       5215  52 062 1  LVWTLIST  DXCH     WAITEXIT
 0096    REF  76  LAST 1116       5216  6 4752 0            AD       TWO
 0097                             5217  52 006 0            DTCB

 0099    REF  15  LAST 1119    E3,1400                        EBANK= LST1
 0100    REF   2  LAST 1119       5220   02063 0  WAITBB    BBCON    WAIT2

R0101              RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.

 0102    REF 309  LAST 1119       5221  50 002 0  FIXDELAY  INDEX    Q                  BOTH ROUTINES MUST BE CALLED UNDER
 0103                             5222  3 0000 1            CAF      0                  WAITLIST CONTROL AND TERMINATE THE TASK
 0104    REF 310  LAST 1119       5223  24 002 0            INCR     Q                  IN WHICH THEY WERE CALLED.

R0105              RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

 0106    REF 311  LAST 1119       5224  56 002 0  VARDELAY  XCH      Q                  DT TO Q. TASK ADRES TO WAITADR.
 0107    REF   2  LAST 1119       5225  54 063 0            TS       WAITADR
 0108    REF  36  LAST 1119       5226  3 0006 1            CA       BBANK              BBANK IS SAVED DURING DELAY.
 0109                             5227  0 0006 1            EXTEND
 0110    REF  20  LAST 1119       5230  04 007 1            ROR      SUPERBNK           ADD SBANK TO BBCON.
 0111    REF 217  LAST 1119       5231  54 001 1            TS       L
 0112    REF   1                  5232  3 5235 0            CAF      DELAYEX
 0113    REF   4  LAST 1119       5233  54 061 1            TS       WAITEXIT           GO TO TASKOVER AFTER TASK ENTRY.
 0114    REF   1                  5234  1 5212 1            TCF      DLY2
 0115   REF  67  LAST  966      5235  1 5257 0  DELAYEX  TCF     TASKOVER -2     RETURNS TO TASKOVER
```

```
R0116    ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

 0118    REF  16  LAST 1119   E3,1400                       EBANK= LST1
 0119    REF   1                 5236   72537 0  ENDTASK -2CADR   SVCT3
 0119    REF   1                 5237   73714 1

 0120    REF  28  LAST  927      5240  10 076 1  SVCT3    CCS     FLAGWRD2        DRIFT FLAG
 0121    REF  68  LAST 1120      5241  1 5261 0           TCF     TASKOVER
 0122    REF  69  LAST 1121      5242  1 5261 0           TCF     TASKOVER
 0123                            5243  1 5244 1           TCF     +1

 01231   REF   3  LAST  222      5244  11 304 0  CKIMUSE  CCS     IMUCADR         DON'T DO NBDONLY IF SOMEONE ELSE IS IN
 01232   REF   1                 5245  1 5256 1           TCF     SVCT3X          IMUSTALL.
 01233                           5246  1 5251 0           TCF     +3
 01234   REF   2  LAST 1121      5247  1 5256 1           TCF     SVCT3X
 01235   REF   3  LAST 1121      5250  1 5256 1           TCF     SVCT3X

 0124    REF   1                 5251  3 7723 0     +3    CAF     PRIO35          COMPENSATE FOR NBD COEFFICIENTS ONLY.
 0125    REF  25  LAST  889      5252  0 5072 1           TC      NOVAC               ENABLE EVERY 81.93 SECONDS
 0126    REF   6  LAST  857   E3,1460                     EBANK= NBDX
 0127    REF   1                 5253   03555 1           2CADR   NBDONLY
 0127    REF   1                 5254   14063 1
 0128    REF  70  LAST 1121      5255  1 5261 0           TCF     TASKOVER


 01281   REF  15  LAST  781      5256  0 5221 0  SVCT3X   TC      FIXDELAY        DELAY MAX OF 2 TIMES FOR IMUZERO.
 01282                           5257   00764 1           DEC     500
 01283   REF   2  LAST 1121      5260  0 5240 1           TC      SVCT3           CHECK DRIFT FLAG AGAIN.
```

```
P0129           BEGIN TASK INSERTION.

 0130                        01,3231                        BANK    01
 0131   REF   1                                             COUNT*  $$/WAIT
 0132   REF   1              01,3231  54 062 1  WAIT2       TS      WAITBANK         BBANK OF CALLING PROGRAM.
 01322  REF 312  LAST 1119   01,3232  3 0002 0              CA      Q
 01324                       01,3233  0 0006 1              EXTEND
 01326  REF   1              01,3234  6 3523 0              BZMF    WAITPOOH

 0133   REF   2  LAST  219   01,3235  4 0026 1              CS      TIME3
 0134   REF  35  LAST 1053   01,3236  6 4744 1              AD      BIT8             BIT 8 = OCT 200
 0135   REF 364  LAST 1115   01,3237  10 000 0              CCS     A                TEST 200 - C(TIME3).  IF POSITIVE,
A0136                                           IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0137                                           C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0138                                           ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0139   REF   2  LAST 1099   01,3240  6 6107 1              AD      OCT40001         OVERFLOW HAS OCCURRED.  SET C(A) =
 0140   REF 365  LAST 1122   01,3241  4 0000 0              CS      A                T - T1 + 1.0 - 201

R0141   NORMAL CASE (C(A) NNZ) YIELDS SAME C(A):  -( -(1.0-(T1-T)) + 200) - 1

 0142   REF   1              01,3242  6 3370 0              AD      OCT40201
 0143   REF 313  LAST 1122   01,3243  6 0002 0              AD      Q                RESULT = TD - T1 + 1.

 0144   REF 366  LAST 1122   01,3244  10 000 0              CCS     A                TEST TD - T1 + 1

 0145   REF  17  LAST 1121   01,3245  6 1400 1              AD      LST1             IF TD - T1 POS, GO TO WTLST5 WITH
 0146   REF   1              01,3246  1 3310 1              TCF     WTLST5           C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0147                        01,3247  13 250 1              NOOP
 0148   REF 314  LAST 1122   01,3250  4 0002 1              CS      Q

R0149   NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0150   SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0151   SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0152   CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0153   REF   1              01,3251  6 4736 1              AD      POS1/2           WHEN TD IS NEXT, FORM QUANTITY
 0154   REF   2  LAST 1122   01,3252  6 4736 1              AD      POS1/2             1.0 - DELTA T = 1.0 - (TD - T)
 0155   REF   3  LAST 1122   01,3253  56 026 0              XCH     TIME3
 0156   REF   7  LAST 1043   01,3254  6 4735 1              AD      NEGMAX
 0157   REF 315  LAST 1122   01,3255  6 0002 0              AD      Q                1.0 - DELTAT T NOW COMPLETE.
 0158                        01,3256  0 0006 1              EXTEND                   ZERO INDEX Q.
 0159                        01,3257  22 007 0              QXCH    7                (ZQ)
 0160   REF  18  LAST 1122   01,3260  57'400 1  WTLST4    XCH     LST1
 0161   REF  19  LAST 1123   01,3261  57'401 0            XCH     LST1 +1
 0162   REF  20  LAST 1123   01,3262  57'402 0            XCH     LST1 +2
 0163   REF  21  LAST 1123   01,3263  57'403 1            XCH     LST1 +3
 0164   REF  22  LAST 1123   01,3264  57'404 0            XCH     LST1 +4
 0165   REF  23  LAST 1123   01,3265  57'405 1            XCH     LST1 +5
 0166   REF  24  LAST 1123   01,3266  57'406 1            XCH     LST1 +6
 0167   REF  25  LAST 1123   01,3267  57'407 0            XCH     LST1 +7

 0168   REF   3  LAST 1119   01,3270  3 0063 1            CA      WAITADR         (MINOR PART OF TASK CADR HAS BEEN IN L.)
 0169   REF 316  LAST 1122   01,3271  50 002 0            INDEX   Q
 0170                        01,3272  1 3273 0            TCF     +1

 0171   REF  24  LAST  751   01,3273  53'411 0            DXCH    LST2
 0172   REF  25  LAST 1123   01,3274  53'413 1            DXCH    LST2 +2
 0173   REF  26  LAST 1123   01,3275  53'415 1            DXCH    LST2 +4
 0174   REF  27  LAST 1123   01,3276  53'417 0            DXCH    LST2 +6
 0175   REF  28  LAST 1123   01,3277  53'421 0            DXCH    LST2 +8D
 0176   REF  29  LAST 1123   01,3300  53'423 1            DXCH    LST2 +10D       AT END, CHECK THAT C(LST2+10) IS STD
 0177   REF  30  LAST 1123   01,3301  53'425 1            DXCH    LST2 +12D
 0178   REF  31  LAST 1123   01,3302  53'427 0            DXCH    LST2 +14D
 0179   REF  32  LAST 1123   01,3303  53'431 1            DXCH    LST2 +16D
 0180   REF   3  LAST  221   01,3304  6 5236 0            AD      ENDTASK           END ITEM, AS CHECK FOR EXCEEDING
A0181                                                                                 THE LENGTH OF THE LIST.
 0182                        01,3305  0 0006 1            EXTEND                  DUMMY TASK ADRES SHOULD BE IN FIXED-
 0183   REF   1              01,3306  1 5215 0            BZF     LVWTLIST        FIXED SO ITS ADRES ALONE DISTINGUISHES
 0184   REF   1              01,3307  1 3363 0            TCF     WTABORT         IT.
```

```
0185  REF 367  LAST 1122   01,3310  10 000 0  WTLST5    CCS     A                    TEST  TD - T2 + 1
0186  REF  26  LAST 1123   01,3311   6 1401 0            AD      LST1 +1
0187                       01,3312   1 3316 1            TCF     +4
0188  REF 117  LAST 1111   01,3313   6 4753 1            AD      ONE
0189  REF   1              01,3314   0 3374 1            TC      WTLST2
0190                       01,3315    00001 0            OCT     1

0191  REF 368  LAST 1124   01,3316  10 000 0  +4        CCS     A                    TEST  TD - T3 + 1
0192  REF  27  LAST 1124   01,3317   6 1402 0            AD      LST1 +2
0193                       01,3320   1 3324 0            TCF     +4
0194  REF 118  LAST 1124   01,3321   6 4753 1            AD      ONE
0195  REF   2  LAST 1124   01,3322   0 3374 1            TC      WTLST2
0196                       01,3323    00002 0            OCT     2

0197  REF 369  LAST 1124   01,3324  10 000 0  +4        CCS     A                    TEST  TD - T4 + 1
0198  REF  28  LAST 1124   01,3325   6 1403 1            AD      LST1 +3
0199                       01,3326   1 3332 1            TCF     +4
0200  REF 119  LAST 1124   01,3327   6 4753 1            AD      ONE
0201  REF   3  LAST 1124   01,3330   0 3374 1            TC      WTLST2
0202                       01,3331    00003 1            OCT     3

0203  REF 370  LAST 1124   01,3332  10 000 0  +4        CCS     A                    TEST  TD - T5 + 1
0204  REF  29  LAST 1124   01,3333   6 1404 0            AD      LST1 +4
0205                       01,3334   1 3340 1            TCF     +4
0206  REF 120  LAST 1124   01,3335   6 4753 1            AD      ONE
0207  REF   4  LAST 1124   01,3336   0 3374 1            TC      WTLST2
0208                       01,3337    00004 0            OCT     4

0209  REF 371  LAST 1124   01,3340  10 000 0  +4        CCS     A                    TEST  TD - T6 + 1
0210  REF  30  LAST 1124   01,3341   6 1405 1            AD      LST1 +5
0211                       01,3342   1 3346 1            TCF     +4
0212  REF 121  LAST 1124   01,3343   6 4753 1            AD      ONE
0213  REF   5  LAST 1124   01,3344   0 3374 1            TC      WTLST2
0214                       01,3345    00005 1            OCT     5

0215  REF 372  LAST 1124   01,3346  10 000 0   +4       CCS     A                    TEST TD - T7 + 1
0216  REF  31  LAST 1124   01,3347   6 1406 1            AD      LST1 +6
0217                       01,3350   1 3354 1            TCF     +4
0218  REF 122  LAST 1124   01,3351   6 4753 1            AD      ONE
0219  REF   6  LAST 1124   01,3352   0 3374 1            TC      WTLST2
0220                       01,3353    00006 1            OCT     6
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 0221     REF 373   LAST 1124    01,3354   10 000 0    +4        CCS      A
 0222     REF  32   LAST 1124    01,3355   6 1407 0              AD       LST1 +7
 0223                            01,3356   1 3362 1              TCF      +4
 0224     REF 123   LAST 1124    01,3357   6 4753 1              AD       ONE
 0225     REF   7   LAST 1124    01,3360   0 3374 1              TC       WTLST2
 0226                            01,3361    00007 0              OCT      7

 0227     REF 374   LAST 1125    01,3362   10 000 0    +4        CCS      A
 0228     REF   1                01,3363   0 3371 1   WTABORT    TC       FILLED
 0229                            01,3364   13 365 0              NOOP                      CAN'T GET HERE
 0230     REF 124   LAST 1125    01,3365   6 4753 1              AD       ONE
 0231     REF   8   LAST 1125    01,3366   0 3374 1              TC       WTLST2
 0232                            01,3367    00010 0              OCT      10

 0233                            01,3370    40201 0   OCT40201  OCT      40201
 02332  REF   5  LAST 1119    01,3371  52 062 1  FILLED    DXCH    WAITEXIT
 02334  REF   5  LAST 1107    01,3372  0 5716 1            TC      BAILOUT1           NO ROOM IN THE INN
 02336                        01,3373   01203 1            OCT     01203
```

```
R0234   THE ENTRY TO WTLST2 JUST PRECEDING OCT   N  IS FOR T   LE TD LE T   -1.
R0235                                                       N           N+1

R0236   (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T    + 1)
R0237                                                                N+1

R0238   THE LST1 ENTRY -(T    - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
R0239                     N+1    N                                  N

R0240   THE ENTRY -(T    - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0241                N+1

 0242   REF   1                01,3374  54 064 1  WTLST2    TS     WAITTEMP            C(A) = -(TD - T    + 1)
 0243   REF 317  LAST 1123     01,3375  50 002 0            INDEX  Q
 0244                          01,3376  3 0000 1            CAF    0
 0245   REF 318  LAST 1127     01,3377  54 002 1            TS     Q               INDEX VALUE INTO Q.

 0246   REF 125  LAST 1125     01,3400  3 4753 1            CAF    ONE
 0247   REF   2  LAST 1127     01,3401  6 0064 0            AD     WAITTEMP
 0248   REF 319  LAST 1127     01,3402  50 002 0            INDEX  Q               C(A) = -(TD - T ) + 1.
 0249   REF  33  LAST 1125     01,3403  27'377 1            ADS    LST1 -1                        N

 0250   REF   3  LAST 1127     01,3404  4 0064 1            CS     WAITTEMP
 0251   REF 320  LAST 1127     01,3405  50 002 0            INDEX  Q
 0252   REF   1                01,3406  1 3260 1            TCF    WTLST4

R0253   C(TIME3) = 1.0 - (T1 - T)

R0254   C(LST1  ) = - (T2 - T1) + 1
R0255   C(LST1+1) = - (T3 - T2) + 1
R0256   C(LST1+2) = - (T4 - T3) + 1
R0257   C(LST1+3) = - (T5 - T4) + 1
R0258   C(LST1+4) = - (T6 - T5) + 1

R0259   C(LST2    ) = 2CADR  TASK1
R0260   C(LST2+2  ) = 2CADR  TASK2
R0261   C(LST2+4  ) = 2CADR  TASK3
R0262   C(LST2+6  ) = 2CADR  TASK4
R0263   C(LST2+8  ) = 2CADR  TASK5
R0264   C(LST2+10) = 2CADR  TASK6
```

```
P026*           ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

 0266                          01,3407  0 0006 1  T3RUPT   EXTEND
 0267  REF  21  LAST 1119      01,3410  04 007 1           RCR      SUPERBNK        READ CURRENT SUPERBANK VALUE AND
 0268  REF   6  LAST  991      01,3411  54 016 1           TS       BANKRUPT        SAVE WITH E AND F BANK VALUES.
 0269                          01,3412  0 0006 1           EXTEND
 0270  REF   6  LAST  991      01,3413  22 012 1           QXCH     QRUPT

 0271  REF   6  LAST 1095      01,3414  3 4734 0  T3RUPT2  CAF      NEG1/2          DISPATCH WAITLIST TASK.
 0272  REF  34  LAST 1127      01,3415  57'407 0           XCH      LST1 +7
 0273  REF  35  LAST 1128      01,3416  57'406 1           XCH      LST1 +6
 0274  REF  36  LAST 1128      01,3417  57'405 1           XCH      LST1 +5
 0275  REF  37  LAST 1128      01,3420  57'404 0           XCH      LST1 +4         1.  MOVE UP LST1 CONTENTS, ENTERING
 0276  REF  38  LAST 1128      01,3421  57'403 1           XCH      LST1 +3             A VALUE OF 1/2 +1 AT THE BOTTOM
 0277  REF  39  LAST 1128      01,3422  57'402 0           XCH      LST1 +2             FOR T6-T5, CORRESPONDING TO THE
 0278  REF  40  LAST 1128      01,3423  57'401 0           XCH      LST1 +1             INTERVAL 81.91 SEC FOR ENDTASK.
 0279  REF  41  LAST 1128      01,3424  57'400 1           XCH      LST1
 0280  REF  31  LAST 1119      01,3425  6 4733 1           AD       POSMAX          2. SET T3 = 1.0 - T2 -T USING LIST 1.
 0281  REF   4  LAST 1122      01,3426  26 026 1           ADS      TIME3           SO T3 WONT TICK DURING UPDATE.
 0282  REF   4  LAST  563      01,3427  54 734 0           TS       RUPTAGN
 0283  REF 226  LAST 1116      01,3430  4 4755 0           CS       ZERO
 0284  REF   5  LAST 1128      01,3431  54 734 0           TS       RUPTAGN         SETS RUPTAGN TO +1 ON OVERFLOW.

 0285                          01,3432  0 0006 1           EXTEND                   DISPATCH TASK.
 0286  REF   4  LAST 1123      01,3433  4 5237 0           DCS      ENDTASK
 0287  REF  33  LAST 1123      01,3434  53'431 1           DXCH     LST2 +16D
 0288  REF  34  LAST 1128      01,3435  53'427 0           DXCH     LST2 +14D
 0289  REF  35  LAST 1128      01,3436  53'425 1           DXCH     LST2 +12D
 0290  REF  36  LAST 1128      01,3437  53'423 1           DXCH     LST2 +10D
 0291  REF  37  LAST 1128      01,3440  53'421 0           DXCH     LST2 +8D
 0292  REF  38  LAST 1128      01,3441  53'417 0           DXCH     LST2 +6
 0293  REF  39  LAST 1128      01,3442  53'415 1           DXCH     LST2 +4
 0294  REF  40  LAST 1128      01,3443  53'413 1           DXCH     LST2 +2
 0295  REF  41  LAST 1128      01,3444  53'411 0           DXCH     LST2

 0296  REF 218  LAST 1119      01,3445  56 001 0           XCH      L
 0297                          01,3446  0 0006 1           EXTEND
 0298  REF  22  LAST 1128      01,3447  01 007 1           WRITE    SUPERBNK        SET SUPERBANK FROM BBCON OF 2CADR
 0299  REF 219  LAST 1128      01,3450  56 001 0           XCH      L               RESTORE TO L FOR DXCH Z.
 0300                          01,3451  52 006 0           DTCB
```

```
P0301           RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

 0302                          5261                         BLOCK   02
 0303   REF    2 LAST 1119 TO 1122:    54     54*           COUNT*  $$/WAIT
 0304   REF    6  LAST 1128    5261  10 734 0  TASKOVER CCS     RUPTAGN           IF +1 RETURN TO T3RUPT, IF -0 RESUME.
 0305   REF    2  LAST 1119    5262  3 5220 1              CAF     WAITBB
 0306   REF   37  LAST 1119    5263  54 006 0              TS      BBANK
 0307   REF    1               5264  1 3414 1              TCF     T3RUPT2           DISPATCH NEXT TASK IF IT WAS DUE.

 0308   REF    7  LAST 1128    5265  3 0016 0              CA      BANKRUPT
 0309                          5266  0 0006 1              EXTEND
 0310   REF   23  LAST 1128    5267  01 007 1              WRITE   SUPERBNK          RESTORE SUPERBANK BEFORE RESUME IS DONE

 0311                          5270  0 0006 1  RESUME      EXTEND
 0312   REF    7  LAST 1128    5271  22 012 1              QXCH    QRUPT
 0313   REF    8  LAST 1129    5272  3 0016 0  NOQRSM      CA      BANKRUPT
 0314   REF   38  LAST 1129    5273  56 006 1              XCH     BBANK
 0315   REF   11  LAST  154    5274  52 011 0  NOQBRSM     DXCH    ARUPT
 03155                         5275  0 0003 1              RELINT
 0316                          5276  5 0017 1              RESUME
```

```
P0317   LONGCALL

R0318   PROGRAM DESCRIPTION                                   DATE- 17 MARCH 1967
R0319   PROGRAM WRITTEN BY W.H. VANDEVER                     LOG SECTION WAITLIST
R0320   MOD BY- R. MELANSON TO ADD DOCUMENTATION         ASSEMBLY SUNDISK REV. 100

R0321   FUNCTIONAL DESCRIPTION-
R0322   LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK
R0324   IMMEDIATELY FOLLOWING THE TC LONGCALL.  FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF
R0326   A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO
R0328   START

R0329   CALLING SEQUENCE-
A0330                                              EXTEND
A0331                                              DCA     TIMELOC
A0332                                              TC      LONGCALL
A0333                                              2CADR   TASKTODO

R0334   NORMAL EXIT MODE-
R0335      1). TC     WAITLIST
R0336      2). DTCB  (TO L+3 OF CALLING ROUTINE 1ST PASS THRU LONGCYCL)
R0337      3). DTCB  (TO TASKOVER ON SUBSEQUENT PASSES THRU LONGCYCL)

R0338   ALARM OR ABORT EXIT MODE-
R0339      NONE

R0340   OUTPUT-
R0341      LONGTIME AND LONGTIME+1 = DELTA TIME
R0342      LONGEXIT AND LONGEXIT+1 = RETURN 2CADR
R0343      LONGCADR AND LONGCADR+1 = TASK 2CADR
R0344      A = SINGLE PRECISION TIME FOR WAITLIST

R0345   ERASABLE INITIALIZATION-
R0346      A = MOST SIGNIFICANT PART OF DELTA TIME
R0347      L = LEAST SIGNIFICANT PART OF DELTA TIME
R0348      Q = ADDRESS OF 2CADR TASK VALUE

R0349   DEBRIS-
R0350      A,Q,L
R0351      LONGCADR AND LONGCADR+1
R0352      LONGEXIT AND LONGEXIT+1
R0353      LONGTIME AND LONGTIME+1

R0354   *** THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERASIBLE ***

 0355                    5277                      BLOCK   02
 0356   REF  42  LAST 1128   E3,1400               EBANK=  LST1
 0357   REF   1          5277  53'154 1  LONGCALL  DXCH    LONGTIME        OBTAIN THE DELTA TIME

 0358                    5300  0 0006 1            EXTEND                  OBTAIN THE 2CADR
 0359  REF 321  LAST 1127       5301  5 0002 0            NDX     Q
 0360                           5302  3 0001 0            DCA     0
 0361  REF   1                  5303  53'150 0            DXCH    LONGCADR

 0362                           5304  0 0006 1            EXTEND                      NOW GO TO THE APPROPRIATE SWITCHED BANK
 0363  REF   1                  5305  3 5310 0            DCA     LGCL2CDR            FOR THE REST OF LONGCALL
 0364                           5306  52 006 0            DTCB

 0365  REF  43  LAST 1130  E3,1400                        EBANK=  LST1
 0366  REF   1                  5307   03452 1  LGCL2CDR  2CADR   LNGCALL2
 0366  REF   1                  5310   02063 0

R0367  *** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***

 0368                      01,3452                        BANK    01
 0369  REF   2 LAST 1122 TO 1129:    145     145*         COUNT*  $$/WAIT
 0370  REF   1             01,3452  23'435 1  LNGCALL2  LXCH    LONGEXIT +1         SAVE THE CORRECT BB FOR RETURN
 0371  REF  77  LAST 1119  01,3453  3 4752 0            CA      TWO                 OBTAIN THE RETURN ADDRESS
 0372  REF 322  LAST 1131  01,3454  26 002 1            ADS     Q
 0373  REF   2  LAST 1131  01,3455  55'434 1            TS      LONGEXIT

 03731 REF   2  LAST 1130  01,3456  3 1153 1            CA      LONGTIME            CHECK FOR LEGITIMATE DELTA-TIME
 03732 REF 375  LAST 1125  01,3457  10 000 0            CCS     A
 03733 REF   1             01,3460  1 3466 1            TCF     LONGCYCL            HI-ORDER OK --> ALL IS OK.
 03734                     01,3461  1 3463 1            TCF     +2                  HI-ORDER ZERO --> CHECK LO-ORDER.
 03735 REF   1             01,3462  1 3521 0            TCF     LONGPOOH            HI-ORDER NEG. --> NEG. DT
 03736 REF   3  LAST 1131  01,3463  3 1154 0      +2    CA      LONGTIME +1         CHECK LO-ORDER FOR ZERO OR NEGATIVE.
 03737                     01,3464  0 0006 1            EXTEND
 03738 REF   2  LAST 1131  01,3465  6 3521 1            BZMF    LONGPOOH            BAD DELTA-TIME.  ABORT

R0374             *** WAITLIST TASK LONGCYCL ***
 0375                      01,3466  0 0006 1  LONGCYCL  EXTEND                      CAN WE SUCCESFULLY TAKE ABOUT 1.25
 0376  REF   1             01,3467  4 3500 0            DCS     DPBIT14             MINUTES OFF OF LONGTIME
 0377  REF   4  LAST 1131  01,3470  21'154 1            DAS     LONGTIME

 0378  REF   5  LAST 1131  01,3471  11'154 1            CCS     LONGTIME +1         THE REASONIBG BEHIND THIS PART IS
 0379  REF   1             01,3472  1 3511 0            TCF     MUCHTIME            INVOLVED, TAKING INTO ACCOUNT THAT THE
A0380                                                                               WORDS MAY NOT BE SIGNED CORRECTED (DP
A0381                                                                               BASIC INSTRUCTIONS
A0382                                                                               DO NOT SIGN CORRECT) AND THAT WE SUBTRAC
A0383                                                                               TED BIT14 (1 OVER HALF THE POS. VALUE
A0384                                                                               REPRESENTIBLE IN SINGLE WORD)
 0385                      01,3473  13 474 1            NOOP                        CAN:T GET HERE     **********
 0386                      01,3474  1 3475 0            TCF     +1
 0387  REF   6  LAST 1131  01,3475  11'153 0            CCS     LONGTIME
 0388  REF   2  LAST 1131  01,3476  1 3511 0            TCF     MUCHTIME
 0389                      01,3477   00000 1  DPBIT14   OCT     00000
 0390                      01,3500   20000 0            OCT     20000

A0391                                                                               LONGCALL
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 0392   REF  66  LAST 1099   01,3501  3 4736 1  LASTTIME CA      BIT14           GET BACK THE CORRECT DELTA TFOR WAITLIST
 0393   REF   7  LAST 1131   01,3502  27'154 1           ADS     LONGTIME +1
 0395   REF  37  LAST  892   01,3503  0 5203 0           TC      WAITLIST
 0396   REF  44  LAST 1131   E3,1400                     EBANK=  LST1
 0397   REF   1              01,3504   03516 0           2CADR   GETCADR         THE ENTRY TO OUR LONGCADR
 0397   REF   1              01,3505   02063 0

 0399   REF   1              01,3506  3 3520 0  LONGRTRN CA      TSKOVCDR        SET IT UP SO THAT ONLY THE FIRST EXIT IS
 0400   REF   3  LAST 1131   01,3507  53'435 0           DXCH    LONGEXIT        TO THE CALLER OF LONGCALL
 0401                        01,3510  52 006 0           DTCB                    THE REST ARE TO TASKOVER

 0402   REF  67  LAST 1132   01,3511  3 4736 1  MUCHTIME CA      BIT14           WE HAVE OVER OUR ABOUT 1.25 MINUTES
 0404   REF  38  LAST 1132   01,3512  0 5203 0           TC      WAITLIST        SO SET UP FOR ANOTHER CYCLE THROUGH HERE
 0405   REF  45  LAST 1132   E3,1400                     EBANK=  LST1
 0406   REF   2  LAST 1131   01,3513   03466 0           2CADR   LONGCYCL
 0406                        01,3514   02063 0

 0408   REF   1              01,3515  1 3506 0           TCF     LONGRTRN        NOW EXIT PROPERLY

R0409             *** WAITLIST TASK  GETCADR ***
 0410   REF   2  LAST 1131   01,3516  53'150 0  GETCADR  DXCH    LONGCADR        GET THE LONGCALL THAT WE WISHED TO START
 0411                        01,3517  52 006 0           DTCB                    AND TRANSFER CONTROL TO IT

 0412   REF  71  LAST 1121   01,3520   05261 1  TSKOVCDR GENADR  TASKOVER
 0413   REF   4  LAST 1132   01,3521  53'435 0  LONGPOOH DXCH    LONGEXIT
 0414                        01,3522  1 3524 0           TCF     +2
 0415   REF   6  LAST 1126   01,3523  52 062 1  WAITPOOH DXCH    WAITEXIT
 0416   REF   2  LAST 1079   01,3524  0 5726 1   +2      TC      POODOO1
 0417                        01,3525   01204 0           OCT     01204
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L      LATITUDE LONGITUDE SUBROUTINES                                                   USER'S PAGE NO.  1      EO S3

R0001  SUBROUTINE TO CONVERT RAD VECTOR AT GIVEN TIME TO LAT,LONG AND ALT

R0002  CALLING SEQUENCE

R0003     L-1     CALL
R0004     L                 LAT-LONG
R0005  SUBROUTINES USED

R0006   R-TO-RP,ARCTAN,SETGAMMA,SETRE
R0007  ERASABLE INIT. REQ.

R0008     AXO,-AYO,AZO,TEPHEM (SET AT LAUNCH TIME)
R0009  ALPHAV = POSITION VECTOR METERS B-29
R0010     MPAC-- TIME  (CSECS B-28)
R0011    ERADFLAG =1, TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0012    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0013  OUTPUT

R0014     LATITUDE IN LAT    (REVS. B-0)
R0015     LONGITUDE IN LONG    (REVS. B-0)
R0016  ALTITUDE IN ALT METERS B-29
 0017                            30,3775                     BANK    30
 0018  REF   1                   13,2000                     SETLOC  LATLONG
 0019                            13,2351                     BANK

 0020  REF   1                                               COUNT*  $$/LT-LG
 0021  REF   7  LAST   972       E4,1431                     EBANK=  ALPHAV
 0022                            13,2351   40220 0  LAT-LONG STQ     SETPD
 0023  REF   2  LAST   144       13,2352   03674 1                   INCORPEX
 0024                            13,2353   00001 0                   0D
 0025                            13,2354   24007 0           STOVL   6D                  SAVE TIME IN 6-7D FOR R-TO-RP
 0026  REF   8  LAST  1133       13,2355   02032 1                   ALPHAV
 0027                            13,2356   51406 1           PUSH    ABVAL               0-5D= R FOR R-TO-RP
 0028  REF   2  LAST   114       13,2357   16070 1           STODL   ALPHAM              ABS. VALUE OF R FOR ALT FORMULA BELOW
 0029  REF   7  LAST  1101       13,2360   24007 0                   ZEROVEC             SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0030                            13,2361   71414 0           BOFF    COS                 USE COS(0) TO GET NON-ZERO IN MPAC
 0031  REF   6  LAST   972       13,2362   01743 0                   LUNAFLAG            0=EARTH,1=MOON
 0032  REF   1                   13,2363   26364 1                   CALLRTRP
 0033                            13,2364   77624 1  CALLRTRP CALL
 0034  REF   5  LAST   979       13,2365   51670 1                   R-TO-RP             RP VECTOR CONVERTED FROM R B-29
 0035                            13,2366   77656 1           UNIT                        UNIT RP B-1
 0036  REF   9  LAST  1133       13,2367   36032 0           STCALL  ALPHAV              U2= 1/2 SINL FOR SETRE SUBR BELOW
 0037  REF   1                   13,2370   26550 0                   SETGAMMA             SET GAMMA=B2/A2 FOR EARTH,=1 FOR MOON
 0038                            13,2371   77624 1           CALL                         SCALED B-1
 0039  REF   1                   13,2372   26560 0                   SETRE               CALC RE METERS B-29
 0040                            13,2373   63545 0           DLOAD   DSQ
 0041  REF  10  LAST  1133       13,2374   02032 1                   ALPHAV
 0042                            13,2375   63525 0           PDDL    DSQ
 0043  REF  11  LAST  1133       13,2376   02034 1                   ALPHAV +2
 0044                            13,2377   75415 0           DAD     SQRT
 0045                          13,2400   76405 1          DMP     SL1R
 0046  REF   1                 13,2401   00011 1                  GAMRP
 0047  REF   7  LAST   580     13,2402   14021 1          STODL   COSTH               COS(LAT) B-1
 0048  REF  12  LAST 1133      13,2403   02036 0                  ALPHAV +4
 0049  REF   7  LAST   580     13,2404   34023 1          STCALL  SINTH               SIN(LAT) B-1
 0050  REF   4  LAST   580     13,2405   26510 1                  ARCTAN
 0051  REF   5  LAST   933     13,2406   15121 1          STODL   LAT                 LAT BC
 0052  REF  13  LAST 1134      13,2407   02032 1                  ALPHAV
 0053  REF   8  LAST 1134      13,2410   14021 1          STODL   COSTH               COS(LONG) B-1
 0054  REF  14  LAST 1134      13,2411   02034 1                  ALPHAV +2
 0055  REF   8  LAST 1134      13,2412   34023 1          STCALL  SINTH               SIN(LONG) B-1
 0056  REF   5  LAST 1134      13,2413   26510 1                  ARCTAN
 0057  REF   5  LAST   933     13,2414   15123 0          STODL   LONG                LONG. REVS B-0 IN RANGE -1/2 TO 1/2
 0058  REF   3  LAST 1133      13,2415   02070 1                  ALPHAM
 0059                          13,2416   77625 0          DSU                         ALT= R-RE METERS B-29
 0060  REF   2  LAST   144     13,2417   03673 0                  ERADM
 0061  REF   5  LAST   933     13,2420   35125 1          STCALL  ALT                 EXIT WITH ALT METERS B-29
 0062  REF   3  LAST 1133      13,2421   03674 1                  INCORPEX
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R0063   SUBROUTINE TO CONVERT LAT,LONG,ALT AT GIVEN TIME TO RADIUS VECTOR
R0064   CALLING SEQUENCE

R0065     L-1     CALL
R0066     L                LALOTORV
R0067   SUBROUTINES USED

R0068    SETGAMMA,SETRE,RP-TO-R
R0069   ERASABLE INIT. REQ.

R0070     AXO,AYO,AZO,TEPHEM  SET AT LAUNCH TIME
R0071     LAT-- LATITUDE  (REVS B0)
R0072     LONG-- LONGITUDE  (REVS B0)
R0073   ALT--ALTITUDE (METERS) B-29
R0074     MPAC-- TIME  (CSECS B-28)
R0075     ERADFLAG =1 TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0076    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0077   OUTPUT

R0078   R-VECTOR IN ALPHAV (METERS B-29)
 0079                         13,2422   40220 0  LALOTORV STQ     SETPD        LAT,LONG,ALT TO R VECTOR
 0080   REF  4  LAST 1134     13,2423   03674 1                   INCORPEX
 0081                         13,2424   00001 0                   0D
 0082                         13,2425   34007 1           STCALL  6D           6-7D= TIME FOR RP-TO-R
 0083   REF  2  LAST 1133     13,2426   26550 0                   SETGAMMA     GAMMA=B2/A2 FOR EARTH,1 FOR MOON B-1
 0084                         13,2427   73545 1           DLOAD   SIN                    COS(LONG)COS(LAT) IN MPAC
 0085   REF  6  LAST 1134     13,2430   01121 1                   LAT              UNIT RP= SIN(LONG)COS(LAT)     2-3D
 0086                         13,2431   65275 1           DMPR    PDDL         PD 2              GAMMA*SIN(LAT)        0-1D
 0087   REF  2  LAST 1134     13,2432   00011 1                   GAMRP
 0088   REF  7  LAST 1135     13,2433   01121 1                   LAT                   0-1D= GAMMA*SIN(LAT) B-2
 0089                         13,2434   65346 0           COS     PDDL         PD 4      2-3D=COS(LAT) B-1 TEMPORARILY
 0090   REF  6  LAST 1134     13,2435   01123 0                   LONG
 0091                         13,2436   57356 0           SIN     DMPR         PD 2
 0092                         13,2437   71525 0           PDDL    COS          PD 4     2-3D=SIN(LONG)COS(LAT) B-2
 0093   REF  8  LAST 1135     13,2440   01121 1                   LAT
 0094                         13,2441   71525 0           PDDL    COS          PD 6      4-5D=COS(LAT) B-1 TEMPORARILY
 0095   REF  7  LAST 1135     13,2442   01123 0                   LONG
 0096                         13,2443   55475 1           DMPR    VDEF         PD 4     MPAC= COS(LONG)COS(LAT) B-2
 0097                         13,2444   41456 0           UNIT    PUSH         0-5D= UNIT RP FOR RP-TO-R SUBR.
 0098   REF 15  LAST 1134     13,2445   36032 0           STCALL  ALPHAV       ALPHAV +4= SINL FOR SETRE SUBR.
 0099   REF  2  LAST 1133     13,2446   26560 0                   SETRE        RE METERS B-29
 0100                         13,2447   43145 0           DLOAD   BOFF         SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0101   REF  8  LAST 1133     13,2450   24007 0                   ZEROVEC
 0102   REF  7  LAST 1133     13,2451   01743 0                   LUNAFLAG
 0103   REF  1                13,2452   26454 0                   CALLRPRT
 0104                         13,2453   77746 1           COS                  USE COS(0) TO GET NON-ZERO IN MPAC
 0105                         13,2454   77624 1  CALLRPRT CALL
 0106   REF  6  LAST  978     13,2455   55716 1                   RP-TO-R      EXIT WITH UNIT R VECTOR IN MPAC
 0107   REF 15  LAST 1135     13,2456   16032 1           STODL   ALPHAV
 0108   REF  3  LAST 1134     13,2457   03673 0                   ERADM
 0109                         13,2460   74215 1            DAD     VXSC            (RE + ALT)(UNIT R) METERS B-30
 0110   REF   6  LAST 1134    13,2461   01125 0                    ALT
 0111   REF  17  LAST 1135    13,2462   02032 1                    ALPHAV
 0112                         13,2463   77772 0            VSL1                    R METERS B-29
 0113   REF  18  LAST 1136    13,2464   36032 0            STCALL  ALPHAV          EXIT WITH R IN METERS B-29
 0114   REF   5  LAST 1135    13,2465   03674 1                    INCORPEX
R0115   SUBROUTINE TO COMPUTE EARTH RADIUS

R0116   INPUT

R0117      1/2 SIN LAT IN ALPHAV +4

R0118   OUTPUT

R0119      EARTH RADIUS IN ERADM AND MPAC   (METERS B-29)

 0120                         13,2466   63545 0  GETERAD   DLOAD   DSQ
 0121   REF  19  LAST 1136    13,2467   02036 0                    ALPHAV +4       SIN**2(L)
 0122                         13,2470   44352 0            SL1     BDSU
 0123   REF   1               13,2471   24005 1                    DP1/2           COS**2(L)
 0124                         13,2472   44275 1            DMPR    BDSU
 0125   REF   1               13,2473   26507 1                    EE
 0126   REF   2  LAST 1136    13,2474   24005 1                    DP1/2
 0127                         13,2475   75465 1            BDDV    SQRT
 0128   REF   1               13,2476   26503 0                    B2XSC
 0129                         13,2477   77622 1            SR4R
 0130   REF   [illegible]  LAST 1135    13,2500   03673 0            STORE   ERADM
 0131                         13,2501   77616 0            RVQ

R01311  THE FOLLOWING CONSTANTS WERE COMPUTED WITH A=6378166,B=6356784 METERS
R01312  B2XSC= B**2 SCALED B-51
R01313  B2/A2= B**2/A**2 SCALED B-1
R01314  EE=(1-B**2/A**2) SCALED B-0
 0132                         13,2502   00446 1  B2XSC     2DEC    .0179450689       B**2 SCALED B-51
 0132                         13,2503   00305 1
 0133   REF   8  LAST 1101    12,2004            DP1/2     =       XUNIT
 0134                         13,2504   17711 0  B2/A2     2DEC    .9933064884 B-1   GAMMA= B**2/A**2 B-1
 0134                         13,2505   05254 1
 0135                         13,2506   00155 0  EE        2DEC    6.6935116 E-3     (1-B**2/A**2) B-0
 0135                         13,2507   25250 1
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P0137    ARCTAN SUBROUTINE


R0138    CALLING SEQUENCE

R0139      SIN THETA IN SINTH B-1
R0140      COS THETA IN COSTH B-1
R0141      CALL ARCTAN

R0142    OUTPUT
R0143      ARCTAN THETA IN MPAC AND THETA B-0 IN RANGE -1/2 TO +1/2


 0144                          13,2510   77600 1  ARCTAN   BOV
 0145   REF   1                13,2511   26512 0                   CLROVFLW
 0146                          13,2512   63545 0  CLROVFLW DLOAD   DSQ
 0147   REF   9  LAST 1134     13,2513   00023 0                   SINTH
 0148                          13,2514   53525 0           PDDL    DSQ
 0149   REF   9  LAST 1134     13,2515   00021 1                   COSTH
 0150                          13,2516   77615 0           DAD
 0151                          13,2517   75454 0           BZE     SQRT
 0152   REF   1                13,2520   26536 0                   ARCTANXX         ATAN=0/0   SET THETA=0
 0153                          13,2521   40065 0           BDDV    BOV
 0154   REF  10  LAST 1137     13,2522   00023 0                   SINTH
 0155   REF   1                13,2523   26543 1                   ATAN=90
 0156                          13,2524   67542 0           SR1     ASIN
 0157   REF   4  LAST  946     13,2525   00025 0           STORE   THETA
 0158                          13,2526   50125 1           PDDL    BMN
 0159   REF  10  LAST 1137     13,2527   00021 1                   COSTH
 0160   REF   1                13,2530   26532 1                   NEGCOS
 0161                          13,2531   43545 1           DLOAD   RVQ
 0162                          13,2532   57545 1  NEGCOS   DLOAD   DCOMP
 0163                          13,2533   43244 1           BPL     DAD
 0164   REF   1                13,2534   26540 1                   NEGOUT
 0165   REF   3  LAST 1136     13,2535   24005 1                   DP1/2
 0166   REF   5  LAST 1137     13,2536   00025 0  ARCTANXX STORE   THETA
 0167                          13,2537   77616 0           RVQ

 0168                          13,2540   52025 1  NEGOUT   DSU     GOTO
 0169   REF   4  LAST 1137     13,2541   24005 1                   DP1/2
 0170   REF   2  LAST 1137     13,2542   26536 0                   ARCTANXX
 0171                          13,2543   75345 1  ATAN=90  DLOAD   SIGN
 0172   REF   1                13,2544   11037 0                   LCDP1/4
 0173   REF  11  LAST 1137     13,2545   00023 0                   SINTH
 0174   REF   6  LAST 1137     13,2546   00025 0           STORE   THETA
 0175                          13,2547   77616 0           RVQ

 0176   REF   2  LAST  938     12,2006            2DZERO   =       DPZERO
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R0177   ..... SETGAMMA SUBROUTINE .....
R0178   SUBROUTINE TO SET GAMMA FOR THE LAT-LONG AND LALOTORV SUBROUTINES

R0179    GAMMA = B**2/A**2 FOR EARTH (B-1)
R0180    GAMMA = 1 FOR MOON (B-1)

R0181   CALLING SEQUENCE
R0182    L          CALL
R0183    L+1                  SETGAMMA

R0184   INPUT
R0185    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0186   OUTPUT
R0187    GAMMA IN GAMRP  (B-1)

  0188                      13,2550   43145 0  SETGAMMA DLOAD  BOFF             BRANCH FOR EARTH
  0189  REF    1            13,2551   26505 0                  B2/A2            EARTH GAMMA
  0190  REF    8  LAST 1135 13,2552   01743 0                  LUNAFLAG
  0191  REF    1            13,2553   26556 0                  SETGMEX
  0192                      13,2554   77735 0           SLOAD
  0193  REF    1            13,2555   24005 1                  1B1              MOON GAMMA
  0194  REF    3  LAST 1135 13,2556   00011 1  SETGMEX  STORE  GAMRP
  0195                      13,2557   77616 0           RVQ
  0196                         0010            GAMRP    =      8D
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P0197    .....SETRE SUBROUTINE .....
R0198    SUBROUTINE TO SET RE (EARTH OR MOON RADIUS)

R0199    RE= RM FOR MOON
R0200    RE= REF FOR FIXED EARTH RADIUS OR COMPUTED RF FOR FISCHER ELLIPSOID

R0201    CALLING SEQUENCE
R0202     L          CALL
R0203     L+1                SETRE

R0204    SUBROUTINES USED
R0205     GETERAD

R0206    INPUT
R0207     ERADFLAG=0 FOR FIXED RE, 1 FOR COMPUTED RE
R0208     ALPHAV +4= 1/2 SINL IF GETERAD IS CALLED
R0209     LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0210    OUTPUT
R0211     ERADM= 504RM FOR MOON (METERS B-29)
R0212     ERADM= ERAD OR COMPUTED RF FOR EARTH (METERS B-29)

 0213                        13,2560   71220 1  SETRE     STQ    DLOAD
 0214    REF   1             13,2561   00051 0                   SETREX
 0215    REF   1             13,2562   10003 0                   504RM
 0216                        13,2563   71214 0            BON    DLOAD           BRANCH FOR MOON
 0217    REF   9  LAST 1138  13,2564   01703 1                   LUNAFLAG
 0218    REF   1             13,2565   26575 1                   TSTRLSRM
 0219    REF   1             13,2566   10001 1                   ERAD
 0220                        13,2567   45014 0            BOFF   CALL            ERADFLAG=0 FOR FIXED RE,1 FOR COMPUTED
 0221    REF   4  LAST  973  13,2570   00742 0                   ERADFLAG
 0222    REF   1             13,2571   26573 1                   SETRXX
 0223    REF   1             13,2572   26466 1                   GETERAD
 0224    REF   5  LAST 1136  13,2573   37673 1  SETRXX    STCALL ERADM           EXIT WITH RE OR RM METERS B-29
 0225    REF   2  LAST 1139  13,2574   00051 0                   SETREX
 0226                        13,2575   77214 0  TSTRLSRM  BON    VLOAD           ERADFLAG=0,SET RO=RLS
 0227    REF   5  LAST 1139  13,2576   00702 1                   ERADFLAG                  =1     RO=RM
 0228    REF   2  LAST 1139  13,2577   26573 1                   SETRXX
 0229    REF  14  LAST  982  13,2600   02023 1                   RLS
 0230                        13,2601   64446 0            ABVAL  SR2R            SCALE FROM B-27 TO B-29
 0231                        13,2602   77650 1            GOTO
 0232    REF   3  LAST 1139  13,2603   26573 1                   SETRXX
 0233    REF  12  LAST  971       0051          SETREX    =      S2
```

```
R0001    ..... RP-TO-R SUBROUTINE .....
R0002    SUBROUTINE TO CONVERT RP (VECTOR IN PLANETARY COORDINATE SYSTEM,EITHER
R0003     EARTH-FIXED OR MOON-FIXED) TO R (SAME VECTOR IN THE BASIC REF. SYSTEM)

R0004     R=MT(T)*(RP+LPXRP)     MT= M MATRIX TRANSPOSE

R0005    CALLING SEQUENCE
R0006     L          CALL
R0007     L+1                RP-TO-R

R0008    SUBROUTINES USED
R0009     EARTHMX,MOONMX,EARTHL

R0010       ITEMS AVAILABLE FROM LAUNCH DATA
R0011        504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0012        IN THE MOON-FIXED COORD. SYSTEM    RADIANS  B0
R0013          ITEMS NECESSARY FOR SUBR. USED (SEE DESCRIPTION OF SUBR.)

R0014    INPUT
R0015     MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0016     0-5D= RP VECTOR
R0017     6-7D= TIME

R0018    OUTPUT
R0019     MPAC= R VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

 0020    REF    1               26,2000                              SETLOC PLANTIN1
 0021                           26,3716                              BANK

 0022    REF    2 LAST    52 TO  153:      18     18*                COUNT* $$/LUPOT

 0023                           26,3716    46020 1  RP-TO-R   STQ     BHIZ
 0024    REF    1               26,3717    00050 1                    RPREXIT
 0025    REF    1               26,3720    55733 0                    RPTORA
 0026                           26,3721    77624 1            CALL                      COMPUTE M MATRIX FOR MOON
 0027    REF    1               26,3722    51720 0                    MOONMX            LP=LM FOR MOON  RADIANS B0
 0028                           26,3723    77775 1            VLOAD
 0029    REF    1               26,3724    02013 1                    504LM
 0030                           26,3725    53235 0  RPTORB    VXV     VAD
 0031    REF    1               26,3726    00001 0                    504RPR
 0032    REF    2  LAST 1140    26,3727    00001 0                    504RPR
 0033                           26,3730    52105 1            VXM     GOTO
 0034    REF    1               26,3731    00025 0                    MMATRIX           MPAC=R=MT(T)*(RP+LPXRP)
 0035    REF    1               26,3732    51706 1                    RPRPXXXX          RESET PUSHLOC TO 0 BEFORE EXITING
 0036                           26,3733    77624 1  RPTORA    CALL                      EARTH COMPUTATIONS
 0037    REF    1               26,3734    55743 1                    EARTHMX           M MATRIX B-1
 0038                           26,3735    77624 1            CALL
 0039    REF    1               26,3736    15753 1                    EARTHL            L VECTOR RADIANS B0
 0040                           26,3737    76521 0            MXV     VSL1              LP=M(T)*L  RAD B-0
 0041    REF    2  LAST 1140    26,3740    00025 0                    MMATRIX
 0042                         26,3741   77650 1          GOTO
 0043    REF    1             26,3742   55725 1                 RPTORB
 00432   REF    1             24,2000                    SETLOC PLANTIN
 00434                        24,3670                    BANK
 00436   REF    1                                        COUNT* $$/LUROT
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R0044      ..... R-TO-RP SUBROUTINE .....
R0045      SUBROUTINE TO CONVERT R (VECTOR IN REFERENCE COORD. SYSTEM) TO RP
R0046       (VECTOR IN PLANETARY COORD SYSTEM) EITHER EARTH-FIXED OR MOON-FIXED

R0047       RP=M(T)*(R-LXR)

R0048      CALLING SEQUENCE
R0049       L          CALL
R0050       L+1                 R-TO-RP

R0051      SUBROUTINES USED
R0052       EARTHMX,MOONMX,EARTHL

R0053      INPUT
R0054       MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0055       0-5D= R VECTOR
R0056       6-7D= TIME

R0057          ITEMS AVAILABLE FROM LAUNCH DATA
R0058           504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0059           IN THE MOON-FIXED COORD. SYSTEM   RADIANS B0
R0060             ITEMS NECESSARY FOR SUBROUTINES USED (SEE DESCRIPTION OF SUBR.)

R0061      OUTPUT
R0062       MPAC=RP VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

 0063                          24,3670   46020 1  R-TO-RP  STQ     BHIZ
 0064      REF   2  LAST 1140  24,3671   00050 1                   RPREXIT
 0065      REF   1             24,3672   51712 1                   RTORPA
 0066                          24,3673   77624 1           CALL
 0067      REF   2  LAST 1140  24,3674   51720 0                   MOONMX
 0068                          24,3675   61375 1           VLOAD   VXM
 0069      REF   2  LAST 1140  24,3676   02013 1                   504LM             LP=LM
 0070      REF   3  LAST 1140  24,3677   00025 0                   MMATRIX
 0071                          24,3700   77772 0           VSL1                       L=MT(T)*LP  RADIANS B0
 0072                          24,3701   51235 1  RTORPB   VXV     BVSU
 0073      REF   3  LAST 1140  24,3702   00001 0                   504RPR
 0074      REF   4  LAST 1142  24,3703   00001 0                   504RPR
 0075                          24,3704   77721 0           MXV                       M(T)*(R-LXR) B-2
 0076      REF   4  LAST 1142  24,3705   00025 0                   MMATRIX
 0077                          24,3706   40372 0  RPEFXXXX VSL1    SETPD
 0078                          24,3707   00001 0                   0D
 0079                          24,3710   77650 1           GOTO
 0080      REF   3  LAST 1142  24,3711   00050 1                   RPREXIT
 0081                          24,3712   77624 1  RTORPA   CALL                      EARTH COMPUTATIONS
 0082      REF   2  LAST 1140  24,3713   55743 1                   EARTHMX
 0083                          24,3714   77624 1           CALL
 0084      REF   2  LAST 1140  24,3715   15753 1                   EARTHL
 0085                          24,3716   77650 1           GOTO                      MPAC=L=(-AX,-AY,0) RAD B-0
 0086      REF   1             24,3717   51701 0                   RTORPB
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P0087    ..... MOONMX SUBROUTINE .....
R0088    SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE MOON

R0089    CALLING SEQUENCE
R0090     L          CALL
R0091     L+1               MOONMX

R0092    SUBROUTINES USED
R0093     NEWANGLE

R0094    INPUT
R0095     6-7D= TIME
R0096        ITEMS AVAILABLE FROM LAUNCH DATA
R0097         BSUBO,BDOT
R0098         TIMSUBO,NODIO,NODDOT,FSUBO,FDOT
R0099         COSI= COS(I) B-1
R0100         SINI= SIN(I) B-1
R0101           I  IS THE ANGLE BETWEEN THE MEAN LUNAR EQUATORIAL PLANE AND THE
R0102           PLANE OF THE ECLIPTIC  (1 DEGREE  32.1 MINUTES)

R0103    OUTPUT
R0104     MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 0105                             24,3720   40220 0  MOONMX   STQ      SETPD
 0106    REF    1                 24,3721   00051 0                    EARTHMXX
 0107                             24,3722   00011 1                    8D
 0108                             24,3723   77770 1           AXT,1                 B REQUIRES SL 0, SL 5 IN NEWANGLE
 0109                             24,3724   00005 1                    5
 0110                             24,3725   65345 0           DLOAD    PDDL         PD 10D              8-9D=BSUBO
 0111    REF    1                 24,3726   14017 1                    BSUBO                            10-11D= BDOT
 0112    REF    1                 24,3727   14011 1                    BDOT
 0113                             24,3730   45006 0           PUSH     CALL         PD 12D
 0114    REF    1                 24,3731   53743 1                    NEWANGLE     EXIT WITH PD 8D AND MPAC= B  REVS B0
 0115                             24,3732   71406 0           PUSH     COS          PD 10D
 0116    REF    1                 24,3733   14041 1           STODL    COB          PD 8D     COS(B) B-1
 0117                             24,3734   77756 0           SIN                             SIN(B) B-1
 0118    REF    1                 24,3735   14043 0           STODL    SOB                        SETUP INPUT FOR NEWANGLE
 0119    REF    1                 24,3736   14015 0                    FSUBO                                8-9D=FSUBO
 0120                             24,3737   41525 0           PDDL     PUSH         PD 10D THEN 12D   10-11D=FDOT
 0121    REF    1                 24,3740   14007 0                    FDOT
 0122                             24,3741   45170 0           AXT,1    CALL         F REQUIRES SL 1, SL 6 IN NEWANGLE
 0123                             24,3742   00004 0                    4
 0124    REF    2  LAST 1143      24,3743   53743 1                    NEWANGLE     EXIT WITH PD 8D AND MPAC= F REVS B0
 0125    REF    1                 24,3744   14027 1           STODL    AVECTR +2    SAVE F TEMP
 0126    REF    1                 24,3745   14013 0                    NODIO                                8-9D=NODIO
 0127                             24,3746   41525 0           PDDL     PUSH         PD 10D THEN 12D   10-11D=NODDOT
 0128    REF    1                 24,3747   14005 1                    NODDOT                               MPAC=T
 0129                             24,3750   45170 0           AXT,1    CALL         NODE REQUIRES SL 0, SL 5 IN NEWANGLE
 0130                             24,3751   00005 1                    5
 0131    REF    3  LAST 1143      24,3752   53743 1                    NEWANGLE     EXIT WITH PD 8D AND MPAC= NODI REVS B0
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0132                       24,3753   71406 0           PUSH    COS             PD 10D   8-9D= NODI   REVS  B0
0133                       24,3754   77606 1           PUSH                    PD 12D 10-11D= COS(NODI)  B-1
0134   REF    2 LAST 1143  24,3755   00025 0           STORE   AVECTR
0135                       24,3756   76405 1           DMP     SL1R
0136   REF    2 LAST 1143  24,3757   00041 1                   COB                                     COS(NODI)     B-1
0137   REF    1            24,3760   14035 1           STODL   BVECTR +2       PD 10D   20-25D=AVECTR= COB*SIN(NODI)
0138                       24,3761   76405 1           DMP     SL1R                                    SOB*SIN(NODI)
0139   REF    2 LAST 1143  24,3762   00043 0                   SOB
0140   REF    2 LAST 1144  24,3763   14037 0           STODL   BVECTR +4       PD 8D
0141                       24,3764   41556 1           SIN     PUSH            PD 10D                 -SIN(NODI)   B-1
0142                       24,3765   77676 0           DCOMP                            26-31D=BVECTR= COB*COS(NODI)
0143   REF    3 LAST 1144  24,3766   14033 1           STODL   BVECTR          PD 8D                   SOB*COS(NODI)
0144   REF    3 LAST 1144  24,3767   00027 1                   AVECTR +2       MOVE F FROM TEMP LOC. TO 504F
0145   REF    1            24,3770   14007 0           STODL   504F
0146                       24,3771   76405 1           DMP     SL1R
0147   REF    3 LAST 1144  24,3772   00041 1                   COB
01472                      24,3773   77650 1           GOTO
01474  REF    1            24,3774   53671 1                   MOONMXA

01475                      25,3671                     BANK    25
01476  REF    1            25,2000                     SETLOC  PLANTIN3
01477                      25,3671                     BANK
01478  REF    1                                        COUNT*  $$/LUROT

0148   REF    4 LAST 1144  25,3671   14027 1  MOONMXA  STODL   AVECTR +2
0149   REF    1            25,3672   00011 1                   SINNODI         8-9D=SIN(NODI)  B-1
0150                       25,3673   76405 1           DMP     SL1R
0151   REF    3 LAST 1144  25,3674   00043 0                   SOB
0152   REF    5 LAST 1144  25,3675   14031 0           STODL   AVECTR +4                                0
0153   REF   12 LAST  849  25,3676   06522 1                   HI6ZEROS                8-13D= CVECTR= -SOB  B-1
0154                       25,3677   57525 1           PDDL    DCOMP           PD 10D                  COB
0155   REF    4 LAST 1144  25,3700   00043 0                   SOB
0156                       25,3701   63325 0           PDDL    PDVL            PD 12D THEN PD 14D
0157   REF    4 LAST 1144  25,3702   00041 1                   COB
0158   REF    4 LAST 1144  25,3703   00033 1                   BVECTR
0159                       25,3704   63361 0           VXSC    PDVL            PD 20D         BVECTR*SINI  B-2
0160   REF    1            25,3705   14003 1                   SINI
0161   REF    1            25,3706   00011 1                   CVECTR
0162                       25,3707   53361 0           VXSC    VAD             PD 14D         CVECTR*COSI  B-2
0163   REF    1            25,3710   14001 0                   COSI
0164                       25,3711   77772 0           VSL1
0165   REF    5 LAST 1142  25,3712   24041 1           STOVL   MMATRIX +12D    PD 8D  M2=BVECTR*SINI+CVECTR*COSI  B-1
0166                       25,3713   63361 0           VXSC    PDVL            PD 14D
0167   REF    2 LAST 1144  25,3714   14003 1                   SINI                           CVECTR*SINI  B-2
0168   REF    5 LAST 1144  25,3715   00033 1                   BVECTR
0169                       25,3716   52361 1           VXSC    VSU             PD 8D          BVECTR*COSI  B-2
0170   REF    2 LAST 1144  25,3717   14001 0                   COSI
0171                       25,3720   65372 1           VSL1    PDDL            PD 14D
0172   REF    2 LAST 1144  25,3721   00007 0                   504F            8-13D=DVECTR=BVECTR*COSI-CVECTR*SINI B-1
0173                       25,3722   74346 0           COS     VXSC
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 0174   REF    1              25,3723   00011 1                     DVECTR
 0175                         25,3724   73525 1           PDDL      SIN               PD 20D  14-19D= DVECTR*COSF  B-2
 0176   REF    3  LAST 1144   25,3725   00007 0                     504F
 0177                         25,3726   52361 1           VXSC      VSU               PD 14D          AVECTR*SINF  B-2
 0178   REF    6  LAST 1144   25,3727   00025 0                     AVECTR
 0179                         25,3730   77772 0           VSL1
 0180   REF    6  LAST 1144   25,3731   14033 1           STODL     MMATRIX +6        M1= AVECTR*SINF-DVECTR*COSF  B-1
 0181   REF    4  LAST 1145   25,3732   00007 0                     504F
 0182                         25,3733   74356 1           SIN       VXSC              PD 8D
 0183                         25,3734   71525 0           PDDL      COS               PD 14D  8-13D=DVECTR*SINF B-2
 0184   REF    5  LAST 1145   25,3735   00007 0                     504F
 0185                         25,3736   53361 0           VXSC      VAD               PD 8D          AVECTR*COSF B-2
 0186   REF    7  LAST 1145   25,3737   00025 0                     AVECTR
 0187                         25,3740   57572 0           VSL1      VCOMP
 0188   REF    7  LAST 1145   25,3741   34025 1           STCALL MMATRIX              MO= -(AVECTR*COSF+DVECTR*SINF)  B-1
 0189   REF    2  LAST 1143   25,3742   00051 0                     EARTHMXX
R0190   COMPUTE X=XO+(XDOT)(T+TO)
R0191   8-9D= XO (REVS B-0),PUSHLOC SET AT 12D
R0192   10-11D=XDOT (REVS/CSEC) SCALED B+23 FOR WEARTH,B+28 FOR NODDOT AND BDOT
R0193                        AND B+27 FOR FDOT
R0194    X1=DIFFERENCE I : 23 AND SCALING OF XDOT,=0 FOR WEARTH,5 FOR NODDOT AND
R0195                                            BDOT AND 4 FOR FDOT
R0196   6-7D=T (CSEC B-28), TIMSUBO= (CSEC B-42 TRIPLE PREC.)

 0197                         25,3743   54345 1  NEWANGLE DLOAD     SP                ENTER PD 12D
 0198                         25,3744   00007 0                     6D
 0199                         25,3745   20617 0                     14D
 0200                         25,3746   72371 1           TAD       TLOAD             CHANGE MODE TO TP
 0201   REF    1              25,3747   01707 0                     TIMSUBO
 0202   REF  726  LAST 1108   25,3750   00155 0                     MPAC
 0203   REF    1              25,3751   14017 1           STODL     TIMSUBM           T+TO CSEC B-42
 0204   REF    2  LAST 1145   25,3752   00020 0                     TIMSUBM +1
 0205                         25,3753   77605 1           DMP                         PD 10D  MULT BY XDOT IN 10-11D
 0206                         25,3754   43257 0           SL*       DAD               PD 8D   ADD XO IN 8-9D AFTER SHIFTING
 0207                         25,3755   20206 1                     5,1                       SUCH THAT SCALING IS B-0
 0208                         25,3756   67206 1           PUSH      SLOAD             PD 10D SAVE PARTIAL (XO+XDOT*T) IN 8-9D
 0209   REF    3  LAST 1145   25,3757   00017 1                     TIMSUBM
 0210                         25,3760   41261 1           SL        DMP
 0211                         25,3761   20212 1                     9D
 0212                         25,3762   00013 0                     10D               XDOT
 0213                         25,3763   43257 0           SL*       DAD               PD 8D   SHIFT SUCH THAT THIS PART OF X
 0214                         25,3764   20213 0                     10D,1                     IS SCALED REVS/CSEC B-0
 02141                        25,3765   77600 1           BOV                         TURN OFF OVERFLOW IF SET BY SHIFT
 02142                        25,3766   53767 1                     +1                INSTRUCTION BEFORE EXITING
 0215                         25,3767   77616 0           RVQ                         MPAC=X= XO+(XDOT)(T+TO)  REVS BO
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R0216   ..... EARTHMX SUBROUTINE .....
R0217   SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE EARTH

R0218   CALLING SEQUENCE
R0219    L          CALL
R0220    L+1                  EARTHMX

R0221   SUBROUTINES USED
R0222    NEWANGLE

R0223   INPUT
R0224       INPUT AVAILABLE FROM LAUNCH DATA      AZO    REVS B-0
R0225                                             TEPHEM  CSEC B-42
R0226    6-7D= TIME CSEC B-28

R0227   OUTPUT
R0228    MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 02282                      26,3743                        BANK    26
 02284  REF   2  LAST 1140  26,2000                        SETLOC  PLANTIN1
 02286                      26,3743                        BANK
 02288  REF   3 LAST 1140 TO 1141:     21      39*         COUNT*  $$/LUROT

 0229                       26,3743   40220 0   EARTHMX    STQ     SETPD              SET    8-9D=AZO
 0230   REF   3  LAST 1145  26,3744   00051 0                      EARTHMXX
 0231                       26,3745   00011 1                      8D                 10-11D=WEARTH
 0232                       26,3746   77770 1              AXT,1                      FOR SL 5, AND SL 10  IN NEWANGLE
 0233                       26,3747   00000 1                      0
 0234                       26,3750   65345 0              DLOAD   PDDL                 LEAVING PD SET AT 12D FOR NEWANGLE
 0235   REF   1             26,3751   01712 1                      AZO
 0236   REF   1             26,3752   14021 1                      WEARTH
 0237                       26,3753   45006 0              PUSH    CALL
 0238   REF   4  LAST 1143  26,3754   53743 1                      NEWANGLE
 0239                       26,3755   41401 1              SETPD   PUSH               18-19D=504AZ
 0240                       26,3756   00023 0                      18D                                  COS(AZ) SIN(AZ) 0
 0241                       26,3757   65346 0              COS     PDDL               20-37D=  MMATRIX= -SIN(AZ) COS(AZ) 0 B-1
 0242   REF   1             26,3760   00023 0                      504AZ                                  0        0      1
 0243                       26,3761   65356 1              SIN     PDDL
 0244   REF  13  LAST 1144  26,3762   06522 1                      HI6ZEROS
 0245                       26,3763   73525 1              PDDL    SIN
 0246   REF   2  LAST 1146  26,3764   00023 0                      504AZ
 0247                       26,3765   65276 1              DCOMP   PDDL
 0248   REF   3  LAST 1146  26,3766   00023 0                      504AZ
 0249                       26,3767   63346 0              COS     PDVL
 0250   REF  14  LAST 1146  26,3770   06522 1                      HI6ZEROS
 0251                       26,3771   41525 0              PDDL    PUSH
 0252   REF   5  LAST  488  26,3772   06520 0                      HIDPHALF
 0253                       26,3773   77650 1              GOTO
 0254   REF   4  LAST 1146  26,3774   00051 0                      EARTHMXX
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R0255    ..... EARTHL SUBROUTINE .....
R0256    SUBROUTINE TO COMPUTE L VECTOR FOR EARTH

R0257    CALLING SEQUENCE
R0258      L          CALL
R0259      L+1                 EARTHL

R0260    INPUT
R0261      AXO,AYO SET AT LAUNCH TIME WITH AYO IMMEDIATELY FOLLOWING AXO IN CORE

R0262    OUTPUT
R0263                   -AX
R0264      MPAC=        -AY     RADIANS B-0
R0265                    0

 026505                            06,3753                           BANK    06
 02651   REF    1                  06,2000                           SETLOC  EARTHLOC
 026515                            06,3753                           BANK
 02652   REF    1                                                    COUNT*  $$/LUROT

 0266                              06,3753    57545 1   EARTHL       DLOAD   DCOMP
 0267    REF    1                  06,3754    01716 0                        AXO
 0268    REF    1                  06,3755    14017 1                STODL   504LPL
 0269    REF    1                  06,3756    01714 1                        -AYO
 0270    REF    2  LAST 1147       06,3757    14021 1                STODL   504LPL +2
 0271    REF    4  LAST  322       06,3760    24007 0                        L06ZEROS
 0272    REF    3  LAST 1147       06,3761    24023 0                STOVL   504LPL +4
 0273    REF    4  LAST 1147       06,3762    00017 1                        504LPL
 0274                              06,3763    77616 0                RVQ
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P0275   CONSTANTS AND ERASABLE ASSIGNMENTS
 0276   REF   5  LAST 1137  12,2004         1B1      =      DP1/2           1  SCALED B-1
 0279   REF  13  LAST 1088     0050         RPREXIT  =      S1              R-TO-RP AND RP-TO-R SUBR EXIT
 0280   REF  13  LAST 1139     0051         EARTHMXX =      S2              EARTHMX,MOONMX SUBR. EXITS
 0281                          0000         504RPR   =      0D              6 REGS  R OR RP VECTOR
 0282                          0010         SINNODI  =      8D              2       SIN(NODI)
 0283                          0010         DVECTR   =      8D              6       D VECTOR MOON
 0284                          0010         CVECTR   =      8D              6       C VECTR MOON
 0285                          0022         504AZ    =      18D             2      AZ
 0286                          0016         TIMSUBM  =      14D             3       TIME SUB M (MOON) T+TO IN GETAZ
 0287                          0016         504LPL   =      14D             6       L OR LP VECTOR
 0288                          0024         AVECTR   =      20D             6       A VECTOR (MOON)
 0289                          0032         BVECTR   =      26D             6       B VECTOR (MOON)
 0290                          0024         MMATRIX  =      20D             18      M MATRIX
 0291                          0040         COB      =      32D             2       COS(B) B-1
 0292                          0042         SOB      =      34D             2       SIN(B) B-1
 0293                          0006         504F     =      6D              2       F (MOON)
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R0001    INCORP1--PERFORMS THE SIX DIMENSIONAL STATE VECTOR DEVIATION FOR POSITI
R0002   ON AND VELOCITY OR THE NINE DIMENSIONAL DEVIATION OF POSITION,VELOCITY,A
R0003   ND RADAR OR LANDMARK BIAS.THE OUTPUT OF THE BVECTOR ROUTINE ALONG WITH T
R0004   HE ERROR TRANSITION MATRIX(W) ARE USED AS INPUT TO THE ROUTINE.THE DEVIA
R0005   TION IS OBTAINED BY COMPUTING AN ESTIMATED TRACKING MEASUREMENT FROM THE
R0006   CURRENT STATE VECTOR AND COMPARING IT WITH AN ACTUAL TRACKING MEASUREMEN
R0007   T AND APPLYING A STATISTICAL WEIGHTING VECTOR.
R0008   INPUT
R0009      DMENFLG = 0 6DIMENSIONAL BVECTOR  1= 9DIMENSIONAL
R0010            W = ERROR TRANSITION MATRIX 6X6 OR 9X9
R0011     VARIANCE = VARIANCE (SCALAR)
R0012       DELTAQ = MEASURED DEVIATION(SCALAR)
R0013      BVECTOR = 6 OR 9 DIMENSIONAL BVECTOR

R0014   OUTPUT
R0015       DELTAX = STATE VECTOR DEVIATIONS 6 OR 9 DIMENSIONAL
R0016           ZI = VECTOR USED FOR THE INCORPORATION 6 OR 9 DIMENSIONAL
R0017      GAMMA = SCALAR
R0018      OMEGA = OMEGA WEIGHTING VECTOR 6 OR 9 DIMENTIONAL
R0019   CALLING SEQUENCE
R0020      L  CALL INCORP1

R0021   NORMAL EXIT

R0022      L+1 OF CALLING SEQUENCE

 0023                             37,3655                             BANK      37
 0024   REF   1                   23,2000                             SETLOC    MEASINC
 0025                             23,2531                             BANK

 0026   REF   1                                                       COUNT*    $$/INCOR

 0027   REF  18   LAST  610       E5,1400                             EBANK=    W

 0028                             23,2531    77620 0   INCORP1        STO
 0029   REF   2   LAST  126       23,2532    02772 1                            EGRESS
 0030                             23,2533    66370 0                  AXT,1     SSP
 0031                             23,2534    00066 1                            54D
 0032   REF  14   LAST 1148       23,2535    00051 0                            S1
 0033                             23,2536    00022 1                            18D              IX1 = 54   S1= 18
 0034                             23,2537    66374 1                  AXT,2     SSP
 0035                             23,2540    00022 1                            18D
 0036   REF  14   LAST 1148       23,2541    00052 0                            S2
 0037                             23,2542    00006 1                            6                IX2 = 18   S2=6
 0038                             23,2543    63775 1   Z123           VLOAD     MXV*
 0039   REF  22   LAST  582       23,2544    03525 0                            BVECTOR          BVECTOR (0)
 0040   REF  19   LAST 1149       23,2545    02467 0                            W +54D,1
 0041   REF   2   LAST  126       23,2546    12665 1                  STORE     ZI +18D,2
 0042                             23,2547    77775 1                  VLOAD
 0043   REF  23   LAST 1149       23,2550    03533 1                            BVECTOR +6       BVECTOR (1)
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0044                       23,2551   52717 1               MXV*     VAD*
0045   REF  20  LAST 1149  23,2552   02555 0                        W +108D,1
0046   REF   3  LAST 1149  23,2553   75112 1                        ZI +18D,2
0047   REF   4  LAST 1150  23,2554   12665 1               STORE    ZI +18D,2
0048                       23,2555   77775 1               VLOAD
0049   REF  24  LAST 1149  23,2556   03541 1                        BVECTOR +12D    BVECTOR (2)
0050                       23,2557   52717 1               MXV*     VAD*
0051   REF  21  LAST 1150  23,2560   02643 1                        W +162D,1
0052   REF   5  LAST 1150  23,2561   75112 1                        ZI +18D,2       B(0)*W+B(1)*(W+54)+B(2)*(W+108)FIRST PAS
0053   REF   6  LAST 1150  23,2562   12665 1               STORE    ZI +18D,2       ZI THEN Z2 THEN Z3
0054                       23,2563   77700 0               TIX,1
0055   REF   1             23,2564   46565 0                        INCOR1
0056                       23,2565   43104 0   INCOR1      TIX,2    BON
0057   REF   1             23,2566   46543 1                        Z123            LOOP FOR Z1,Z2,Z3
0058   REF   3  LAST  583  23,2567   02706 1                        DMENFLG
0059   REF   1             23,2570   46574 0                        INCOR1A
0060                       23,2571   77775 1               VLOAD
0061   REF  17  LAST  920  23,2572   06522 1                        ZEROVECS
0062   REF   7  LAST 1150  23,2573   02657 1               STORE    ZI +12D
0063                       23,2574   77201 1   INCOR1A     SETPD    VLOAD
0064                       23,2575   00001 0                        0
0065   REF   8  LAST 1150  23,2576   02643 1                        ZI
0066                       23,2577   47036 1               VSQ      RTB
0067   REF   6  LAST  582  23,2600   21633 1                        TPMODE
0068                       23,2601   47515 0               PDVL     VSQ
0069   REF   9  LAST 1150  23,2602   02651 1                        ZI +6
0070                       23,2603   76234 0               RTB      TAD
0071   REF   7  LAST 1150  23,2604   21633 1                        TPMODE
0072                       23,2605   47515 0               PDVL     VSQ
0073   REF  10  LAST 1150  23,2606   02657 1                        ZI +12D
0074                       23,2607   76234 0               RTB      TAD
0075   REF   8  LAST 1150  23,2610   21633 1                        TPMODE
0076                       23,2611   77171 0               TAD      AXT,2
0077   REF  11  LAST  582  23,2612   02707 0                        VARIANCE
0078                       23,2613   00000 1                        0
0079   REF   2  LAST  126  23,2614   02665 0               STORE    TRIPA           ZI*2 + Z2*2 + Z3*2 + VARIANCE
0080                       23,2615   40151 0               TLOAD    BOV
0081   REF  12  LAST 1150  23,2616   02707 0                        VARIANCE        CLEAR OVFIND
0082                       23,2617   46620 1                        +1
0083   REF   1             23,2620   02670 1               STORE    TEMPVAR         TEMP STORAGE FOR VARIANCE
0084                       23,2621   77654 0               BZE
0085   REF   1             23,2622   46631 1                        INCOR1C
0086                       23,2623   40112 1   INCOR1B     SL2      BOV
0087   REF   2  LAST 1150  23,2624   46631 1                        INCOR1C
0088   REF   2  LAST 1150  23,2625   02670 1               STORE    TEMPVAR
0089                       23,2626   52114 1               INCR,2   GOTO
0090                       23,2627   00001 0               DEC      1
0091   REF   1             23,2630   46623 1                        INCOR1B
0092                       23,2631   61551 1   INCOR1C     TLOAD    ROUND
0093   REF   3  LAST 1150  23,2632   02665 0                        TRIPA
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0094                          23,2633   75405 1              DMP     SQRT
0095      REF    3  LAST 1150 23,2634   02670 1                      TEMPVAR
0096                          23,2635   76257 0              SL*     TAD
0097                          23,2636   57576 1                      0,2
0098      REF    4  LAST 1150 23,2637   02665 0                      TRIPA
0099                          23,2640   63101 1              NORM    INCR,2
0100      REF   19  LAST 1016 23,2641   00050 1                      X2
0101                          23,2642   77775 1              DEC     -2
0102                          23,2643   77134 1              SXA,2   AXT,2
0103      REF    2  LAST  114 23,2644   02103 1                      NORMGAM       NORMALIZATION COUNT -2 FOR GAMMA
0104                          23,2645   00242 0                      162D
0105                          23,2646   40265 1              BDDV    SETPD
0106      REF    6  LAST  920 23,2647   06512 1                      DP1/4TH
0107                          23,2650   00001 0                      0
0108      REF    2  LAST  145 23,2651   03500 1              STORE   GAMMA
0109                          23,2652   60351 0              TLOAD   NORM
0110      REF    5  LAST 1151 23,2653   02665 0                      TRIPA
0111      REF   36  LAST 1088 23,2654   00047 1                      X1
0112                          23,2655   65345 0              DLOAD   PDDL          PD 0-1 = NORM (A)
0113      REF  727  LAST 1145 23,2656   00155 0                      MPAC
0114      REF    8  LAST  582 23,2657   03547 1                      DELTAQ
0115                          23,2660   77701 1              NORM
0116      REF   15  LAST 1149 23,2661   00051 0                      S1
0117                          23,2662   70460 1              XSU,1   SR1
0118      REF   16  LAST 1151 23,2663   00050 1                      S1
0119                          23,2664   41471 0              DDV     PUSH          PD 0-1 = DELTAQ/A
01193                         23,2665   77650 1              GOTO
01196     REF    1            23,2666   45711 1                      NEWZCOMP
0120                          23,2667   77731 1      -3      SSP
0121      REF   15  LAST 1149 23,2670   00052 0                      S2
0122                          23,2671   00066 1                      54D
0123                          23,2672   60775 1   INCOR2     VLOAD   VXM*          COMPUTE OMEGA1,2,3
0124      REF   11  LAST 1150 23,2673   02643 1                      ZI
0125      REF   22  LAST 1150 23,2674   75134 0                      W +162D,2
0126                          23,2675   77206 0              PUSH    VLOAD
0127      REF   12  LAST 1151 23,2676   02651 1                      ZI +6
0128                          23,2677   53303 1              VXM*    VAD
0129      REF   23  LAST 1151 23,2700   75112 1                      W +180D,2
0130                          23,2701   77206 0              PUSH    VLOAD
0131      REF   13  LAST 1151 23,2702   02657 1                      ZI +12D
0132                          23,2703   53303 1              VXM*    VAD
0133      REF   24  LAST 1151 23,2704   75070 1                      W +198D,2
0134                          23,2705   61006 0              PUSH    TIX,2         PD 2-7=OMEGA1,8-13=OMEGA2,14-19=OMEGA3
0135      REF    1            23,2706   46672 0                      INCOR2
0136                          23,2707   45575 1              VLOAD   STADR
0137      REF    2  LAST  145 23,2710   74260 0              STORE   OMEGA +12D
0138                          23,2711   45575 1              VLOAD   STADR
0139      REF    3  LAST 1151 23,2712   74266 0              STORE   OMEGA +6
0140                          23,2713   45575 1              VLOAD   STADR
0141      REF    4  LAST 1151 23,2714   74274 0              STORE   OMEGA
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 0142                          23,2715   77214 0             BON     VLOAD
 0143   REF   4  LAST 1150     23,2716   02706 1                     DMENFLG
 0144   REF   1                23,2717   46722 1                     INCOR2AB
 0145   REF  18  LAST 1150     23,2720   06522 1                     ZEROVECS
 0146   REF   5  LAST 1151     23,2721   03517 1             STORE   OMEGA +12D
 0147                          23,2722   66374 1  INCOR2AB   AXT,2   SSP
 0148                          23,2723   00022 1                     18D
 0149   REF  16  LAST 1151     23,2724   00052 0                     S2
 0150                          23,2725   00006 1                     6
 0151                          23,2726   77773 1  INCOR3     VLOAD*
 0152   REF   6  LAST 1152     23,2727   74252 1                     OMEGA +18D,2
 0153                          23,2730   53761 1             VXSC    VSL*
 0154                          23,2731   00001 0                     0                DELTAQ/A
 0155                          23,2732   20201 0                     0,1
 0156   REF   5  LAST  586     23,2733   12707 1             STORE   DELTAX +18D,2
 0157                          23,2734   77304 0             TIX,2   VLOAD
 0158   REF   1                23,2735   46726 0                     INCOR3
 0159   REF   6  LAST 1152     23,2736   02673 1                     DELTAX +6
 0160                          23,2737   77732 1             VSL3
 0161   REF   7  LAST 1152     23,2740   02673 1             STORE   DELTAX +6
 0162                          23,2741   77650 1             GOTO
 0163   REF   3  LAST 1149     23,2742   02772 1                     EGRESS
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R0164     INCORP2 -INCORPORATES THE COMPUTED STATE VECTOR DEVIATIONS INTO THE
R0165    ESTIMATED STATE VECTOR. THE STATE VECTOR UPDATED MAY BE FOR EITHER THE
R0166    LEM OR THE CSM.DETERMINED BY FLAG VEHUPFLG.(ZERO = LEM) (1 = CSM)
R0167    INPUT
R0168       PERMANENT STATE VECTOR FOR EITHER THE LEM OR CSM
R0169       VEHUPFLG = UPDATE VEHICLE 0=LEM  1=CSM
R0170       W =        ERROR TRANSITION MATRIX
R0171       DELTAX  =  COMPUTED STATE VECTOR DEVIATIONS
R0172       DMENFLG =  SIZE OF W MATRIX (ZERO =6X6) (1=9X9)
R0173       GAMMA   =  SCALAR FOR INCORPORATION
R0174       ZI      =  VECTOR USED IN INCORPORATION
R0175       OMEGA   =  WEIGHTING VECTOR

R0176    OUTPUT
R0177       UPDATED PERMANENT STATE VECTOR

R0178    CALLING SEQUENCE
R0179       L. CALL INCORP2

R0180    NORMAL EXIT
R0181       L+1 OF CALLING SEQUENCE

 0182    REF    1                23,2000                          SETLOC MEASINC1
 0183                            23,2743                          BANK

 0184    REF    2 LAST 1149 TO 1153:    138    138*               COUNT* $$/INCOR

 0185                            23,2743   45020 1   INCORP2   STQ    CALL
 0186    REF    4  LAST 1152     23,2744   02772 1                    EGRESS
 0187    REF   27  LAST  787     23,2745   2741* 0                    INTSTALL
 0188                            23,2746   74375 0             VLOAD  VXSC            CALC. GAMMA * OMEGA1,2,3
 0189    REF    7  LAST 1152     23,2747   03503 1                    OMEGA
 0190    REF    3  LAST 1151     23,2750   03500 1                    GAMMA
 0191    REF    2  LAST  126     23,2751   26713 0             STOVL  OMEGAM1
 0192    REF    8  LAST 1153     23,2752   03511 1                    OMEGA +6
 0193                            23,2753   77761 1             VXSC
 0194    REF    4  LAST 1153     23,2754   03500 1                    GAMMA
 0195    REF    2  LAST  126     23,2755   26721 1             STOVL  OMEGAM2
 0196    REF    9  LAST 1153     23,2756   03517 1                    OMEGA +12D
 0197                            23,2757   77761 1             VXSC
 0198    REF    5  LAST 1153     23,2760   03500 1                    GAMMA
 0199    REF    2  LAST  126     23,2761   02727 1             STORE  OMEGAM3
 0200                            23,2762   77776 1             EXIT
 0201    REF    1                23,2763  3 3244 0             CAF    54DD            INITIAL IX 1 SETTING FOR W MATRIX
 0202    REF    1                23,2764  55'320 0             TS     WIXA
 0203    REF    1                23,2765  55'321 1             TS     WIXB
 0204    REF  227  LAST 1128     23,2766  3 4755 1             CAF    ZERO
 0205    REF    1                23,2767  55'322 1             TS     ZIXA            INITIAL IX 2 SETTING FOR Z COMPONENT
 0206    REF    1                23,2770  55'323 0             TS     ZIXB
 0207    REF  104  LAST  980     23,2771  0 5353 1   FAZA      TC     PHASCHNG
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0208                       23,2772   04022 0           OCT     04022
0209   REF  66  LAST  983  23,2773  0 5504 0           TC      UPFLAG
0210   REF   2  LAST  711  23,2774   00236 0           ADRES   REINTFLG
0212   REF   2  LAST 1153  23,2775  3 1321 0  FAZA1    CA      WIXB          START FIRST PHASE OF INCORP2
0213   REF   2  LAST 1153  23,2776  55'320 0           TS      WIXA           TO UPDATE 6 OR 9 DIM. W MATRIX IN TEMP
0214   REF   2  LAST 1153  23,2777  3 1323 1           CA      ZIXB
0215   REF   2  LAST 1153  23,3000  55'322 1           TS      ZIXA
0216   REF 224  LAST 1023  23,3001  0 6037 0           TC      INTPRET
0217                       23,3002   73150 1           LXA,1   LXA,2
0218   REF   3  LAST 1154  23,3003   01320 1                   WIXA
0219   REF   3  LAST 1154  23,3004   01322 0                   ZIXA
0220                       23,3005   70731 0           SSP     DLOAD*
0221   REF  17  LAST 1151  23,3006   00051 0                   S1
0222                       23,3007   00006 1                   6
0223   REF  14  LAST 1151  23,3010   75134 0                   ZI,2
0224                       23,3011   60276 1           DCOMP   NORM          CALC UPPER 3X9 PARTITION OF W MATRIX
0225   REF  17  LAST 1152  23,3012   00052 0                   S2
0226                       23,3013   65161 1           VXSC    XCHX,2
0227   REF   3  LAST 1153  23,3014   02713 0                   OMEGAM1
0228   REF  18  LAST 1154  23,3015   00051 0                   S2
0229                       23,3016   57144 1           LXC,2   XAD,2
0230   REF  20  LAST 1151  23,3017   00047 1                   X2
0231   REF   3  LAST 1151  23,3020   02103 1                   NORMGAM
0232                       23,3021   65057 0           VSL*    XCHX,2
0233                       23,3022   57576 1                   0,2
0234   REF  19  LAST 1154  23,3023   00051 0                   S2
0235                       23,3024   77653 1           VAD*
0236   REF  25  LAST 1151  23,3025   02467 0                   W +54D,1
0237   REF   2  LAST  126  23,3026   02735 1           STORE   HOLDW
0238                       23,3027   57543 1           DLOAD*  DCOMP         CALC MIDDLE 3X9 PARTITION OF W MATRIX
0239   REF  15  LAST 1154  23,3030   75134 0                   ZI,2
0240                       23,3031   74301 0           NORM    VXSC
0241   REF  20  LAST 1154  23,3032   00052 0                   S2
0242   REF   3  LAST 1153  23,3033   02721 1                   OMEGAM2
0243                       23,3034   71124 0           XCHX,2  LXC,2
0244   REF  21  LAST 1154  23,3035   00051 0                   S2
0245   REF  21  LAST 1154  23,3036   00047 1                   X2
0246                       23,3037   53674 1           XAD,2   VSL*
0247   REF   4  LAST 1154  23,3040   02103 1                   NORMGAM
0248                       23,3041   57576 1                   0,2
0249                       23,3042   52724 1           XCHX,2  VAD*
0250   REF  22  LAST 1154  23,3043   00051 0                   S2
0251   REF  26  LAST 1154  23,3044   02555 0                   W +108D,1
0252   REF   3  LAST 1154  23,3045   02743 0           STORE   HOLDW +6
0253                       23,3046   77614 1           BOFF
0254   REF   5  LAST 1152  23,3047   02746 0                   DMENFLG       BRANCH IF 6 DIMENSIONAL
0255   REF   1             23,3050   47070 0                   FAZB
0256                       23,3051   57543 1           DLOAD*  DCOMP         CALC LOWER 3X9 PARTITION OF W MATRIX
0257   REF  16  LAST 1154  23,3052   75134 0                   ZI,2
0258                       23,3053   74301 0           NORM    VXSC
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 0259   REF  23  LAST 1154   23,3054   00052 0                 S2
 0260   REF   3  LAST 1153   23,3055   02727 1                 OMEGAM3
 0261                        23,3056   71124 0         XCHX,2  LXC,2
 0262   REF  24  LAST 1155   23,3057   00051 0                 S2
 0263   REF  22  LAST 1154   23,3060   00047 1                 X2
 0264                        23,3061   53674 1         XAD,2   VSL*
 0265   REF   5  LAST 1154   23,3062   02103 1                 NORMGAM
 0266                        23,3063   57576 1                 0,2
 0267                        23,3064   52724 1         XCHX,2  VAD*
 0268   REF  25  LAST 1155   23,3065   00051 0                 S2
 0269   REF  27  LAST 1154   23,3066   02643 1                 W +162D,1
 0270   REF   4  LAST 1154   23,3067   02751 0         STORE   HOLDW +12D
 0271                        23,3070   77624 1  FAZB   CALL
 0272   REF  18  LAST  583   23,3071   11244 0                 GRP2PC
 0273                        23,3072   77776 1         EXIT
 0274   REF   4  LAST 1154   23,3073  3 1320 1  FAZB1  CA      WIXA             START 2ND PHASE OF INCORP2 TO TRANSFER
 0275   REF   1              23,3074  6 3245 1         AD      6DD                 TEMP REG TO PERM W MATRIX
 0276   REF   3  LAST 1154   23,3075  55'321 1         TS      WIXB
 0277   REF   4  LAST 1154   23,3076  3 1322 0         CA      ZIXA
 0278   REF   2  LAST  219   23,3077  6 7746 0         AD      MINUS2
 0279   REF   3  LAST 1154   23,3100  55'323 0         TS      ZIXB
 0280   REF 225  LAST 1154   23,3101  0 6037 0         TC      INTPRET
 0281                        23,3102   66350 1         LXA,1   SSP
 0282   REF   5  LAST 1155   23,3103   01320 1                 WIXA
 0283   REF  18  LAST 1154   23,3104   00051 0                 S1
 0284                        23,3105   00006 1                 6
 0285                        23,3106   77775 1         VLOAD
 0286   REF   5  LAST 1155   23,3107   02735 1                 HOLDW
 0287   REF  28  LAST 1155   23,3110   06467 1         STORE   W +54D,1
 0288                        23,3111   77775 1         VLOAD
 0289   REF   6  LAST 1155   23,3112   02743 0                 HOLDW +6
 0290   REF  29  LAST 1155   23,3113   06555 1         STORE   W +108D,1
 0291                        23,3114   77214 0         BOFF    VLOAD
 0292   REF   6  LAST 1154   23,3115   02746 0                 OMENFLG
 0293   REF   1              23,3116   47126 1                 FAZB5
 0294   REF   7  LAST 1155   23,3117   02751 0                 HOLDW +12D
 0295   REF  30  LAST 1155   23,3120   06643 0         STORE   W +162D,1
 0296                        23,3121   52100 1  FAZB2  TIX,1   GOTO
 0297                        23,3122   47124 0                 +2
 0298   REF   1              23,3123   47134 1                 FAZC             DONE WITH W MATRIX. UPDATE STATE VECTOR
 0299                        23,3124   77634 0         RTB
 0300   REF   1              23,3125   46771 1                 FAZA
 0301                        23,3126   43335 0  FAZB5  SLOAD   DAD
 0302   REF   4  LAST 1155   23,3127   01324 0                 ZIXB
 0303   REF   1              23,3130   07247 1                 12DD
 0304                        23,3131   52030 0         BHIZ    GOTO
 0305   REF   2  LAST 1155   23,3132   47134 1                 FAZC
 0306   REF   1              23,3133   47121 0                 FAZB2
 0307                        23,3134   77624 1  FAZC   CALL
 0308   REF  19  LAST 1155   23,3135   11244 0                 GRP2PC
 0309                           23,3136   53375 0           VLOAD  VAD              START 3RD PHASE OF INCORP2
 0310   REF   4  LAST  582      23,3137   01701 0                  X789             7TH,8TH,9TH,COMPONENT OF STATE VECTOR
 0311   REF   8  LAST 1152      23,3140   02701 0                  DELTAX +120      INCORPORATION FOR X789
 0312   REF   2  LAST  145      23,3141   03472 0           STORE  TX789
 0313                           23,3142   47014 1           BON    RTB
 0314   REF  12  LAST  581      23,3143   00707 1                  VEHUPFLG
 0315   REF   1                 23,3144   47234 1                  DOCSM
 0316   REF   1                 23,3145   26770 0                  MOVEPLEM
 0317                           23,3146   77004 0  FAZAB    BOVB   AXT,2
 0318   REF   2  LAST  565      23,3147   57753 1                  TCDANZIG
 0319                           23,3150   00000 1                  0
 0320                           23,3151   77014 1           BOFF   AXT,2
 0321   REF   5  LAST  717      23,3152   04344 0                  MOONTHIS
 0322                           23,3153   47155 0                  +2
 0323                           23,3154   00002 0                  2
 0324                           23,3155   53775 1           VLOAD  VSR*
 0325   REF   9  LAST 1156      23,3156   02665 0                  DELTAX           B27 IF MOON ORBIT, B29 IF EARTH
 0326                           23,3157   57205 1                  0 -7,2
 0327                           23,3160   40055 0           VAD    BOV
 0328   REF   4  LAST  321      23,3161   01521 0                  TDELTAV
 0329   REF   1                 23,3162   47174 0                  FAZAB1
 0330   REF   5  LAST 1156      23,3163   25521 0           STOVL  TDELTAV
 0331   REF  10  LAST 1156      23,3164   02673 1                  DELTAX +6        B5 IF MOON ORBIT, B7 IF EARTH
 0332                           23,3165   53257 1           VSR*   VAD
 0333                           23,3166   57202 0                  0 -4,2
 0334   REF   4  LAST  321      23,3167   01527 0                  TNUV
 0335                           23,3170   77600 1           BOV
 0336   REF   1                 23,3171   47200 0                  FAZAB2
 0337   REF   5  LAST 1156      23,3172   35527 1           STCALL TNUV
 0338   REF   1                 23,3173   47207 1                  FAZAB3
 0339                           23,3174   53375 0  FAZAB1   VLOAD  VAD
 0340   REF  13  LAST  788      23,3175   01535 0                  RCV
 0341   REF  11  LAST 1156      23,3176   02665 0                  DELTAX
 0342   REF  14  LAST 1156      23,3177   01535 0           STORE  RCV
 0343                           23,3200   53375 0  FAZAB2   VLOAD  VAD
 0344   REF  11  LAST  788      23,3201   01543 1                  VCV
 0345   REF  12  LAST 1156      23,3202   02673 1                  DELTAX +6
 0346   REF  12  LAST 1156      23,3203   01543 1           STORE  VCV
 0347                           23,3204   45134 0           SXA,2  CALL
 0348   REF   3  LAST  297      23,3205   02030 0                  PBODY
 0349   REF   1                 23,3206   23441 1                  RECTIFY
 03491                          23,3207   77624 1  FAZAB3   CALL
 03492  REF  20  LAST 1155      23,3210   11244 0                  GRP2PC
 0350                           23,3211   47014 1           BON    RTB
 0351   REF  13  LAST 1156      23,3212   00707 1                  VEHUPFLG
 0352   REF   1                 23,3213   47237 1                  DOCSM1
 0353   REF   2  LAST   37      23,3214   26747 1                  MOVEALEM
 0354                           23,3215   77624 1           CALL
 0355   REF   1                 23,3216   26070 1                  SVDWN2           STORE DOWNLINK STATE VECTOR
 0356                           23,3217   77624 1  FAZAB4   CALL
 0357   REF  21  LAST 1156   23,3220   11244 0                      GRP2PC      PHASE CHANGE
 0358                        23,3221   77214 0            BUFF      VLOAD
 0359   REF   7  LAST 1155   23,3222   02746 0                      DMENFLG
 0360   REF   1              23,3223   47226 1                      FAZAB5      6 DIMENSIONAL
 0361   REF   3  LAST 1156   23,3224   03472 0                      TX789       9 DIMENSIONAL
 0362   REF   [illegible]  LAST 1156   23,3225   01701 0            STORE     X789
 0363                        23,3226   66150 0  FAZAB5    LXA,1     SXA,1
 0364   REF   5  LAST 1153   23,3227   02772 1                      EGRESS
 0365   REF  13  LAST 1091   23,3230   00052 0                      QPRET
 0366                        23,3231   77776 1            EXIT
 0367   REF  54  LAST  867   23,3232   04635 0            TC        POSTJUMP    EXIT
 0368   REF   3  LAST  611   23,3233   27425 1            CADR      INTWAKE
 0369                        23,3234   52034 1  DOCSM     RTB       GOTO
 0370   REF   1              23,3235   26723 0                      MOVEPCSM
 0371   REF   1              23,3236   47146 1                      FAZAB
 0372                        23,3237   45034 1  DOCSM1    RTB       CALL
 0373   REF   1              23,3240   26674 0                      MOVEACSM
 0374   REF   2  LAST  297   23,3241   26114 1                      SVDWN1      STORE DOWNLINK STATE VECTOR
 0375                        23,3242   77650 1            GOTO
 0376   REF   1              23,3243   47217 0                      FAZAB4
 0377   REF  19  LAST 1152   23,2521            ZEROO     =         ZEROVECS
 0378                        23,3244   00066 1  54DD      DEC       54
 0379                        23,3245   77771 0  6DD       DEC       -6
 0380                        23,3246   00014 1  12DD      DEC       12
 0400   REF   1              22,2000                      SETLOC    RENDEZ
 0401                        22,3711                      BANK
 0402   REF   1                                           COUNT*    $$/INCOR

 0403                        22,3711   51575 1  NEWZCOMP  VLOAD     ABVAL
 0404   REF  17  LAST 1154   22,3712   02643 1                      ZI
 0405   REF   1              22,3713   24045 0            STOVL     NORMZI
 0406   REF  18  LAST 1157   22,3714   02651 1                      ZI +6
 0407                        22,3715   41446 1            ABVAL     PUSH
 0408                        22,3716   50025 0            DSU       BMN
 0409   REF   2  LAST 1157   22,3717   00045 0                      NORMZI
 0410                        22,3720   45723 0                      +3
 0411                        22,3721   45545 1            DLOAD     STADR
 0412   REF   3  LAST 1157   22,3722   77732 1            STORE     NORMZI
 0413                        22,3723   51575 1            VLOAD     ABVAL
 0414   REF  19  LAST 1157   22,3724   02657 1                      ZI +12D
 0415                        22,3725   45206 1            PUSH      DSU
 0416   REF   4  LAST 1157   22,3726   00045 0                      NORMZI
 0417                        22,3727   71240 1            BMN       DLOAD
 0418                        22,3730   45733 1                      +3
 0419                        22,3731   77626 0            STADR
 0420   REF   5  LAST 1157   22,3732   77732 1            STORE     NORMZI      LARGEST ABVAL
 0421                        22,3733   66145 1            DLOAD     SXA,1
 0422   REF   6  LAST 1157   22,3734   00045 0                      NORMZI
 0423   REF   7  LAST 1157   22,3735   00044 1                      NORMZI      SAVE X1
 0424                        22,3736   62101 0            NORM      INCR,1
 0425  REF  37  LAST 1151   22,3737   00047 1                      X1
 0426                       22,3740   00002 0              DEC     2
 0427                       22,3741   53775 1              VLOAD   VSL*
 0428  REF  20  LAST 1157   22,3742   02643 1                      ZI
 0429                       22,3743   20201 0                      0,1
 0430  REF  21  LAST 1158   22,3744   26643 1              STOVL   ZI
 0431  REF  22  LAST 1158   22,3745   02651 1                      ZI +6
 0432                       22,3746   77657 0              VSL*
 0433                       22,3747   20201 0                      0,1
 0434  REF  23  LAST 1158   22,3750   26651 1              STOVL   ZI +6
 0435  REF  24  LAST 1158   22,3751   02657 1                      ZI +12D
 0436                       22,3752   66057 0              VSL*    SXA,1
 0437                       22,3753   20201 0                      0,1
 0438  REF   8  LAST 1157   22,3754   00045 0                      NORMZI +1       SAVE SHIFT
 0439  REF  25  LAST 1158   22,3755   02657 1              STORE   ZI +12D
 0440                       22,3756   54150 1              LXA,1   XSU,1
 0441  REF   6  LAST 1155   22,3757   02103 1                      NORMGAM
 0442  REF   9  LAST 1158   22,3760   00045 0                      NORMZI +1
 0443                       22,3761   77660 1              XSU,1
 0444  REF  10  LAST 1158   22,3762   00045 0                      NORMZI +1
 0445                       22,3763   70130 1              SXA,1   LXC,1
 0446  REF   7  LAST 1158   22,3764   02103 1                      NORMGAM
 0447  REF  11  LAST 1158   22,3765   00045 0                      NORMZI +1
 0448                       22,3766   40270 0              XAD,1   SETPD
 0449  REF  12  LAST 1158   22,3767   00044 1                      NORMZI
 0450                       22,3770   00003 1                      2D
 0451                       22,3771   77650 1              GOTO
 0452  REF   2  LAST 1151   22,3772   46667 1                      INCOR2 -3
 0453                            0044           NORMZI     =       36D
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L        CONIC SUBROUTINES                                                                   USER'S PAGE NO.   1       E0 53

P0001    PROGRAM DESCRIPTION - ENTIRE CONIC SUBROUTINE LOG SECTION                               DATE - 1 SEPTEMBER 1967
R0003    MOD NO. - 0                                                                             LOG SECTION - CONIC SUBROUTINES
R0005    MOD BY KRAUSE                                                                           ASSEMBLY - COLOSSUS REVISION 88
R0007


R0008    FUNCTIONAL DESCRIPTION -

R0009         THE FOLLOWING SET OF SUBROUTINES SOLVE VARIOUS PROBLEMS INVOLVING THE TRAJECTORY PRODUCED BY A CENTRAL
R0011    INVERSE-SQUARE FORCE ACTING ON A POINT MASS, AS OUTLINED IN THE CMC AND LGC LUNAR LANDING MISSION GSOP, SECTION
R0013    5.5.1.2.  A GENERAL USAGE POINT-OF-VIEW WAS TAKEN IN FORMULATING, MECHANIZING, AND SCALING THE SUBROUTINES,
R0015    RATHER THAN OPTIMIZING EACH FOR A PARTICULAR USE.  THEREFORE, MULTIPLE USAGE CAN BE MADE OF THE SUBROUTINES
R0017    INVOLVING ANY REALISTIC SET OF CONSTRAINTS.  IT SHOULD BE NOTED THAT ONLY ONE SET OF CODING IS USED, WHETHER THE
R0019    EARTH, MOON, OR ANY OTHER CELESTIAL BODY IS SPECIFIED AS THE CENTRAL BODY OF THE PROBLEM, PROVIDED ONE OBSERVES
R0021    THE INHERENT SCALE CHANGE REQUIRED IN POSITION, VELOCITY, MU, AND TIME, AS OUTLINED IN MISSION PROGRAMMING
R0023    DEFINITION MEMO NO. 10.  THIS CAN BE ACCOMPLISHED BY SIMPLY ADDING TO THE MUTABLE AND INITIALIZING THE SUBROU-
R0025    TINES APPROPRIATELY.
R0026         DUE TO THE UNIFORMITY OF THE EQUATIONS INVOLVED, CODING WAS MINIMIZED BY TREATING INDIVIDUAL EQUATIONS AND
R0028    BLOCKS OF EQUATIONS AS SUBROUTINES OF LOWER RANK WHENEVER POSSIBLE.  AS A RESULT, THREE BY-PRODUCTS SUBROUTINES,
R0030    DIRECTLY USABLE AS INDEPENDENT SUBROUTINES, WERE GENERATED.


R0031    RESTRICTIONS -

R0032         THE ONLY LIMITATION IN THE SCOPE OF PROBLEM WHICH CAN BE SOLVED BY A PARTICULAR SUBROUTINE IS THE SCALING
R0034    LIMIT OF EACH PARAMETER AS SPECIFIED IN THE GSOP.  THESE SCALING LIMITS WERE CHOSEN SO THAT ALL FEASIBLE TRAJEC-
R0036    TORIES COULD BE HANDLED.
R0037         SINCE THE SUBROUTINES (EXCEPT KEPLER) USE COMMON SUBROUTINES OF LOWER RANK WHICH USE ERASABLE OTHER THAN
R0039    THE PUSHLIST (DUE TO ITS LIMITED SIZE) AND COMMON INTERPRETIVE SWITCHES, THE CONIC SUBROUTINES CANNOT BE ALLOWED
R0041    TO INTERRUPT EACH OTHER.  IT IS UP TO THE USER TO GUARANTEE THIS CONDITION.
R0043
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P0044    PROGRAM DESCRIPTION - KEPLER SUBROUTINE                                          DATE - 11 OCTOBER 1967
R0046    MOD NO. -1                                                                              LOG SECTION - CONIC SUBROUTINES
R0048    MOD BY KRAUSE                                                                    ASSEMBLY - COLOSSUS 103 AND SUNDANCE 222
R0050    MOD NO. - 2  (AUGUST 1968) BY ROBERTSON: TO PERMIT BACKDATING BY MORE THAN ONE ORBITAL PERIOD.

R00502   MOD NO. - 3  (DEC 1968) BY ROBERTSON: SUPPRESSION OF X-MODULO-ING

R00503   MOD. NO. - 4  (JAN 1969) BY ROBERTSON: CLEAR OVFIND AT KEPLER ENTRY

R0051    FUNCTIONAL DESCRIPTION -
R0052         THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND THE DESIRED TRANSFER TIME THROUGH WHICH THE STATE IS TO
R0054    BE UPDATED ALONG A CONIC TRAJECTORY, COMPUTES THE NEW, UPDATED STATE VECTOR.  THE TRAJECTORY MAY BE ANY CONIC
R0056    SECTION - CIRCULAR, ELLIPTIC, PARABOLIC, HYPERBOLIC, OR RECTILINEAR WITH RESPECT TO THE EARTH OR THE MOON.  THE
R0058    USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT
R0060    INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.  AN ITERA-
R0062    TION TECHNIQUE IS UTILIZED IN THE COMPUTATION.
R0063         IF A NEGATIVE TIME-OF-FLIGHT IS INPUT, THE PROGRAM WILL SOLVE FOR THE STATE WHICH WOULD BE PRODUCED BY
R0065    EXTRAPOLATING THE POSITION BACKWARD IN TIME.
R00651        IF THE ABSOLUTE VALUE OF THE DESIRED TRANSFER TIME EXCEEDS THE ORBITAL PERIOD, THE SUBROUTINE, THROUGH A
R00653   MODULAR TECHNIQUE, WILL COMPUTE THE STATE CORRESPONDING TO THE DESIRED TIME (WHETHER POSITIVE OR NEGATIVE).
R0066

R0067    THE RESTRICTIONS ARE -
R0069         1. (PREVIOUS RESTRICTION ON THE NEGATIVE DESIRED TRANSFER TIME IS NOW DELETED.)
R0071         2.  THE PARAMETERS IN THE PROBLEM CANNOT EXCEED THEIR SCALING LIMITS AS SPECIFIED IN THE GSOP.  IF
R0073    ANY OF THESE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0075

R0076         THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATION SPEED IS DEPENDENT ON THE ACCURACY OF THE
R0078    GUESS, XKEPNEW.  THE AGC COMPUTATION TIME IS APPROXIMATELY .061 SECONDS FOR INITIALIZATION, .065 SECONDS FOR THE
R0080    FINAL COMPUTATIONS, PLUS .083 SECONDS FOR EACH ITERATION.
R0081


R0082    REFERENCES -
R0083         R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP, SECTION 5.5, SGA
R0085    MEMO 67-4.
R0086


R0087    INPUT - ERASABLE INITIALIZATION REQUIRED

R0088             * SCALE FACTOR *
R0089    VARIABLE*IN POWERS OF 2*                              DESCRIPTION AND REMARKS
R0090    --------*---------------*                              -----------------------
R0091    RRECT   * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0092            * +27 FOR MOON *
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R0093    VRECT    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0094             * +5 FOR MOON  *
R0095    X1 (38D)* NONE          *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0097             *               *RESPECTIVELY, IS THE CENTRAL BODY
R0098    TAU.     * +28           *DESIRED TRANSFER TIME IN CENTISECONDS (DP)
R00987            *               *    MAY BE POS OR NEG AND ABSOLUTE VALUE MAY BE GREATER OR LESS THAN ONE ORBITAL PERIOD.
R0099    XKEPNEW * +17 FOR EARTH*DP GUESS OF ROOT X OF KEPLERS EQN IN SQRT(METERS). SIGN SHOULD AGREE WITH THAT OF TAU.
R0100             * +16 FOR MOON  *    AND ABS VALUE SHOULD BE LESS THAN THAT CORRESPONDING TO A PERIOD,VIZ, 2PI SQRT(SEMI-
R0101             *               *    MAJOR AXIS),FOR SPEED OF CONVERGENCE,BUT IF EITHER CONDITION FAILS, XKEPNEW IS RESET
R01017            *               *    BY KEPLER TO A POOR BUT VALID GUESS.
R0102    TC       * +28           *DP PREV. VALUE OF TIME IN CENTISECS.  MUST BE LESS THAN ONE ORBITAL PERIOD.
R0103    XPREV    * +17 FOR EARTH*DP PREV. VALUE OF X IN SQRT(METERS).  MUST BE LESS THAN AN X CORRESPONDING TO ONE
R0105             * +16 FOR MOON *    ORBITAL PERIOD,VIZ,2PI SQRT(SEMI-MAJOR AXIS)
R0106


R0107    SUBROUTINES CALLED -
R0108         DELTIME
R0109


R0110    CALLING SEQUENCE AND NORMAL EXIT MODES -

R0111    KEPRTN-2 GOTO                       MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0113    KEPRTN-1          KEPLER            RETURNS WITH XPREV IN MPAC. PL IS AT 0.
R0114    KEPRTN   ...                        CONTINUE

R0115    KEPLER MUST NOT BE CALLED DIRECTLY SINCE AN INTERRUPTION OF IT WOULD DESTROY THE ERASABLES IT NEEDS TO COMPLETE
R0117    THE INTERRUPTED JOB.  THEREFORE THE USER MUST CALL CSMCONIC OR LEMCONIC WHICH GUARANTEES NO INTERRUPTS AND WHICH
R0119    ALSO CALLS KEPPREP TO COMPUTE A GUESS OF XKEPNEW.
R0120


R0121    ABORT EXIT MODES -
R0122         NONE
R0123


R0124    OUTPUT -

R0125             * SCALE FACTOR *
R0126    VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0127    --------*--------------*                         -----------------------
R0128    RCV      * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS
R0129             * +27 FOR MOON *
R0130    VCV      * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC
R0131             * +5 FOR MOON  *
R0132    TC       * +28           *DP TRANSFER TIME IN CENTISECS TO WHICH KEPLER CONVERGED. ALWAYS LESS THAN ONE PERIOD.
R0134    XPREV    * +17 FOR EARTH*DP VALUE OF X IN SQRT(METERS) TO WHCIH KEPLER CONVERGED. ALWAYS LESS THAN THE X
R0136             * +16 FOR MOON *    CORRESPONDING TO ONE PERIOD.
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R0137   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0138

R0139   DEBRIS -

R0140         PARAMETERS WHICH MAY BE OF USE -

R0141            * SCALE FACTOR *
R0142   VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0143   --------*---------------*                         -----------------------
R0144   URRECT  * +1            *DP UNIT VECTOR OF INITIAL POSITION
R0145   RI      * +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION IN METERS
R0146           * +27 FOR MOON *
R0147   ALPHA   * -22 FOR EARTH*DP INVERSE OF SEMIMAJOR AXIS IN 1/METERS
R0148           * -20 FOR MOON *
R01481  TMODULO * +28           *DP INTEGRAL NUMBER OF PERIODS IN  CENTISECS. WHICH WAS SUBTRACTED FROM TAU. TO PRODUCE A
R01483          *               *TAU. OF LESS THAN ONE PERIOD.

R0149         PARAMETERS OF NO USE -
R0150   DP PARAMETERS - EPSILONT, DELX, DELT, RCNORM, XMODULO, PLUS PUSHLIST REGISTERS 0 THROUGH 39D.
R0152
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R0153    PROGRAM DESCRIPTION - LAMBERT SUBROUTINE                                 DATE - 1 SEPTEMBER 1967
R0155    MOD NO. - 0                                                              LOG SECTION - CONIC SUBROUTINES
R0157    MOD BY KRAUSE                                                            ASSEMBLY - COLOSSUS REVISION 88
R0159

R0160    FUNCTIONAL DESCRIPTION -

R0161          THIS SUBROUTINE CALCULATES THE INITIAL VELOCITY REQUIRED TO TRANSFER A POINT-MASS ALONG A CONIC TRAJECTORY
R0163    FROM AN INITIAL POSITION TO A TERMINAL POSITION IN A PRESCRIBED TIME INTERVAL.  THE RESULTING TRAJECTORY MAY BE
R0165    A SECTION OF A CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE
R0167    SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY
R0169    CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.  AN ITERATION TECHNIQUE IS
R0171    UTILIZED IN THE COMPUTATION.
R0172

R0173    THE RESTRICTIONS ARE -
R0174          1. RECTILINEAR TRAJECTORIES CANNOT BE COMPUTED.
R0175          2. AN ACCURACY DEGRADATION OCCURS AS THE COSINE OF THE TRUE ANOMALY DIFFERENCE APPROACHES +1.0.
R0177          3. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0179    AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0180          4. NEGATIVE TRANSFER TIME IS AMBIGUOUS AND WILL RESULT IN NO SOLUTION.
R0182          5. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE
R0184    LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0185          THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATIONS SPEED IS DEPENDENT ON THE ACCURACY OF THE FIRST
R0187    GUESS OF THE INDEPENDENT VARIABLE, COGA.                                THE AGC COMPUTATION TIME IS APPROXIMATE-
R0189    LY .105 SECONDS FOR INITIALIZATION, .069 SECONDS FOR FINAL COMPUTATIONS, PLUS .205 SECONDS FOR EACH ITERATION.
R0191

R0192    REFERENCES -
R0193          R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8,
R0195    SGA MEMO 67-4.
R0196

R0197    INPUT - ERASABLE INITIALIZATION REQUIRED

R0198             * SCALE FACTOR *
R0199    VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0200    --------*--------------*                         -----------------------
R0201    R1VEC   * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0202            * +27 FOR MOON *
R0203    R2VEC   * +29 FOR EARTH*DP TARGET OR TERMINAL POSITION VECTOR IN METERS
R0204            * +27 FOR MOON *
R0205    TDESIRED* +28            *DP DESIRED TRANSFER TIME IN CENTISECONDS
R0206    X1 (38D)* NONE           *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0208            *                *RESPECTIVELY, IS THE CENTRAL BODY
R0209    GEOMSGN * NONE           *SP +.5 IF DESIRED TRANSFER ANGLE IS LESS THAN 180 DEGREES, -.5 IF GREATER THAN 180 DEG.
R0211    GUESSW  * NONE           *AN INTERPRETER SWITCH TO BE SET IF NO GUESS OF COGA IS AVAILABLE, CLEAR IF A GUESS OF
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R0213              *                 *COGA IS TO BE USED BY LAMBERT
R0214   COGA       * +5              *DP GUESS OF COTANGNT OF FLIGHT PATH ANGLE (MEASURED FROM VERTICAL).  THIS WILL BE
R0216                                *IGNORED IF GUESSW IS SET.
R0217   NORMSW     * NONE            *AN INTERPRETER SWITCH TO BE SET IF UN IS TO BE AN INPUT TO THE SUBROUTINE, CLEAR IF
R0219              *                 *LAMBERT IS TO COMPUTE ITS OWN NORMAL (UN).
R0220   UN         * +1              *DP UNIT  NORMAL TO THE DESIRED ORBIT PLANE IN THE DIRECTION OF THE RESULTING ANGULAR
R0222              *                 *MOMENTUM VECTOR.  THIS WILL BE IGNORED IF NORMSW IS CLEAR.
R0224   VTARGTAG*  NONE              *A S.P. TAG TO BE SET TO ZERO IF LAMBERT IS TO COMPUTE THE VELOCITY AT R2VEC AS WELL AS
R0226              *                 *AT R1VEC.
R0227   ITERCTR *  NONE              *A S.P. COUNTER WHICH SPECIFIES THE MAXIMUM NUMBER OF ITERATIONS ALLOWABLE.
R02271             *                 *(AN ITERATION MEANS A PASS THRU KEPLER EQN (DELTIME). AT LEAST ONE OF THESE MUST
R02272             *                 *ALWAYS OCCUR, EVEN IF COGA CORRESPONDING TO SOLUTION WERE INPUT AS A GUESS.)
R02273             *                 *TWENTY ITERATIONS ARE SUFFICIENT TO SOLVE ALL PROBLEMS INCLUDING THOSE WITHOUT GUESS.
R02274

R0228   SUBROUTINES CALLED -
R0229        GEOM, GETX. DELTIME, ITERATOR, LAMENTER (PART OF NEWSTATE)
R0230


R0231   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0232   L          CALL                        MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0234   L+1                LAMBERT             RETURNS WITH PL AT 0 AND WITH VVEC IN MPAC IF VTARGTAG WAS NON-ZERO OR VTARGET
R0236                                          IN MPAC IF VTARGTAG WAS ZERO
R0237   L+2        BON                         CONTINUE IF SOLNSW CLEAR SINCE SOLUTION IS ACCEPTABLE
R0239   L+3                SOLNSW
R0240   L+4                LAMABORT
R0241        IF A LAMBERT RESULT IS TO BE A FIRST GUESS FOR THE NEXT LAMBERT CALCULATION, COGA MUST BE PRESERVED AND
R0243   GUESSW MUST BE CLEAR FOR EACH SUCCEEDING LAMBERT CALL.
R0244


R0245   ABORT EXIT MODES -
R0246        IF SOLNSW WAS SET UPON EXITING, EITHER LAMBERT WAS ASKED TO COMPUTE A TRANSFER TOO NEAR 0 OR 360 DEG, OR T
R0248   WAS TOO SMALL TO PRODUCE A REALISTIC TRANSFER BETWEEN R1VEC AND R2VEC.  IN EITHER CASE THE FIX MUST BE MADE
R0250   ACCORDING TO THE NEEDS OF THE PARTICULAR USER.  THE ABORT EXIT MODE MAY BE CODED AS ...
R0252   LAMABORT DLOAD  ABS                          A MEASURE OF PROXIMITY TO 0 OR
R0253                   1-CSTH                       360 DEGREES.
R0254            DSU    BMN
R0255                   ONEBIT
R0256                   CHANGER2                     CHANGE R2VEC DIRECTION SLIGHTLY.
R0257            DLOAD  DAD
R0258                   TDESIRED
R0259                   SOMETIME
R0260            STCALL TDESIRED                     INCREASE TDESIRED
R0261                   LAMBERT
R0262
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R0263    OUTPUT -
R0264             * SCALE FACTOR *
R0265    VARIABLE*IN POWERS OF 2*                              DESCRIPTION AND REMARKS
R0266    --------*---------------*                              -----------------------
R0267    VVEC     * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND REQUIRED TO SATISFY THE BOUNDARY VALUE
R0269             * +5 FOR MOON  *PROBLEM.
R0270    VTARGET * +7 FOR EARTH *DP RESULTANT VELOCITY VECTOR AT R2VEC IN METERS/CENTISECOND.
R0272             * +5 FOR MOON  *
R0273    SOLNSW   * NONE         *INTERPRETER SWITCH WHICH IS SET IF THE SUBROUTINE CANNOT SOLVE THE PROBLEM, CLEAR IF THE
R0275             *              *SOLUTION EXISTS.
R0276    FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0277


R0278    DEBRIS -
R0279         PARAMETERS WHICH MAY BE OF USE -

R0280             * SCALE FACTOR *
R0281    VARIABLE*IN POWERS OF 2*                              DESCRIPTION AND REMARKS
R0282    --------*---------------*                              -----------------------
R0283    SNTH     * +1           *DP SIN OF ANGLE BETWEEN R1VEC AND R2VEC
R0284    CSTH     * +1           *DP COSINE OF ANGLE
R0285    1-CSTH   * +2           *DP 1-CSTH
R0286    COGA     * +5           *DP COTAN OF INITIAL REQUIRED FLIGHT PATH ANGLE MEASURED FROM VERTICAL
R0289    P        * +4           *DP RATIO OF SEMILATUS RECTUM TO INITIAL RADIUS
R0290    R1A      * +6           *DP RATIO OF INITIAL RADIUS TO SEMIMAJOR AXIS
R0291    R1 (32D)* +29 FOR EARTH*DP INITIAL RADIUS IN METERS
R0292             * +27 FOR MOON *
R0293    UR1      * +1           *DP UNIT VECTOR OF R1VEC
R0294    U2       * +1           *DP UNIT VECTOR OF R2VEC

R0295         PARAMETERS OF NO USE
R0296    DP PARAMETERS - EPSILONL, CSTH-RHO, TPREV, TERRLAMB, R2, [illegible]LAMB (SF),  PLUS PUSHLIST REGISTER 0 THROUGH 41D
R0298    ADDITIONAL INTERPRETIVE SWITCHES USED - INFINFLG, 360SW, SLOPESW, ORDERSW
R0300
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P0301    PROGRAM DESCRIPTION - TIME-THETA SUBROUTINE                                                  DATE - 1 SEPTEMBER 1967
R0303    MOD NO. - 0                                                                                  LOG SECTION - CONIC SUBROUTINES
R0305    MOD BY KRAUSE                                                                                ASSEMBLY - COLOSSUS REVISION 88
R0307

R0308    FUNCTIONAL DESCRIPTION -

R0309          THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE
R0311    STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0313    PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR.  THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0315    CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0317    EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0319    ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0320

R0321    THE RESTRICTIONS ARE -
R0322          1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0324    AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0325          2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0327    ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0328          THE AGC COMPUTATION TIME IS APPROXIMATELY .292 SECONDS.
R0329


R0330    REFERENCES -
R0331          R-479, "MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0333


R0334    INPUT - ERASABLE INITIALIZATION REQUIRED

R0335            * SCALE FACTOR *
R0336    VARIABLE*IN POWERS OF 2*                                DESCRIPTION AND REMARKS
R0337    --------*--------------*                                -----------------------
R0338    RVEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0339            * +27 FOR MOON *
R0340    VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0341            * +5 FOR MOON  *
R0342    SNTH    * +1           *DP SINE OF TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE STATE IS TO BE UPDATED
R0344    CSTH    * +1           *DP COSINE OF THE ANGLE
R0345    RVSW    * NONE         *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0347            *              *IS TO BE COMPUTED ALSO.
R0348    X1 (38D)*NONE          *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0350            *              *RESPECTIVELY, IS THE CENTRAL BODY.
R0351

R0352    SUBROUTINES CALLED -
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R0353          PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0354


R0355   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0356        IF ONLY TIME IS DESIRED AS OUTPUT -
R0357   L          SET     CALL                MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0359   L+1                RVSW
R0360   L+2                TIMETHET            RETURN WITH PL AT 0 AND T IN MPAC
R0361   L+3        ...                         CONTINUE
R0362

R0363        IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0364   L          CLEAR   CALL                MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0366   L+1                RVSW
R0367   L+2                TIMETHET            RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
R0369                                          THE INITIAL VELOCITY VECTOR IN MPAC.
R0370   L+3        STOVL   NEWVVEC
R0371   L+4        STADR
R0372   L+5        STORE   NEWRVEC                      NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0374   L+6        ...                                  CONTINUE
R0375


R0376   ABORT EXIT MODES -
R0377           IF COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-THETA, TIME-THETA WILL TRANSFER TO POODOO WITH
R0379           AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 AND 721).
R0386


R0387   OUTPUT -
R0388           * SCALE FACTOR *
R0389   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0390   --------*--------------*                        -----------------------
R0391   T (30D) * +28          *DP TRANSFER TIME IN CENTISECONDS
R0392   INFINFLG* NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF THE TRANSFER ANGLE REQUIRES CLOSURE THROUGH
R0394           *              *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0396   COGAFLAG* NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0398           *              *CLEAR IF NOT.

R0399   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0400   MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0401    MPAC +5* +5 FOR MOON  *
R0402   0D - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0403           * +27 FOR MOON *

R0404   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0405
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R0406   DEBRIS -

R0407         PARAMETERS WHICH MAY BE OF USE -

R0408              * SCALE FACTOR *
R0409   VARIABLE*IN POWERS OF 2*                           DESCRIPTION AND REMARKS
R0410   --------*---------------*                           -----------------------
R0411   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0413           * +27 FOR MOON *
R0414   R1A     * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0416   P       * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0417   COGA    * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0419   UR1     * +1           *DP UNIT VECTOR OF RVEC
R0420   U2      * +1           *DP UNIT VECTOR OF VVEC
R0421   UN      * +1           *DP UNIT VECTOR OF UR1*U2
R0422

R0423         PARAMETERS OF NO USE -
R0424   SP PARAMETERS - INITT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0426   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0427
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R0428   PROGRAM DESCRIPTION - TIME-RADIUS SUBROUTINE                                   DATE - 11 OCTOBER 1967
R0430   MOD NO. -1                                                                            LOG SECTION - CONIC SUBROUTINES
R0432   MOD BY KRAUSE                                                                         ASSEMBLY - COLOSSUS REVISION 88
R0434

R0435   FUNCTIONAL DESCRIPTION -

R0436        THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED RADIUS TO WHICH THE
R0438   STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0440   PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR.  THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0442   CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0444   EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0446   ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0447        IF THE DESIRED RADIUS IS BEYOND THE RADIUS OF APOCENTER OF THE CONIC OR BELOW THE RADIUS OF PERICENTER,
R0449   APSESW WILL BE SET AND THE SUBROUTINE WILL RETURN THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY.
R0451

R0452   THE RESTRICTIONS ARE -
R0453        1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0455   AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0456        2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0458   ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R04581       3. AN ACCURACY DEGRADATION OCCURS AS THE SENSITIVITIES OF TIME AND UPDATED STATE VECTOR TO CHANGES IN
R04583  RDESIRED INCREASE.  THIS WILL OCCUR NEAR EITHER APSIS OF THE CONIC AND WHEN THE CONIC IS NEARLY CIRCULAR.  IN
R04585  PARTICULAR, IF THE CONIC IS AN EXACT CIRCLE, THE PROBLEM IS UNDEFINED AND THE SUBROUTINE WILL ABORT.
R04587

R0459        THE AGC COMPUTATION TIME IS APPROXIMATELY .363 SECONDS
R0460


R0461   REFERENCES -
R0462        R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0464


R0465   INPUT - ERASABLE INITIALIZATION REQUIRED

R0466            * SCALE FACTOR *
R0467   VARIABLE*IN POWERS OF 2*                            DESCRIPTION AND REMARKS
R0468   --------*--------------*                            -----------------------
R0469   RVEC     * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0470            * +27 FOR MOON *
R0471   VVEC     * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0472            * +5 FOR MOON  *
R0473   RDESIRED* +29 FOR EARTH*DP TERMINAL RADIAL DISTANCE ON CONIC TRAJECTORY FOR WHICH TRANSFER TIME IS TO BE
R0475            * +27 FOR MOON *COMPUTED.
R0476   SGNRDOT * NONE          *SP TAG SET TO +.5 OR -.5 ACCORDING TO WHETHER THE RADIAL VELOCITY AT RDESIRED IS TO BE
R0478            *              *POSITIVE OR NEGATIVE, RESPECTIVELY.  THIS TAG REDUCES THE DOUBLE-VALUED PROBLEM TO A
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R0480            *              *SINGLE-VALUED PROBLEM.
R0481    X1 (38D)*NONE          *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0483            *              *RESPECTIVELY, IS THE CENTRAL BODY.
R0484    RVSW    * NONE         *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0486            *              *IS TO BE COMPUTED ALSO.
R0487


R0488    SUBROUTINES CALLED -
R0489         PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0490


R0491    CALLING SEQUENCE AND NORMAL EXIT MODES -

R0492       IF ONLY TIME IS DESIRED AS OUTPUT -
R0493    L        SET    CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0495    L+1             RVSW
R0496    L+2             TIMERAD         RETURN WITH PL AT 0 AND T IN MPAC
R0497    L+3      ...                    CONTINUE
R0498

R0499       IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0500    L        CLEAR  CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0502    L+1             RVSW
R0503    L+2             TIMERAD         RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
R0505                                    THE INITIAL VELOCITY VECTOR IN MPAC.
R0506    L+3      STOVL  NEWVVEC
R0507    L+4      STADR
R0508    L+5      STORE  NEWRVEC                  NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0510    L+6      ...                             CONTINUE
R0511


R0512    ABORT EXIT MODES -
R0513             IF SOINSW AND/OR COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-RADIUS, TIME-RADIUS WILL TRANSFER
R0515             TO POODOO WITH AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 & 721)
R0522


R0523    OUTPUT -
R0524            * SCALE FACTOR *
R0525    VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0526    --------*--------------*                          -----------------------
R0527    T (30D) * +28          *DP TRANSFER TIME IN CENTISECONDS
R0528    INFINFLG* NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED AND SGNRDOT REQUIRE CLOSURE THROUGH
R0530            *              *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0532    COGAFLAG* NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0534            *              *CLEAR IF NOT.
R0535    APSESW  * NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED WAS GREATER THAN RADIUS OF APOCENTER OR
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R0537             *               *LESS THAN RADIUS OF PERICENTER.  THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY,
R0539             *               *WILL THEN BE RETURNED.  THE SWITCH IS CLEAR IF RDESIRED WAS BETWEEN PERICENTER AND
R0541             *               *APOCENTER.
R05411  SOLNSW    * NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF THE CONIC IS SO CLOSE TO A CIRCLE THAT THE TERMIN
R05413                            *ATION IS AMBIGUOUS, VIOLATING RESTRICTION 3.  IF ECCENTRICITY IS GREATER THAN 2-TO-THE-
R05415                            *MINUS-18, THE SWITCH IS CLEAR.
R0542

R0543   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0544   MPAC -    * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0545    MPAC +5* +5 FOR MOON  *
R0546   0D - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0547             * +27 FOR MOON *

R0548   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0549


R0550   DEBRIS -

R0551          PARAMETERS WHICH MAY BE OF USE -

R0552             * SCALE FACTOR *
R0553   VARIABLE* IN POWERS OF 2*                            DESCRIPTION AND REMARKS
R0554   ---------*----------------*                            ------------------------
R0555   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0557             * +27 FOR MOON *
R0558   R1A       * +6            *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0560   P         * +4            *DP RATIO OF SEMILATUS RECTUM TO R1
R0561   COGA      * +5            *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0563   UR1       * +1            *DP UNIT VECTOR OF RVEC
R0564   U2        * +1            *DP UNIT VECTOR OF VVEC
R0565   UN        * +1            *DP UNIT VECTOR OF UR1*U2
R0566   CSTH      * +1            *DP COSINE OF TRUE ANOMALY DIFFERENCE BETWEEN RVEC AND RDESIRED.
R0568   SNTH      * +1            *DP SINE OF TRUE ANOMALY DIFFERENCE.
R0569

R0570          PARAMETERS OF NO USE -
R0571   SP PARAMETERS -  RTNIT, GEOMSGN, RTNPRM, MAGVEC2=Q2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0573   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0574
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L        CONIC SUBROUTINES                                                             USER'S PAGE NO.  14       E0 S3

R0575    PROGRAM DESCRIPTION - APSIDES SUBROUTINE                                         DATE - 1 SEPTEMBER 1967
R0577    MOD NO. - 0                                                                      LOG SECTION - CONIC SUBROUTINES
R0579    MOD BY KRAUSE                                                                    ASSEMBLY - COLOSSUS REVISION 88
R0581

R0582    FUNCTIONAL DESCRIPTION -

R0583         THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR CALCULATES THE RADIUS OF PERICENTER AND OF APOCENTER AND THE
R0585    ECCENTRICITY OF THE RESULTING CONIC TRAJECTORY, WHICH MAY BE A STRAIGHT LINE,
R0587    CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0589    EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0591    ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0592

R0593    THE RESTRICTIONS ARE -
R0594         1.  IF APOCENTER IS BEYOND THE SCALING OF POSITION, THE SCALE FACTOR LIMIT (536,870,910 METERS WITH RESPECT
R0596    TO THE EARTH OR 134,217,727.5 METERS WITH RESPECT TO THE MOON) WILL BE RETURNED.
R0598         2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0600    ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0601         THE AGC COMPUTATION TIME IS APPROXIMATELY .103 SECONDS.
R0602


R0603    REFERENCES -
R0604         MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5
R0606


R0607    INPUT - ERASABLE INITIALIZATION REQUIRED

R0608            * SCALE FACTOR *
R0609    VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0610    --------*---------------*                         -----------------------
R0611    RVEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0612            * +27 FOR MOON *
R0613    VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0614            * +5 FOR MOON  *
R0615    X1 (38D)*NONE            *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0617            *                *RESPECTIVELY, IS THE CENTRAL BODY.
R0618


R0619    SUBROUTINES CALLED -
R0620         PARAM, GEOM
R0621


R0622    CALLING SEQUENCE AND NORMAL EXIT MODES -
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R0623       IF ONLY TIME IS DESIRED AS OUTPUT -
R0624    L          CALL                      MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0626    L+1                 APSIDES          RETURNS WITH PL AT 0, RADIUS OF APOCENTER IN MPAC AND RADIUS OF PERICENTER IN OD
R0628    L+2        STODL    APOAPSE
R0629    L+3                 OD
R0630    L+4        STORE    PERIAPSE                   APOAPSE AND PERIAPSE ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS
R0632    L+5        ...                       CONTINUE
R0633


R0634    OUTPUT -
R0635            * SCALE FACTOR *
R0636    VARIABLE* IN POWERS OF 2*                             DESCRIPTION AND REMARKS
R0637    --------*--------------*                              -----------------------
R0638    MPAC    * +29 FOR EARTH*DP RADIUS OF APOCENTER IN METERS
R0639            * +27 FOR MOON *
R0640    OD-1D   * +29 FOR EARTH*DP RADIUS OF PERICENTER IN METERS
R0641            * +27 FOR MOON *
R0642    ECC     * +3           *DP ECCENTRICITY OF CONIC TRAJECTORY.

R0643    FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0644


R0645    DEBRIS -

R0646          PARAMETERS WHICH MAY BE OF USE -

R0647            * SCALE FACTOR *
R0648    VARIABLE* IN POWERS OF 2*                             DESCRIPTION AND REMARKS
R0649    --------*--------------*                              -----------------------
R0650    R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0652            * +27 FOR MOON *
R0653    R1A     * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0655    P       * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0656    COGA    * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0658    UR1     * +1           *DP UNIT VECTOR OF RVEC
R0659    U2      * +1           *DP UNIT VECTOR OF VVEC
R0660    UN      * +1           *DP UNIT VECTOR OF UR1*U2
R0661    MAGVEC2 * +7 FOR EARTH *DP MAGNITUDE OF VVEC
R0662            * +5 FOR MOON  *
R0663

R0664          PARAMETERS OF NO USE -
R0665    SP PARAMETERS - INAPSE, GEOMSGN, RTNPRM, PLUS PUSHLIST LOCATIONS 0-5,10D-11D, 14D-21D, 31D-38D.
R0667    ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW
R0668


 0669    REF    1            12,2000                       SETLOC CONICS
 0670                          12,2023                          BANK

 0671   REF   1                                                 COUNT*  $$/CONIC
 0672   REF   2  LAST  125     E5,1721                          EBANK=  UR1
 0678                          12,2023   40001 1   KEPLERN     SETPD   BOV
 0679                          12,2024   00001 0                         0
 0680                          12,2025   24026 0                         +1
 0681                          12,2026   77773 1               VLOAD*
 0683   REF   4  LAST  693     12,2027   10005 0                         MUTABLE,1
 0684                          12,2030   24017 1               STOVL   14D
 0685   REF   4  LAST  710     12,2031   01503 0                         RRECT
 0686                          12,2032   66256 0               UNIT    SSP
 0687   REF   1                12,2033   00027 1                         ITERCTR
 0688                          12,2034   00024 1                         20D
 0689   REF   2  LAST  125     12,2035   16647 0               STODL   URRECT
 0690                          12,2036   00045 0                         36D
 0691   REF   5  LAST  690     12,2037   24041 1               STOVL   R1
 0692   REF   5  LAST 1174     12,2040   01503 0                         RRECT
 0693                          12,2041   76441 1               DOT     SL1R
 0694   REF   3  LAST  495     12,2042   01511 0                         VRECT
 0695                          12,2043   76405 1               DMP     SL1R
 0696   REF   1                12,2044   00023 0                         1/ROOTMU          1/ROOTMU (-17 OR -14)
 0697   REF   1                12,2045   24043 0               STOVL   KEPC1             C1=R.V/ROOTMU (+17 OR +16)

 0698   REF   4  LAST 1174     12,2046   01511 0                         VRECT
 0699                          12,2047   57236 1               VSQ     DMPR
 0700   REF   1                12,2050   00017 1                         1/MU              1/MU (-34 OR -28)
 0701                          12,2051   52405 1               DMP     SL3
 0702   REF   6  LAST 1174     12,2052   00041 1                         R1
 0703                          12,2053   61425 0               DSU     ROUND
 0704   REF   1                12,2054   11035 1                         D1/64
 0705   REF   1                12,2055   00045 0               STORE   KEPC2             C2=RV.V/MU -1 (+6)

 0706                          12,2056   74421 0               BDSU    SR1R
 0707   REF   2  LAST 1174     12,2057   11035 1                         D1/64
 0708                          12,2060   77671 1               DDV
 0709   REF   7  LAST 1174     12,2061   00041 1                         R1
 0710   REF   1                12,2062   00011 1               STORE   ALPHA             ALPHA=(1-C2)/R1 (-22 OR -20)

 0711                          12,2063   71244 0               BPL     DLOAD             MAXIMUM X DEPENDS ON TYPE OF CONIC
 0712   REF   1                12,2064   24073 0                         1REV
 0713   REF   1                12,2065   11053 1                         -50SC             -50SC (+12)
 0714                          12,2066   40071 0               DDV     BOV
 0715   REF   2  LAST 1174     12,2067   00011 1                         ALPHA
 0716   REF   1                12,2070   24077 1                         STOREMAX
 0717                          12,2071   52166 1               SQRT    GOTO
 0718   REF   2  LAST 1174     12,2072   24077 1                         STOREMAX

 0719                          12,2073   55366 1   1REV        SQRT    BDDV
 0720   REF   1              12,2074   11055 1                     2PISC              2PISC (+6)
 0721                        12,2075   77600 1            BOV
 0722   REF   3   LAST 1174  12,2076   24077 1                     STOREMAX
 0723   REF   1              12,2077   00013 0  STOREMAX  STORE    XMAX
 0724                        12,2100   65205 0            DMP      PDDL
 0725   REF   2   LAST 1174  12,2101   00023 0                     1/ROOTMU
 0726   REF   3   LAST 1174  12,2102   00011 1                     ALPHA
 0727                        12,2103   65301 0            NORM     PDDL
 0728   REF   3[illegible]  LAST 1158  12,2104   00047 1                     X1
 0729                        12,2105   56257 1            SL*      DDV
 0730                        12,2106   20173 0                     0 -6,1
 0731                        12,2107   50000 1            BOV      BMN
 0732   REF   1              12,2110   24124 0                     MODDONE
 0733   REF   2   LAST 1175  12,2111   24124 0                     MODDONE            MPAC=PERIOD
 0734                        12,2112   51525 1  PERIODCH  PDDL     ABS                OD=PERIOD
 0735   REF   2   LAST  114  12,2113   02074 0                     TAU.
 0736                        12,2114   50025 0            DSU      BMN
 0737                        12,2115   00001 0                     OD
 0738   REF   3   LAST 1175  12,2116   24124 0                     MODDONE
 0739                        12,2117   77765 0            SIGN
 0740   REF   3   LAST 1175  12,2120   02074 0                     TAU.
 0741   REF   4   LAST 1175  12,2121   16074 0            STODL    TAU.
 0750                        12,2122   77650 1            GOTO
 0751   REF   1              12,2123   24112 0                     PERIODCH
 0752                        12,2124   71201 1  MODDONE   SETPD    DLOAD
 0753                        12,2125   00001 0                     0
 0754   REF   2   LAST  114  12,2126   02130 1                     XKEPNEW
 0755   REF   1              12,2127   00025 0            STORE    X
 07555                       12,2130   53165 0            SIGN     BZE
 0756   REF   5   LAST 1175  12,2131   02074 0                     TAU.
 07565  REF   1              12,2132   24302 0                     BADX
 0757                        12,2133   51440 0            BMN      ABS
 07575  REF   2   LAST 1175  12,2134   24302 0                     BADX
 0758                        12,2135   51025 1            DSU      BPL
 07585  REF   2   LAST 1175  12,2136   00013 0                     XMAX
 0759   REF   3   LAST 1175  12,2137   24302 0                     BADX
 07595                       12,2140   51145 0  STORBNDS  DLOAD    BPL
 0760   REF   6   LAST 1175  12,2141   02074 0                     TAU.
 07605  REF   1              12,2142   24152 1                     STOREMIN
 0761                        12,2143   57545 1            DLOAD    DCOMP
 07615  REF   3   LAST 1175  12,2144   00013 0                     XMAX
 0762   REF   1              12,2145   14015 0            STODL    XMIN
 07625  REF   1              12,2146   24007 0                     KEPZERO
 0763   REF   4   LAST 1175  12,2147   00013 0            STORE    XMAX
 07635                       12,2150   77650 1            GOTO
 0764   REF   1              12,2151   24155 0                     DXCOMP
 07645                       12,2152   77745 1  STOREMIN  DLOAD
 0765   REF   2   LAST 1175  12,2153   24007 0                     KEPZERO
 07655  REF   2   LAST 1175  12,2154   00015 0            STORE    XMIN
 0766                        12,2155   57345 1  DXCOMP    DLOAD    DMPE
 0767    REF    7  LAST 1175    12,2156    02074 0                        TAU.
 0768    REF    1               12,2157    11046 0                        BEE22
 07685                          12,2160    77646 0              ABS
 0769    REF    1               12,2161    16177 1              STODL     EPSILONT
 0770    REF    1               12,2162    01553 0                        XPREV
 0779                           12,2163    77621 1   XDIFF      BDSU
 0780    REF    2  LAST 1175    12,2164    00025 0                        X
 0781    REF    2  LAST  125    12,2165    02643 1              STORE     DELX


 0782                           12,2166    63545 0   KEPLOOP    DLOAD     DSQ
 0783    REF    3  LAST 1176    12,2167    00025 0                        X                 X=XKEP
 0784                           12,2170    41501 0              NORM      PUSH              0D=XSQ (+34 OR +32 -N1)        PL AT 2
 0785    REF   39  LAST 1175    12,2171    00047 1                        X1
 0786                           12,2172    53605 1              DMP       SRR*
 0787    REF    4  LAST 1175    12,2173    00011 1                        ALPHA
 0788                           12,2174    21573 0                        0 -6,1
 0789    REF    1               12,2175    34031 1              STCALL    XI                XI=ALPHA XSQ (+6)
 0790    REF    1               12,2176    24421 0                        DELTIME
 0791                           12,2177    44200 0              BOV       BDSU
 0792    REF    1               12,2200    24311 1                        TIMEOVFL          UNLIKELY
 0793    REF    8  LAST 1176    12,2201    02074 0                        TAU.
 0794    REF    2  LAST  125    12,2202    02645 1              STORE     DELT              DELT=DELINDEP
 0795                           12,2203    44246 1              ABS       BDSU
 0796    REF    2  LAST 1176    12,2204    02177 1                        EPSILONT
 0797                           12,2205    71244 0              BPL       DLOAD
 0798    REF    1               12,2206    24333 1                        KEPCONVG
 0799    REF    5  LAST  729    12,2207    00037 0                        T
 0800                           12,2210    60225 1              DSU       NORM
 0801    REF    2  LAST  110    12,2211    01551 1                        TC
 0802    REF   40  LAST 1176    12,2212    00047 1                        X1
 0803                           12,2213    60325 0              PDDL      NORM
 0804    REF    3  LAST 1176    12,2214    02643 1                        DELX
 0805    REF   23  LAST 1155    12,2215    00050 1                        X2
 0806                           12,2216    41260 0              XSU,1     DMP
 0807    REF   24  LAST 1176    12,2217    00047 1                        X2
 0808    REF    3  LAST 1176    12,2220    02645 1                        DELT
 0809                           12,2221    56257 1              SLR*      DDV
 0810                           12,2222    21202 1                        1,1
 0811                           12,2223    41542 1              SR1       PUSH              0D=TRIAL DELX                  PL AT 2
 0812                           12,2224    71244 0              BPL       DLOAD
 0813    REF    1               12,2225    24246 1                        POSDELX
 0814    REF    4  LAST 1176    12,2226    00025 0                        X
 0815    REF    5  LAST 1175    12,2227    00013 0              STORE     XMAX              MOVE MAX BOUND IN
 0816                           12,2230    45221 1              BDSU      DSU                                              PL AT 0
 0817    REF    3  LAST 1175    12,2231    00015 0                        XMIN
 0818                           12,2232    51000 0              BOV       BPL
 0819    REF    1               12,2233    24240 1                        NDXCHNGE
 0820    REF    2  LAST 1176    12,2234    24240 1                        NDXCHNGE
 0821                           12,2235    52145 0              DLOAD     GOTO
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L          CONIC SUBROUTINES                                                         USER'S PAGE NO.  19       E5 S3

 0822                          12,2236   00001 0                     OD
 0823    REF   1               12,2237   24260 0                     NEWDELX

 0824                          12,2240   45345 1  NDXCHNGE DLOAD     DSU
 0825    REF   4  LAST 1176    12,2241   00015 0                     XMIN
 0826    REF   5  LAST 1176    12,2242   00025 0                     X
 0827                          12,2243   52075 1           DMPR      GOTO             TO FORCE MPAC +2 TO ZERO
 0828    REF   1               12,2244   11051 0                     DP9/10
 0829    REF   2  LAST 1177    12,2245   24260 0                     NEWDELX

 0830                          12,2246   77745 1  POSDELX  DLOAD
 0831    REF   6  LAST 1177    12,2247   00025 0                     X
 0832    REF   5  LAST 1177    12,2250   00015 0           STORE     XMIN             MOVE MIN BOUND IN
 0833                          12,2251   45221 1           BDSU      DSU                                             PL AT 0
 0834    REF   6  LAST 1176    12,2252   00013 0                     XMAX
 0835                          12,2253   50000 1           BOV       BMN
 0836    REF   1               12,2254   24274 0                     PDXCHNGE
 0837    REF   2  LAST 1177    12,2255   24274 0                     PDXCHNGE
 0838                          12,2256   77745 1           DLOAD
 0839                          12,2257   00001 0                     OD
 0840    REF   4  LAST 1176    12,2260   02643 1  NEWDELX  STORE     DELX
 0841                          12,2261   43254 0           BZE       DAD
 0842    REF   2  LAST 1176    12,2262   24333 1                     KEPCONVG
 0843    REF   7  LAST 1177    12,2263   00025 0                     X
 0844    REF   8  LAST 1177    12,2264   14025 0           STODL     X
 0845    REF   6  LAST 1176    12,2265   00037 0                     T
 0846    REF   3  LAST 1176    12,2266   01551 1           STORE     TC
 0847                          12,2267   46034 1  BRNCHCTR RTB       BHIZ
 0848    REF   1               12,2270   24644 1                     CHECKCTR
 0849    REF   3  LAST 1177    12,2271   24333 1                     KEPCONVG
 0850                          12,2272   77650 1           GOTO
 0851    REF   1               12,2273   24166 0                     KEPLOOP          ITERATE

 0852                          12,2274   45345 1  PDXCHNGE DLOAD     DSU
 0853    REF   7  LAST 1177    12,2275   00013 0                     XMAX
 0854    REF   9  LAST 1177    12,2276   00025 0                     X
 0855                          12,2277   52075 1           DMPR      GOTO             TO FORCE MPAC +2 TO ZERO
 0856    REF   2  LAST 1177    12,2300   11051 0                     DP9/10
 0857    REF   3  LAST 1177    12,2301   24260 0                     NEWDELX

 0858                          12,2302   70545 1  BADX     DLOAD     SR1
 0859    REF   8  LAST 1177    12,2303   00013 0                     XMAX
 0860                          12,2304   77765 0           SIGN
 0861    REF   9  LAST 1176    12,2305   02074 0                     TAU.
 0862    REF  10  LAST 1177    12,2306   00025 0           STORE     X
 0863                          12,2307   77650 1           GOTO
 0864    REF    1                 12,2310    24140 1                    STORBNDS
 0879                             12,2311    50145 1  TIMEOVFL DLOAD   BMN              X WAS TOO BIG
 0880    REF   11  LAST 1177      12,2312    00025 0                    X
 08805   REF    1                 12,2313    24330 1                    NEGTOVFL
 0881    REF    9  LAST 1177      12,2314    00013 0           STORE    XMAX
 0882                             12,2315    70545 1  CMNTOVFL DLOAD   SR1
 0883    REF    5  LAST 1177      12,2316    02643 1                    DELX
 0884    REF    6  LAST 1178      12,2317    02643 1           STORE    DELX
 0885                             12,2320    44254 1           BZE      BDSU
 08855   REF    1                 12,2321    02112 1                    KEPRTN
 0886    REF   12  LAST 1178      12,2322    00025 0                    X
 0887    REF   13  LAST 1178      12,2323    14025 0           STODL    X
 0888    REF    4  LAST 1177      12,2324    01551 1                    TC
 0889    REF    7  LAST 1177      12,2325    00037 0           STORE    T
 0890                             12,2326    77650 1           GOTO
 0891    REF    1                 12,2327    24267 1                    BRNCHCTR
 08911   REF    5  LAST 1177      12,2330    00015 0  NEGTOVFL STORE   XMIN
 08912                            12,2331    77650 1           GOTO
 08913   REF    1                 12,2332    24315 0                    CMNTOVFL
 0892                             12,2333    44545 0  KEPCONVG DLOAD   SR4R
 0893    REF    8  LAST 1174      12,2334    00041 1                    R1
 0894                             12,2335    74225 1           DSU      VXSC
 0895    REF    1                 12,2336    00035 1                    XSQC(XI)
 0896    REF    3  LAST 1174      12,2337    02647 0                    URRECT
 0897                             12,2340    65372 1           VSL1     PDDL             0D=(R1-XSQC(XI))URRECT (+33 OR +31)
 0898    REF   14  LAST 1178      12,2341    00025 0                    X
 0899                             12,2342    60316 0           DSQ      NORM
 0900    REF   41  LAST 1176      12,2343    00047 1                    X1
 0901                             12,2344    57275 0           DMPR     DMPR
 0902    REF    3  LAST 1175      12,2345    00023 0                    1/ROOTMU
 0903    REF   15  LAST 1178      12,2346    00025 0                    X
 0904                             12,2347    53605 1           DMP      SRR*
 0905    REF    1                 12,2350    00033 1                    S(XI)
 0906                             12,2351    21572 1                    0 -7,1
 0907                             12,2352    77621 1           BDSU
 0908    REF    8  LAST 1178      12,2353    00037 0                    T
 0909                             12,2354    74352 0           SL1      VXSC
 0910    REF    5  LAST 1174      12,2355    01511 0                    VRECT
 0911                             12,2356    53372 1           VSL1     VAD                                          PL AT 0
 0912                             12,2357    77712 0           VSL4
 0913    REF   15  LAST 1156      12,2360    01535 0           STORE    RCV              RCV (+29 OR +27)

 0914                             12,2361    60246 1           ABVAL    NORM
 0915    REF   25  LAST 1176      12,2362    00050 1                    X2
 0916    REF    1                 12,2363    14043 0           STODL    RCNORM
 0917    REF    2  LAST 1176      12,2364    00031 0                    XI
 0918                             12,2365    45275 0           DMPR     DSU
 0919    REF    2  LAST 1178      12,2366    00033 1                    S(XI)
 0920    REF    1                 12,2367    11033 1                    D1/128
 0921                          12,2370   76405 1            DMP     SL1R
 0922  REF   1                 12,2371   00021 1                    ROOTMU
 0923                          12,2372   53605 1            DMP     SLR*
 0924  REF  16  LAST 1179      12,2373   00025 0                    X
 0925                          12,2374   56601 0                    0 -3,2
 0926                          12,2375   74271 0            DDV     VXSC
 0927  REF   2  LAST 1178      12,2376   00043 0                    RCNORM
 0928  REF   4  LAST 1178      12,2377   02647 0                    URRECT
 0929                          12,2400   65372 1            VSL1    PDDL              0D=URRECT(XI S(XI)-1)X ROOTMU/RCV (+15
 0930  REF   2  LAST 1178      12,2401   00035 1                    XSQC(XI)          OR +13)                             PL AT 6
 0931                          12,2402   56257 1            SLR*    DDV
 0932                          12,2403   56602 0                    0 -4,2
 0933  REF   3  LAST 1179      12,2404   00043 0                    RCNORM
 0934                          12,2405   74221 0            BDSU    VXSC
 0935  REF   1                 12,2406   11047 1                    D1/256
 0936  REF   6  LAST 1178      12,2407   01511 0                    VRECT
 0937                          12,2410   42455 0            VAD     VSL8                                                PL AT 0
 0938                          12,2411   77626 0            STADR
 0939  REF  13  LAST 1156      12,2412   52234 0            STODL   VCV               VCV (+7 OR +5)
 0940  REF   9  LAST 1178      12,2413   00037 0                    T
 0943  REF   5  LAST 1178      12,2414   15551 1            STODL   TC
 0944  REF  17  LAST 1179      12,2415   00025 0                    X
 0947  REF   2  LAST 1176      12,2416   01553 0            STORE   XPREV
 0948                          12,2417   77650 1            GOTO
 0949  REF   2  LAST 1178      12,2420   02112 1                    KEPRTN
 0950                            12,2421   77776 1  DELTIME  EXIT                         MPAC=XI (+6), OD=XSQ (+34 OR +32 -N1)
 0951   REF   4  LAST 1085       12,2422  0 7222 1           TC       POLY
 0952                            12,2423   00010 0           DEC      8
 0953                            12,2424   02525 1           2DEC     .083333334
 0953                            12,2425   12526 0
 0954                            12,2426   67356 0           2DEC     -.266666684
 0954                            12,2427   75666 0
 0955                            12,2430   15001 1           2DEC     .406349155
 0955                            12,2431   23771 1
 0956                            12,2432   64342 0           2DEC     -.361198675
 0956                            12,2433   43674 0
 0957                            12,2434   06563 1           2DEC     .210153242
 0957                            12,2435   04645 1
 0958                            12,2436   75173 0           2DEC     -.086221951
 0958                            12,2437   52672 0
 0959                            12,2440   00656 1           2DEC     .026268812
 0959                            12,2441   14331 0
 0960                            12,2442   77633 1           2DEC     -.006163316
 0960                            12,2443   40512 0
 0961                            12,2444   00023 0           2DEC     .001177342
 0961                            12,2445   11210 1
 0962                            12,2446   77774 0           2DEC     -.000199055
 0962                            12,2447   67506 0
 0963   REF 226  LAST 1155       12,2450  0 6037 0           TC       INTPRET
 0964   REF   3  LAST 1178       12,2451   14033 1           STODL    S(XI)
 0965   REF   3  LAST 1178       12,2452   00031 0                    XI
 0966                            12,2453   77776 1           EXIT
 0967   REF   5  LAST 1130       12,2454  0 7222 1           TC       POLY
 0968                            12,2455   00010 0           DEC      8
 0969                            12,2456   01000 0           2DEC     .031250001
 0969                            12,2457   00000 1
 0970                            12,2460   72525 0           2DEC     -.166666719
 0970                            12,2461   52506 0
 0971                            12,2462   13301 1           2DEC     .355555413
 0971                            12,2463   15337 1
 0972                            12,2464   62776 0           2DEC     -.406347410
 0972                            12,2465   54733 1
 0973                            12,2466   11176 1           2DEC     .288962094
 0973                            12,2467   13267 0
 0974                            12,2470   73410 0           2DEC     -.140117894
 0974                            12,2471   51674 0
 0975                            12,2472   01446 0           2DEC     .049247387
 0975                            12,2473   33641 1
 0976                            12,2474   77451 1           2DEC     -.013081923
 0976                            12,2475   65233 0
 0977                            12,2476   00055 1           2DEC     .002806389
 0977                            12,2477   37266 1
 0978                            12,2500   77767 1           2DEC     -.000529414
 0978                            12,2501   52336 0
 0979   REF 227  LAST 1180       12,2502  0 6037 0           TC       INTPRET
 0980                            12,2503   53605 1          DMP     SRR*                                      PL AT 0
 0981                            12,2504   00001 0                  0D
 0982                            12,2505   21574 1                  0 -5,1
 0983     REF   3  LAST 1179     12,2506   00035 1          STORE   XSQC(XI)      XSQC(XI) (+33 OR +31)
 0984                            12,2507   72405 0          DMP     SL1
 0985     REF   2  LAST 1174     12,2510   00043 0                  KEPC1
 0986                            12,2511   65234 1          RTB     PDDL          XCH WITH PL. 0D=C1 XSQ C(XI) (+49 OR +46
 0987     REF   9  LAST 1150     12,2512   21633 1                  TPMODE                                    PL AT 0,3
 0988                            12,2513   53605 1          DMP     SRR*
 0989     REF   4  LAST 1180     12,2514   00033 1                  S(XI)
 0990                            12,2515   21574 1                  0 -5,1
 0991                            12,2516   72405 0          DMP     SL1
 0992     REF   2  LAST 1174     12,2517   00045 0                  KEPC2
 0993                            12,2520   65234 1          RTB     PDDL          3D=C2 XSQ S(XI) (+35 OR +33)  PL AT 6
 0994     REF  10  LAST 1181     12,2521   21633 1                  TPMODE
 0995     REF   9  LAST 1178     12,2522   00041 1                  R1
 0996                            12,2523   76261 0          SR      TAD                                       PL AT 3
 0997                            12,2524   20607 1                  6
 0998                            12,2525   41301 0          NORM    DMP           TO PRESERVE SIGNIF.
 0999     REF  42  LAST 1178     12,2526   00047 1                  X1
 1000     REF  18  LAST 1179     12,2527   00025 0                  X
 1001                            12,2530   76257 0          SR*     TAD           X(C2 XSQ S(XI) +D1) (+49 OR +46) PL AT 0
 1002                            12,2531   20576 1                  0 -3,1
 1003                            12,2532   57232 0          SL4R    DMPR
 1004     REF   4  LAST 1178     12,2533   00023 0                  1/ROOTMU
 1005     REF  10  LAST 1179     12,2534   00037 0          STORE   T
 1006                            12,2535   77616 0          RVQ
 1007                          12,2536   71214 0  ITERATOR BONCLR DLOAD
 1008   REF    1               12,2537   00614 1                  SLOPESW
 1009   REF    1               12,2540   24606 1                  FIRSTIME
 1010   REF    1               12,2541   00037 0                  DEP
 1011                          12,2542   60225 1           DSU    NORM
 1012   REF    3  LAST   125   12,2543   02762 0                  DEPREV
 1013   REF   43  LAST  1181   12,2544   00047 1                  X1
 1014                          12,2545   60325 0           PDDL   NORM
 1015   REF    1               12,2546   00015 0                  DELINDEP
 1016   REF   26  LAST  1178   12,2547   00050 1                  X2
 1017                          12,2550   41260 0           XSU,1  DMP
 1018   REF   27  LAST  1182   12,2551   00047 1                  X2
 1019   REF    3  LAST   125   12,2552   02760 1                  DELDEP
 1020                          12,2553   56257 1           SLR*   DDV                                         PL UP 2
 1021                          12,2554   21202 1                  1,1
 1022                          12,2555   43142 1           SR1    BOFF
 1023   REF    1               12,2556   04351 1                  ORDERSW
 1024   REF    1               12,2557   24562 0                  SGNCHECK
 1025                          12,2560   75246 0           ABS    SIGN         IN CASE 2ND DERIV. CHANGED SIGN, MUST
 1026   REF    4  LAST  1132   12,2561   02760 1                  DELDEP       DISREGARD IT TO FIND MIN.

 1027                          12,2562   51006 0  SGNCHECK PUSH   BPL          TRIAL DELINDEP                 PL DOWN 2
 1028   REF    1               12,2563   24620 0                  POSDEL
 1029                          12,2564   43145 0           DLOAD  BON
 1030   REF    1               12,2565   02766 1                  INDEP
 1031   REF    2  LAST  1182   12,2566   04311 0                  ORDERSW
 1032   REF    1               12,2567   24571 1                  MINCHECK
 1033   REF    1               12,2570   00017 1           STORE  MAX          IF NOT 2ND ORDER, CAN MOVE MAX BOUND IN.

 1034                          12,2571   45221 1  MINCHECK BDSU   DSU
 1035   REF    1               12,2572   00011 1                  MIN
 1036                          12,2573   51000 0           BOV    BPL
 1037   REF    1               12,2574   24600 1                  MODNGDEL
 1038   REF    2  LAST  1182   12,2575   24600 1                  MODNGDEL
 1039                          12,2576   77650 1           GOTO
 1040   REF    1               12,2577   24632 0                  DELOK


 1041                          12,2600   45345 1  MODNGDEL DLOAD  DSU          TRIAL DELINDEP WOULD EXCEED MIN BOUND
 1042   REF    2  LAST  1182   12,2601   00011 1                  MIN
 1043   REF    2  LAST  1182   12,2602   02766 1                  INDEP
 1044                          12,2603   52005 0           DMP    GOTO
 1045   REF    3  LAST  1177   12,2604   11051 0                  DP9/10
 1046   REF    1               12,2605   24634 0                  NEWDEL

 1047                          12,2606   41345 0  FIRSTIME DLOAD  DMP
 1048   REF    3  LAST  1182   12,2607   00011 1                  MIN
 1049   REF    1               12,2610   00051 0                  TWEEKIT      DLOAD TWEEKIT(40D) SENSITIVE TO CHANGE.
 1050                          12,2611   41325 0           PDDL   DMP          S2(41D) SHOULDNT CONTAIN HI ORDER ONES
 1051    REF    2  LAST 1182    12,2612    00017 1                       MAX
 1052    REF    2  LAST 1182    12,2613    00051 0                       TWEEKIT
 1053                           12,2614    77625 0             DSU
 1054                           12,2615    52165 1             SIGN      GOTO
 1055    REF    5  LAST 1182    12,2616    02760 1                       DELDEP
 1056    REF    2  LAST 1182    12,2617    24562 0                       SGNCHECK


 1057                           12,2620    43145 0  POSDEL     DLOAD     BON
 1058    REF    3  LAST 1182    12,2621    02766 1                       INDEP
 1059    REF    3  LAST 1182    12,2622    04311 0                       ORDERSW
 1060    REF    1               12,2623    24625 0                       MAXCHECK
 1061    REF    4  LAST 1182    12,2624    00011 1             STORE     MIN                IF NOT 2ND ORDER, CAN MOVE MIN BOUND IN.

 1062                           12,2625    45221 1  MAXCHECK   BDSU      DSU
 1063    REF    3  LAST 1183    12,2626    00017 1                       MAX
 1064                           12,2627    50000 1             BOV       BMN
 1065    REF    1               12,2630    24636 1                       MODPSDEL
 1066    REF    2  LAST 1183    12,2631    24636 1                       MODPSDEL
 1067                           12,2632    77745 1  DELOK      DLOAD
 1068                           12,2633    00001 0                       0D
 1069    REF    2  LAST 1182    12,2634    00015 0  NEWDEL     STORE     DELINDEP
 1070                           12,2635    77616 0             EXIT


 1071                           12,2636    45345 1  MODPSDEL   DLOAD     DSU
 1072    REF    4  LAST 1183    12,2637    00017 1                       MAX
 1073    REF    4  LAST 1183    12,2640    02766 1                       INDEP
 1074                           12,2641    52005 0             DMP       GOTO
 1075    REF    4  LAST 1182    12,2642    11051 0                       DP9/10
 1076    REF    2  LAST 1182    12,2643    24634 0                       NEWDEL


 1077    REF  126  LAST 1127    12,2644   4 0753 0  CHECKCTR   CS        ONE
 1078    REF   56  LAST 1108    12,2645   50 120 1             INDEX     FIXLOC
 1079    REF    2  LAST 1174    12,2646   6 0026 0             AD        ITERCTR
 1080    REF   57  LAST 1183    12,2647   50 120 1             INDEX     FIXLOC
 1081    REF    3  LAST 1193    12,2650   54 026 1             TS        ITERCTR
 1082    REF  728  LAST 1191    12,2651   54 154 0             TS        MPAC
 1083    REF   55  LAST 1094    12,2652   0 6061 0             TC        DANZIG
 1084                               12,2653   44545 0  NEWSTATE DLOAD   SR4R
 1088   REF  10  LAST 1181          12,2654   00041 1                   R1
 1089                               12,2655   74225 1           DSU     VXSC
 1090   REF   4  LAST 1181          12,2656   00035 1                   XSQC(XI)
 1091   REF   3  LAST 1174          12,2657   02722 1                   UR1
 1092                               12,2660   65372 1           VSL1    PDDL          0D=(R1-XSQC(XI))UR1 (+33 OR 31) PL AT 6
 1093   REF  19  LAST 1181          12,2661   00025 0                   X
 1094                               12,2662   60316 0           DSQ     NORM
 1095   REF  44  LAST 1182          12,2663   00047 1                   X1
 1096                               12,2664   57275 0           DMPR    DMPR
 1097   REF   5  LAST 1161          12,2665   00023 0                   1/ROOTMU
 1098   REF  20  LAST 1184          12,2666   00025 0                   X
 1099                               12,2667   53605 1           DMP     SRR*
 1100   REF   5  LAST 1181          12,2670   00033 1                   S(XI)
 1101                               12,2671   21572 1                   0 -7,1
 1102                               12,2672   77621 1           BDSU
 1103   REF  11  LAST 1181          12,2673   00037 0                   T
 1104                               12,2674   74352 0           SL1     VXSC
 1105   REF  11  LAST  729          12,2675   02744 1                   VVEC
 1106                               12,2676   53372 1           VSL1    VAD                                         PL AT 0
 1107                               12,2677   41512 1           VSL4    PUSH
 1108                               12,2700   77646 0           ABVAL
 1109                               12,2701   77701 1  LAMENTER NORM
 1110   REF  45  LAST 1184          12,2702   00047 1                   X1
 1111   REF   1                     12,2703   16720 0           STODL   R2
 1112   REF   4  LAST 1180          12,2704   00031 0                   XI
 1113                               12,2705   45205 1           DMP     DSU
 1114   REF   6  LAST 1184          12,2706   00033 1                   S(XI)
 1115   REF   2  LAST 1178          12,2707   11033 1                   D1/128
 1116                               12,2710   76405 1           DMP     SL1R
 1117   REF   2  LAST 1179          12,2711   00021 1                   ROOTMU
 1118                               12,2712   53605 1           DMP     SLR*
 1119   REF  21  LAST 1184          12,2713   00025 0                   X
 1120                               12,2714   21176 1                   0 -3,1
 1121                               12,2715   74271 0           DDV     VXSC
 1122   REF   2  LAST 1184          12,2716   02720 0                   R2
 1123   REF   4  LAST 1184          12,2717   02722 1                   UR1
 1124                               12,2720   65372 1           VSL1    PDDL          6D=V2VEC PART (+15 OR 13)       PL AT 12
 1125   REF   5  LAST 1184          12,2721   00035 1                   XSQC(XI)
 1126                               12,2722   56257 1           SLR*    DDV
 1127                               12,2723   21175 1                   0 -4,1
 1128   REF   3  LAST 1184          12,2724   02720 0                   R2
 1129                               12,2725   77621 1           BDSU
 1130   REF   2  LAST 1179          12,2726   11047 1                   D1/256
 1131                               12,2727   53361 0           VXSC    VAD                                         PL AT 6
 1132   REF  12  LAST 1184          12,2730   02744 1                   VVEC
 1133                               12,2731   43412 1           VSL8    RVQ
R1134
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 1135   REF    3  LAST   45   04,2000                      SETLOC CONICS1
 1136                         04,3027                      BANK

 1137   REF    2 LAST    45 TO    46:     16    15*        COUNT* $$/CONIC
R1138   DO NOT DISTURB THE ORDER OF THESE CDS, OVERLAYS HAVE BEEN MADE.
 1139                         04,3027   00000 1  BEE17     DEC      0                  KEEP WITH D1/8 2DEC 1.0B-17 (0000004000)
 1140                         04,3030   04000 0  D1/8      2DEC     1.0 B-3
 1140                         04,3031   00000 1
 1141                         04,3032   00200 0  D1/128    2DEC     1.0 B-7
 1141                         04,3033   00000 1
 1142                         04,3034   00400 0  D1/64     2DEC     1.0 B-6
 1142                         04,3035   00000 1
 1143                         04,3036   10000 0  D1/4      2DEC     1.0 B-2
 1143                         04,3037   00000 1
 1144                         04,3040   02000 0  D1/16     2DEC     1.0 B-4
 1144                         04,3041   00000 1
 1145                         04,3042   01000 0  D1/32     2DEC     1.0 B-5
 1145                         04,3043   00000 1
 1146                         04,3044   00020 0  D1/1024   2DEC     1.0 B-10
 1146                         04,3045   00000 1
 1147                         04,3046   00100 0  D1/256    2DEC     1.0 B-8
 1147                         04,3047   00000 1
 1148                         04,3050   34631 1  DP9/10    2DEC     .9
 1148                         04,3051   23146 0
 1149   REF    5  LAST 1147   12,2006            KEPZERO   EQUALS LO6ZEROS
 1150                         04,3052   77467 1  -50SC     2DEC     -50.0 B-12
 1150                         04,3053   77777 0
 1151                         04,3054   03110 1  2PISC     2DEC     6.28318530 B-6
 1151                         04,3055   17665 1
 1152   REF    1              04,3041            BEE19     EQUALS D1/32 -1           2DEC 1.0 B-19 (00000 01000)
 1153   REF    3  LAST 1184   04,3045            BEE22     EQUALS D1/256 -1          2DEC 1.0 B-22 (00000 00100)
 1154                         04,3056   00000 1  ONEBIT    2DEC     1.0 B-28
 1154                         04,3057   00001 0
 1155                         04,3060   37767 0  COGUPLIM 2DEC     .999511597
 1155                         04,3061   37737 0
 1156                         04,3062   40010 1  COGLOLIM 2DEC     -.999511597
 1156                         04,3063   40040 1
R1157
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 1158   REF    2  LAST 1173   12,2000                      SETLOC CONICS
 1159                         12,2732                      BANK

 1160   REF    2 LAST 1174 TO 1185:   455   455*           COUNT* $$/CONIC
 1161                         12,2732   40220 0  TIMETHET STQ    SETPD                                   PL AT 0
 1162   REF    1              12,2733   02710 0                  RTNTT
 1163                         12,2734   00001 0                  0
 11635                        12,2735   77600 1            BOV
 11636                        12,2736   24737 1                  +1
 1164                         12,2737   63375 0            VLOAD  PDVL          SETUP FOR PARAM CALL      PL AT 6
 1165   REF    9  LAST  729   12,2740   02655 0                  RVEC
 1166   REF   13  LAST 1184   12,2741   02744 1                  VVEC
 1167                         12,2742   77624 1            CALL
 1168   REF    1              12,2743   11064 0                  PARAM
 1169                         12,2744   45000 0            BOV    CALL                                    PL AT 0
 1170   REF    1              12,2745   24764 1                  COGAOVFL
 1171   REF    1              12,2746   24767 1                  GETX
 1172                         12,2747   43145 0  COMMNOUT DLOAD  BON
 1173   REF    5  LAST 1184   12,2750   00031 0                  XI
 1174   REF    1              12,2751   04310 1                  INFINFLG
 1175   REF    1              12,2752   25742 1                  ABTCONIC
 1176                         12,2753   45014 0            CLEAR  CALL
 1177   REF    1              12,2754   04273 0                  COGAFLAG
 1178   REF    2  LAST 1176   12,2755   24421 0                  DELTIME
 1179                         12,2756   45014 0            BON    CALL
 1180   REF    8  LAST  729   12,2757   03706.0                  RVSW
 1181   REF    2  LAST 1186   12,2760   02710 0                  RTNTT
 1182   REF    1              12,2761   24653 1                  NEWSTATE
 1183                         12,2762   77650 1            GOTO
 1184   REF    3  LAST 1186   12,2763   02710 0                  RTNTT


 1185                         12,2764   77614 1  COGAOVFL SETGO
 1186   REF    2  LAST 1186   12,2765   04033 0                  COGAFLAG
 1187   REF    2  LAST 1186   12,2766   25742 1                  ABTCONIC
 11872                        04,3064                      BANK   4
 11874  REF    4  LAST 1185   04,2000                      SETLOC CONICS1
 11876                        04,3064                      BANK
 11878  REF    3 LAST 1185 TO 1186:    29    45*           COUNT* $$/CONIC
 1188                         04,3064   43020 1  PARAM    STQ    CLEAR         MPAC=V1VEC, 0D=R1VEC      PL AT 6
 1189   REF    2  LAST  125   04,3065   02753 1                  RTNPRM
 1190   REF    7  LAST  778   04,3066   03665 1                  NORMSW
 11901                        04,3067   77614 1            CLEAR
 11902  REF    3  LAST 1186   04,3070   04273 0                  COGAFLAG
 1191                         04,3071   45131 0            SSP    CALL
 1192   REF    7  LAST  779   04,3072   02673 1                  GEOMSGN
 1193                         04,3073   27777 0                  37777         GAMMA ALWAYS LESS THAN 180DEG
 1194   REF    1              04,3074   11130 0                  GEOM          MPAC=SNGA (+1), 0D=CSGA (+1) PL AT 2
 1195                         04,3075   14045 0            STODL  36D           36D=SIN GAMMA (+1)        PL AT 0
 1196                         04,3076   56261 1            SR     DDV
 1197                          04,3077   20606 0                 [illegible]

 1198                          04,3100   00045 0                 36D
 1199   REF   2  LAST  125     04,3101   32766 1        STOVL*   COGA
 1200   REF   5  LAST 1174     04,3102   10005 0                 MUTABLE,1
 1201   REF   2  LAST 1174     04,3103   14017 1        STODL    1/MU
 1202   REF   3  LAST  125     04,3104   02720 0                 MAGVEC2
 1203                          04,3105   60316 0        DSQ      NORM
 1204   REF  46  LAST 1134     04,3106   00047 1                 X1
 1205                          04,3107   41275 1        DMPR     DMP
 1206   REF   3  LAST 1137     04,3110   00017 1                 1/MU
 1207   REF  11  LAST 1184     04,3111   00041 1                 R1
 1208                          04,3112   77657 0        SRR*
 1209                          04,3113   21576 0                 0 -3,1
 1210                          04,3114   44206 0        PUSH     BDSU          OD=R1 V1SQ/MU (+6)          PL AT 2
 1211   REF   2  LAST 11 5     04,3115   11043 0                 D1/32
 1212   REF   4  LAST  690     04,3116   16742 1        STODL    R1A           R1A (+6)                    PL AT 0

 1213                          04,3117   60205 0        DMP      NORM
 1214                          04,3120   00045 0                 36D
 1215   REF  47  LAST 1187     04,3121   00047 1                 X1
 1216                          04,3122   53605 1        DMP      SR*
 1217                          04,3123   00045 0                 36D
 1218                          04,3124   20575 1                 0 -4,1
 1219   REF   4  LAST  635     04,3125   02740 0        STORE    P             P (+4)
 1220                          04,3126   77650 1        GOTO
 1221   REF   3  LAST 1186     04,3127   02753 1                 RTNPRM
 1225                           04,3130  77656 1  GEOM      UNIT                    MPAC=V2VEC, 0D=R1VEC          PL AT 6
 1226   REF   2  LAST  125      04,3131  16712 1            STODL    U2             U2 (+1)
 1227                           04,3132  00045 0                     36D
 1228   REF   4  LAST 1187      04,3133  26720 0            STOVL    MAGVEC2                                      PL AT 0
 1229                           04,3134  77656 1            UNIT
 1230   REF   5  LAST 1184      04,3135  02722 1            STORE    UR1            UR1 (+1)
 1231                           04,3136  72441 0            DOT      SL1
 1232   REF   3  LAST 1183      04,3137  02712 1                     U2
 1233                           04,3140  77725 1            PDDL                    0D=CSTH (+1)                  PL AT 2
 1234                           04,3141  00045 0                     36D
 1235   REF  12  LAST 1197      04,3142  24041 1            STOVL    R1             R1 (+29 OR +27)
 1236   REF   6  LAST 1188      04,3143  02722 1                     UR1
 1237                           04,3144  76435 1            VXV      VSL1
 1238   REF   4  LAST 1183      04,3145  02712 1                     U2
 1239                           04,3146  75214 1            BON      SIGN
 1240   REF   8  LAST 1136      04,3147  03705 0                     NORMSW
 1241   REF   1                 04,3150  11162 1                     HAVENORM
 1242   REF   8  LAST 1186      04,3151  02673 1                     GEOMSGN
 1243                           04,3152  40056 0            UNIT     BOV
 1244   REF   1                 04,3153  11160 0                     COLINEAR
 1245   REF   6  LAST  779      04,3154  16674 0  UNITNORM  STODL    UN             UN (+1)
 1246                           04,3155  00045 0                     36D
 1247                           04,3156  43565 0            SIGN     RVQ            MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
 1248   REF   9  LAST 1138      04,3157  02673 1                     GEOMSGN


 1249                           04,3160  52162 0  COLINEAR  VSR1     GOTO
 1250   REF   1                 04,3161  11154 1                     UNITNORM


 1251                           04,3162  75246 0  HAVENORM  ABVAL    SIGN
 1252   REF  10  LAST 1188      04,3163  02673 1                     GEOMSGN
 1253                           04,3164  77616 0            RVQ                     MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
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1254                            12,2767                       BANK    12
1255    REF   3  LAST 1186      12,2000                       SETLOC  CONICS
1256                            12,2767                       BANK

12565   REF   3 LAST 1186 TO 11  :      29    484*            COUNT*  $$/CONIC
1257                            12,2767   66374 1  GETX       AXT,2   SSP                 ASSUMES P (+4) IN MPAC
1258                            12,2770   00003 1                     3
1259    REF  26  LAST 1155      12,2771   00052 0                     S2
1260                            12,2772   00001 0                     1
1261                            12,2773   77614 1             CLEAR
1262    REF   1                 12,2774   04276 0                     360SW
1263                            12,2775   65366 1             SQRT    PDDI                OD=SQRT(P)                    PL AT 2
1264    REF   6  LAST  729      12,2776   02732 0                     CSTH
1265                            12,2777   44342 1             SR1     BDSU
1266    REF   2  LAST   37      12,3000   11037 0                     D1/4
1267                            12,3001   54325 1             PDDL    SRR                                           PL AT 4D
1268    REF   8  LAST  729      12,3002   02730 1                     SNTH
1269                            12,3003   21607 0                     6
1270                            12,3004   77671 1             DDV                                                   PL AT 2
1271                            12,3005   77600 1             BOV
1272    REF   1                 12,3006   25122 1                     360CHECK
1273                            12,3007   41225 1             DSU     DMP
1274    REF   3  LAST 1187      12,3010   02766 1                     COGA                                              PL AT 0
1275                            12,3011   40132 0             SL2R    BOV
1276    REF   2  LAST 1189      12,3012   25122 1                     360CHECK
1277                            12,3013   63406 0  WLOOP      PUSH    DSQ                 OD=W (+5)                     PL AT 2
1278                            12,3014   65351 0             DLOAD   PDDL                2D=WSQ (+10)                  PL AT 5
1279    REF 729  LAST 1183      12,3015   00155 0                     MPAC
1280    REF   5  LAST 1187      12,3016   02742 1                     R1A
1281                            12,3017   76202 0             SR4     TAD                                           PL AT 2
1282                            12,3020   75440 0             BMN     SQRT
1283    REF   1                 12,3021   25205 1                     INFINITY
1284                            12,3022   43306 0             ROUND   DAD                                           PL AT OD
1285                            12,3023   61000 0             BOV     TIX,2
1286    REF   1                 12,3024   25120 0                     RESETX2
1287    REF   1                 12,3025   25013 1                     WLOOP


1288                            12,3026   40065 0             BDDV    BOV
1289    REF   3  LAST 1184      12,3027   11033 1                     D1/128
1290    REF   2  LAST 1189      12,3030   25205 1                     INFINITY
1291                            12,3031   41440 1  POLYCOEF   BMN     PUSH                OD=1/W (+2) OR 16/W (+6)    PL AT 2
1292    REF   3  LAST 1189      12,3032   25205 1                     INFINITY
1293                            12,3033   77716 1             DSQ
1294                            12,3034   41301 0             NORM    DMP
1295    REF  48  LAST 1187      12,3035   00047 1                     X1
1296    REF   6  LAST 1189      12,3036   02742 1                     R1A
1297                            12,3037   77457 1             SRR*    EXIT
1298                            12,3040   21567 0                     0 -10D,1
1299    REF   6  LAST 1180      12,3041   0 7222 1            TC      POLY
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 1300                          12,3042   00005 1             DEC     5
 1301                          12,3043   20000 0             2DEC    .5
 1301                          12,3044   00000 1
 1302                          12,3045   72525 0             2DEC    -.166666770
 1302                          12,3046   52471 1
 1303                          12,3047   03146 1             2DEC    .100000392
 1303                          12,3050   15003 0
 1304                          12,3051   75556 0             2DEC    -.071401086
 1304                          12,3052   45210 0
 1305                          12,3053   01615 1             2DEC    .055503292
 1305                          12,3054   13553 0
 1306                          12,3055   76371 0             2DEC    -.047264098
 1306                          12,3056   63777 0
 1307                          12,3057   01232 0             2DEC    .040694204
 1307                          12,3060   27367 0
 1308  REF 228  LAST 1180      12,3061  0 6037 0             TC      INTPRET
 1309                          12,3062   76405 1             DMP     SL1R                                        PL AT 0D
 1310                          12,3063   43006 0             PUSH    BON
 1311  REF   2  LAST 1189      12,3064   04316 1                     360SW
 1312  REF   1                 12,3065   25172 1                     TRUE360X
 1313                          12,3066   60316 0   XCOMMON   DSQ     NORM
 1314  REF  49  LAST 1189      12,3067   00047 1                     X1
 1315                          12,3070   53605 1             DMP     SRR*
 1316  REF   7  LAST 1189      12,3071   02742 1                     R1A
 1317                          12,3072   21565 1                     0 -12D,1
 1318  REF   6  LAST 1186      12,3073   14031 0             STODL   XI                 XI (+6)

 1319  REF  13  LAST 1188      12,3074   00041 1                     R1
 1320                          12,3075   75542 0             SR1     SQRT
 1321                          12,3076   41306 1             ROUND   DMP
 1322                          12,3077   77632 0             SL4R                                                PL AT 0
 1323  REF  22  LAST 1184      12,3100   00025 0             STORE   X                  X (+17 OR +16)

 1324                          12,3101   60316 0             DSQ     NORM
 1325  REF  50  LAST 1190      12,3102   00047 1                     X1
 1326                          12,3103   41325 0             PDDL    DMP                0D=XSQ (+34 OR +32 -N1)  PL AT 2
 1327  REF   5  LAST 1187      12,3104   02740 0                     P
 1328  REF  14  LAST 1190      12,3105   00041 1                     R1
 1329                          12,3106   75452 0             SL3     SQRT
 1330                          12,3107   56405 0             DMP     SL3R
 1331  REF   4  LAST 1189      12,3110   02766 1                     COGA
 1332  REF   3  LAST 1181      12,3111   14043 0             STODL   KEPC1
 1333  REF   8  LAST 1190      12,3112   02742 1                     R1A
 1334                          12,3113   43021 0             BDSU    CLEAN
 1335  REF   3  LAST 1174      12,3114   11035 1                     D1/64
 1336  REF   2  LAST 1186      12,3115   04270 0                     INFINFLG
 1337  REF   3  LAST 1181      12,3116   00045 0             STORE   KEPC2
 1338                          12,3117   77616 0             RVQ
 1339                          12,3120   77774 0  RESETX2   AXT,2
 1340                          12,3121   00003 1                     3


 1341                          12,3122   51001 1  360CHECK  SETPD   BPL
 1342                          12,3123   00001 0                    0D
 1343   REF   1                12,3124   25127 1                    INVRSEQN
 1344                          12,3125   77614 1            SET
 1345   REF   3   LAST 1190    12,3126   04076 1                    360SW


 1346                          12,3127   75545 1  INVRSEQN  DLOAD   SQRT
 1347   REF   6   LAST 1190    12,3130   02740 0                    P
 1348                          12,3131   41325 0            PDDL    DMP          0D=SQRT(P)  (+2)                PL AT 2
 1349   REF   9   LAST 1189    12,3132   02730 1                    SNTH
 1350   REF   5   LAST 1190    12,3133   02766 1                    COGA
 1351                          12,3134   65352 0            SL1     PDDL         2D=SNTH COGA (+5)               PL AT 4
 1352   REF   7   LAST 1189    12,3135   02732 0                    CSTH
 1353                          12,3136   43202 0            SR4     DAD
 1354   REF   3   LAST 1187    12,3137   11043 0                    D1/32
 1355                          12,3140   41225 1            DSU     DMP                                       PL AT 2,0
 1356                          12,3141   55301 0            NORM    BDDV
 1357   REF  51   LAST 1190    12,3142   00047 1                    X1
 1358   REF  10   LAST 1191    12,3143   02730 1                    SNTH
 1359                          12,3144   51457 0            SLR*    ABS          NOTE: NEAR 360 CASE TREATED DIFFERENTLY
 1360                          12,3145   21174 0                    0 -5,1
 1361                          12,3146   63406 0            PUSH    DSQ          0D=1/W (-1)                  PL AT 2
 1362                          12,3147   14043 0            STODL   34D
 1363   REF   1                12,3150   11041 1                    D1/16
 1364                          12,3151   63406 0  1/WLOOP   PUSH    DSQ          2D=G (+4)                       PL AT 4
 1365                          12,3152   65234 1            RTB     PDDL                                      PL AT 7
 1366   REF  11   LAST 1181    12,3153   21633 1                    TPMODE
 1367   REF   9   LAST 1190    12,3154   02742 1                    R1A
 1368                          12,3155   40405 1            DMP     SR4
 1369                          12,3156   00043 0                    34D
 1370                          12,3157   77771 0            TAD                                                  PL AT 4
 1371                          12,3160   75440 0            BMN     SQRT
 1372   REF   4   LAST 1189    12,3161   25205 1                    INFINITY
 1373                          12,3162   77615 0            DAD                                       PL AT 2
 1374                          12,3163   60304 0            TIX,2   NORM
 1375   REF   1                12,3164   25151 0                    1/WLOOP
 1376   REF  52   LAST 1191    12,3165   00047 1                    X1
 1377                          12,3166   77665 1            BDDV                                                 PL AT 0
 1378                          12,3167   52057 1            SLR*    GOTO
 1379                          12,3170   21172 0                    0 -7,1
 1380   REF   1                12,3171   25031 1                    POLYCOEF


 1381                          12,3172   50145 1  TRUE360X  DLOAD   BMN
 1382   REF  10   LAST 1191    12,3173   02742 1                    R1A
 1383   REF   5  LAST 1191   12,3174   25205 1                     INFINITY
 1384                        12,3175   60366 1            SQRT     NORM
 1385   REF  53  LAST 1191   12,3176   00047 1                     X1
 1386                        12,3177   53665 1            BDDV     SL*
 1387   REF   2  LAST 1175   12,3200   11055 1                     2PISC
 1388                        12,3201   20176 0                     0 -3,1
 1389                        12,3202   41425 1            DSU      PUSH              0D=2PI/SQRT(F1A) -X         PL AT 0,2
 1390                        12,3203   77650 1            GOTO
 1391   REF   1              12,3204   25066 0                     XCOMMON
 1392                        12,3205   40001 1  INFINITY  SETPD    BOV               NO SOLUTION EXISTS SINCE CLOSURE THROUGH
 1393                        12,3206   00001 0                     0                 INFINITY IS REQUIRED
 1394   REF   1              12,3207   25210 0                     OVFLCLR
 1395                        12,3210   43414 1  OVFLCLR   SET      RVQ
 1396   REF   3  LAST 1190   12,3211   04070 1                     INFINFLG
 1397                         12,3212   40220 0  LAMBERT  STQ      SETPD
 1398     REF    5  LAST  125 12,3213   02710 0                    RTNLAMB
 1399                         12,3214   00001 0                    0D
 13995                        12,3215   77600 1           BOV
 13996                        12,3216   25217 1                    +1
 1400                         12,3217   76614 0           CLEAR    VLOAD*
 1401     REF    1            12,3220   02674 0                    SOLNSW
 1403     REF    6  LAST 1187 12,3221   10005 0                    MUTABLE,1
 1404     REF    4  LAST 1187 12,3222   14017 1           STODL    1/MU
 1405     REF    3  LAST  687 12,3223   02671 0                    TDESIRED
 1406                         12,3224   77675 0           DMPR
 1407     REF    1            12,3225   11042 1                    BEE19
 1408     REF    2  LAST  125 12,3226   02764 0           STORE    EPSILONL
 1409                         12,3227   77214 0           SET      VLOAD
 1410     REF    2  LAST 1182 12,3230   00474 0                    SLOPESW
 1411     REF    6  LAST  689 12,3231   02655 0                    R1VEC
 1412                         12,3232   45115 0           PDVL     CALL       0D=R1VEC (+29 OR +27)          PL AT 6
 1413     REF   10  LAST  689 12,3233   02663 0                    R2VEC      MPAC=R2VEC (+29 OR +27)
 1414     REF    2  LAST 1186 12,3234   11130 0                    GEOM
 1415     REF   11  LAST 1191 12,3235   16730 1           STODL    SNTH       0D=CSTH (+1)                   PL AT 2
 1416     REF    5  LAST 1188 12,3236   02720 0                    MAGVEC2
 1417                         12,3237   65301 0           NORM     PDDL                                      PL AT 4
 1418     REF   54  LAST 1192 12,3240   00047 1                    X1
 1419     REF   15  LAST 1190 12,3241   00041 1                    R1
 1420                         12,3242   56342 1           SR1      DDV                                       PL AT 2
 1421                         12,3243   65257 1           SL*      PDDL       DXCH WITH 0D, 0D=R1/R2 (+7)   PL AT 0,2
 1422                         12,3244   20173 0                    0 -6,1
 1423                         12,3245   77626 0           STADR
 1424     REF    8  LAST 1191 12,3246   75045 1           STORE    CSTH       CSTH (+1)
 1425                         12,3247   44342 1           SR1      BDSU
 1426     REF    3  LAST 1189 12,3250   11037 0                    D1/4
 1427     REF    2  LAST  125 12,3251   02734 0           STORE    1-CSTH     1-CSTH (+2)

 142[illegible]                         12,3252   5310[illegible] 0           ROUND    BZE
 1429     REF    1            12,3253   25463 1                    360LAMB
 1430                         12,3254   65301 0           NORM     PDDL                                      PL AT 4
 1431     REF   55  LAST 1193 12,3255   00047 1                    X1
 1432                         12,3256   00001 0                    0D
 1433                         12,3257   56342 1           SR1      DDV                                       PL AT 2
 1434                         12,3260   75457 0           SL*      SQRT
 1435                         12,3261   20176 0                    0 -3,1
 1436                         12,3262   54325 1           PDDL     SR         2D=SQRT(2R1/R2(1-CSTH)) (+5)  PL AT 4
 1437     REF   12  LAST 1193 12,3263   02730 1                    SNTH
 1438                         12,3264   20607 1                    6
 1439                         12,3265   43271 1           DDV      DAD                                       PL AT 2
 1440     REF    3  LAST 1193 12,3266   02734 0                    1-CSTH
 14401                        12,3267   77626 0           STADR
 14402    REF    1            12,3270   77760 0           STORE    COGAMAX
 1441                         12,3271   50000 1           BOV      BMN        IF OVFL, COGAMAX=COGUPLIM
 1442     REF    1            12,3272   25277 1                    UPLIM      IF NEG, USE EVEN IF LT COGLOLIM, SINCE
 14421  REF   1                12,3273   25302 1                     MAXCOGA         THIS WOULD BE RESET IN LAMBLOOP
 14422                         12,3274   50025 0            DSU      BMN            IF COGAMAX GT COGUPLIM, COGAMAX=COGUPLIM
 14423  REF   1                12,3275   11061 0                     COGUPLIM
 14424  REF   2  LAST 1194     12,3276   25302 1                     MAXCOGA        OTHERWISE OK, SO GO TO MAXCOGA
 14425                         12,3277   77745 1  UPLIM     DLOAD
 14426  REF   2  LAST 1194     12,3300   11061 0                     COGUPLIM       COGUPLIM=.999511597 = MAX VALUE OF COGA
 14427  REF   2  LAST 1193     12,3301   00017 1            STORE    COGAMAX          NOT CAUSING OVFL IN R1A CALCULATION
 1443                          12,3302   77745 1  MAXCOGA   DLOAD
 1444   REF   9  LAST 1193     12,3303   02732 0                     CSTH
 1445                          12,3304   45261 0            SR       DSU                                                PL AT 0
 1446                          12,3305   20607 1                     6
 1447                          12,3306   77626 0            STADR
 1448   REF   2  LAST  125     12,3307   61041 0            STODL    CSTH-RHO
 1449   REF  11  LAST 1188     12,3310   02673 1                     GEOMSGN
 1450                          12,3311   71240 1            BMN      DLOAD
 1451   REF   1                12,3312   25503 0                     LOLIM
 1452   REF   3  LAST 1194     12,3313   02736 1                     CSTH-RHO
 1453                          12,3314   56352 0            SL1      DDV
 1454   REF  13  LAST 1193     12,3315   02730 1                     SNTH
 1455                          12,3316   77600 1            BOV
 1456   REF   2  LAST 1194     12,3317   25503 0                     LOLIM
 1457   REF   1                12,3320   00011 1  MINCOGA   STORE    COGAMIN        COGAMIN (+5)
 1458                          12,3321   66214 0            BON      SSP
 1459   REF   3  LAST  688     12,3322   00715 1                     GUESSW
 1460   REF   1                12,3323   25467 0                     NOGUESS
 1461   REF   3  LAST 1183     12,3324   00051 0                     TWEEKIT
 1462                          12,3325   00001 0                     00001
 1463                          12,3326   77745 1            DLOAD
 1464   REF   6  LAST 1191     12,3327   02766 1                     COGA


 1465                          12,3330   77605 1  LAMBLOOP  DMP
 1466   REF  14  LAST 1194     12,3331   02730 1                     SNTH
 1467                          12,3332   45342 0            SR1      DSU
 1468   REF   4  LAST 1194     12,3333   02736 1                     CSTH-RHO
 1469                          12,3334   65301 0            NORM     PDDL           OD=SNTH COGA-(CSTH-RHO) (+7+C(X1)) PL=2
 1470   REF  56  LAST 1193     12,3335   00047 1                     X1
 1471   REF   4  LAST 1193     12,3336   02734 0                     1-CSTH
 1472                          12,3337   56257 1            SL*      DDV            1-CSTH  (+2)                        PL AT 0
 1473                          12,3340   20170 0                     0 -9D,1
 1474                          12,3341   53040 0            BMN      BZE
 1475   REF   1                12,3342   25417 1                     NEGP
 1476   REF   2  LAST 1194     12,3343   25417 1                     NEGP
 1477   REF   7  LAST 1191     12,3344   16740 0            STODL    P              P=(1-CSTH)/(SNTH COGA-(CSTH-RHO)) (+4)
 1478   REF   7  LAST 1194     12,3345   02766 1                     COGA
 1479                          12,3346   43316 1            DSQ      DAD
 1480   REF   1                12,3347   11045 0                     D1/1024
 1481                          12,3350   41301 0            NORM     DMP
 1482   REF  57  LAST 1194     12,3351   00047 1                     X1
 1483   REF   8  LAST 1194     12,3352   02740 0                     P
 1484                          12,3353   44257 1           SR*     BDSU
 1485                          12,3354   20571 0                   0 -8D,1
 1486   REF   4   LAST 1191    12,3355   11043 0                   D1/32
 1487   REF  11   LAST 1191    12,3356   16742 1           STODL   R1A                R1A=2-P(1+COGA COGA) (+6)

 1488   REF   9   LAST 1194    12,3357   02740 0                   P
 1489                          12,3360   45000 0           BOV     CALL
 1490   REF   1                12,3361   25422 1                   HIENERGY
 1491   REF   2   LAST 1186    12,3362   24767 1                   GETX
 1492                          12,3363   77745 1           DLOAD
 1493   REF  12   LAST 1184    12,3364   00037 0                   T
 1494   REF   1                12,3365   16762 0           STODL   TPREV
 1495   REF   7   LAST 1190    12,3366   00031 0                   XI
 1496                          12,3367   45014 0           BON     CALL
 1497   REF   4   LAST 1192    12,3370   04310 1                   INFINFLG
 1498   REF   3   LAST 1194    12,3371   25417 1                   NEGP               HAVE EXCEEDED THEORETICAL BOUNDS
 1499   REF   3   LAST 1186    12,3372   24421 0                   DELTIME
 1500                          12,3373   44200 0           BOV     BDSU
 1501   REF   1                12,3374   25437 0                   BIGTIME
 1502   REF   4   LAST 1193    12,3375   02671 0                   TDESIRED
 1503   REF   1                12,3376   02760 1           STORE   TERRLAMB
 1504                          12,3377   44246 1           ABS     BDSU
 1505   REF   3   LAST 1193    12,3400   02764 0                   EPSILONL
 1506                          12,3401   47044 1           BPL     RTB
 1507   REF   1                12,3402   25506 0                   INITV
 1508   REF   2   LAST 1177    12,3403   24644 1                   CHECKCTR
 1509                          12,3404   45030 0           BHIZ    CALL
 1510   REF   1                12,3405   25450 1                   SUFFCHEK
 1511   REF   1                12,3406   24536 1                   ITERATOR
 1512                          12,3407   53145 1           DLOAD   BZE
 1513   REF 730   LAST 1189    12,3410   00155 0                   MPAC
 1514   REF   2   LAST 1195    12,3411   25450 1                   SUFFCHEK
 1515                          12,3412   77615 0           DAD
 1516   REF   8   LAST 1194    12,3413   02766 1                   COGA
 1517   REF   9   LAST 1195    12,3414   02766 1           STORE   COGA
 1518                          12,3415   77650 1           GOTO
 1519   REF   1                12,3416   25330 0                   LAMBLOOP


 1520                          12,3417   51145 0  NEGP     DLOAD   BPL                IMPOSSIBLE TRAJECTORY DUE TO INACCURATE
 1521   REF   1                12,3420   00015 0                   DCOGA              BOUND CALCULATION. TRY NEW COGA.
 1522   REF   1                12,3421   25442 1                   LOENERGY


 1523                          12,3422   71201 1  HIENERGY SETPD   DLOAD              HIGH ENERGY TRAJECTORY RESULTED
 1524                          12,3423   00001 0                   0
 1525   REF  10   LAST 1195    12,3424   02766 1                   COGA               IN OVFL OF P OR R1A, OR XI EXCEEDING 50.
 1526   REF   2   LAST 1194    12,3425   00011 1           STORE   COGAMIN            THIS IS THE NEW BOUND.
 1527                          12,3426   70545 1  COMMONLM DLOAD   SR1
 1528   REF   2   LAST 1195    12,3427   00015 0                   DCOGA
 1529   REF   3  LAST 1195   12,3430   00015 0                STORE   DCOGA          USE DCOGA/2 AS DECREMENT
 1530                        12,3431   44254 1                BZE     BDSU
 15301  REF   3  LAST 1195   12,3432   25450 1                        SUFFCHEK
 1531   REF  11  LAST 1195   12,3433   02766 1                        COGA
 1532   REF  12  LAST 1196   12,3434   02766 1                STORE   COGA
 1533                        12,3435   77650 1                GOTO                   RESTART THIS LOOP
 1534   REF   2  LAST 1195   12,3436   25330 0                        LAMBLOOP


 1535                        12,3437   77745 1  BIGTIME       DLOAD
 1536   REF   2  LAST 1195   12,3440   02762 0                        TPREV
 1537   REF  13  LAST 1195   12,3441   00037 0                STORE   T


 1538                        12,3442   71201 1  LOENERGY      SETPD   DLOAD          LOW ENERGY TRAJECTORY RESULTED
 1539                        12,3443   00001 0                        0
 1540   REF  13  LAST 1196   12,3444   02766 1                        COGA           IN OVERFLOW OF TIME.
 1541   REF   3  LAST 1194   12,3445   00017 1                STORE   COGAMAX        THIS IS THE NEW BOUND.
 1542                        12,3446   77650 1                GOTO
 1543   REF   1              12,3447   25426 0                        COMMONLM


 1544                        12,3450   51545 1  SUFFCHEK      DLOAD   ABS
 1545   REF   2  LAST 1195   12,3451   02760 1                        TERRLAMB
 1546                        12,3452   41325 0                PDDL    DMP                               PL AT 2D
 1547   REF   5  LAST 1195   12,3453   02671 0                        TDESIRED
 1548   REF   1              12,3454   11030 1                        BEE17
 1549                        12,3455   45215 0                DAD     DSU                               PL AT 0D
 1550   REF   1              12,3456   11057 0                        ONEBIT
 1551                        12,3457   43044 0                BPL     SETGO
 1552   REF   2  LAST 1195   12,3460   25506 0                        INITV
 1553   REF   2  LAST 1193   12,3461   02434 0                        SOLNSW
 1554   REF   3  LAST 1196   12,3462   25506 0                        INITV
 1555                        12,3463   43001 1  360LAMB       SETPD   SETGO          LAMBERT CANNOT HANDLE CSTH=1
 1556                        12,3464   00001 0                        0
 1557   REF   3  LAST 1196   12,3465   02434 0                        SOLNSW
 1558   REF   6  LAST 1193   12,3466   02710 0                        RTNLAMB


 1559                        12,3467   71331 0  NOGUESS       SSP     DLOAD
 1560   REF   4  LAST 1194   12,3470   00051 0                        TWEEKIT
 1561                        12,3471   10000 0                        20000
 1562   REF   3  LAST 1195   12,3472   00011 1                        COGAMIN
 1563                        12,3473   65342 1                SR1     PDDL                              PL AT 2
 1564   REF   4  LAST 1196   12,3474   00017 1                        COGAMAX
 1565                        12,3475   43342 0                SR1     DAD
 1566                        12,3476   77626 0                STADR                                     PL AT 0
 1567   REF  14  LAST 1196   12,3477   75011 0                STORE   COGA
 1568   REF   4  LAST 1196   12,3500   00015 0                STORE   DCOGA
 1569                        12,3501   77650 1                GOTO
 1570   REF   3  LAST 1196   12,3502   25330 0                     LAMBLOOP


 1574                        12,3503   32145 0  LOLIM     DLOAD   GOTO
 1575   REF   1              12,3504   11063 1                    COGLOLIM         COGLOLIM=-.999511597
 1576   REF   1              12,3505   25320 1                    MINCOGA


 1577                        12,3506   60345 0  INITV     DLOAD   NORM
 1578   REF  16  LAST 1193   12,3507   00041 1                    R1
 1579   REF  58  LAST 1194   12,3510   00047 1                    X1
 1580                        12,3511   70525 1            PDDL    SR1                                    PL AT 2
 1581   REF  10  LAST 1195   12,3512   02740 0                    P
 1582                        12,3513   77671 1            DDV                                            PL AT 0
 1583                        12,3514   75457 0            SL*     SQRT
 1584                        12,3515   20175 0                    0 -4,1
 1585                        12,3516   72405 0            DMP     SL1
 1586   REF   3  LAST 1184   12,3517   00021 1                    ROOTMU
 1587                        12,3520   41206 0            PUSH    DMP              OD=VTAN (+7)          PL AT 2
 1588   REF  15  LAST 1196   12,3521   02766 1                    COGA
 1589                        12,3522   74261 1            SL      VXSC
 1590                        12,3523   20206 1                    5
 1591   REF   7  LAST 1188   12,3524   02722 1                    UR1
 1592                        12,3525   77725 1            PDDL                     XCH WITH OD           PL AT 0,6
 1593                        12,3526   76561 1            VXSC    VSL1
 1594   REF   7  LAST 1188   12,3527   02674 0                    UN
 1595                        12,3530   53235 0            VXV     VAD                                    PL AT 0
 1596   REF   8  LAST 1197   12,3531   02722 1                    UR1
 1597                        12,3532   77772 0            VSL1
 1599   REF  14  LAST 1186   12,3533   02744 1            STORE   VVEC
 1600                        12,3534   53135 0            SLOAD   BZE
 1601   REF   5  LAST  689   12,3535   02702 0                    VTARGTAG
 1602   REF   1              12,3536   25541 0                    TARGETV
 1603                        12,3537   77650 1            GOTO
 1604   REF   7  LAST 1196   12,3540   02710 0                    RTNLAMB


 1605                        12,3541   45145 0  TARGETV   DLOAD   CALL
 1606   REF   6  LAST 1193   12,3542   02720 0                    MAGVEC2
 1607   REF   1              12,3543   24701 1                    LAMENTER
 1608   REF   4  LAST  690   12,3544   02703 1            STORE   VTARGET
 1609                        12,3545   77650 1            GOTO
 1610   REF   8  LAST 1197   12,3546   02710 0                    RTNLAMB
 1611                          12,3547   40220 0  TIMERAD  STQ     SETPD                                           PL AT 0
 1612   REF   1                12,3550   02710 0                   STNTR
 1613                          12,3551   00001 0                   0
 16135                         12,3552   77600 1           BOV
 16136                         12,3553   25554 1                   +1
 1614                          12,3554   63375 0           VLOAD   PDVL                                            PL AT 6
 1615   REF  10   LAST 1186    12,3555   02655 0                   RVEC
 1616   REF  15   LAST 1197    12,3556   02744 1                   VVEC
 1617                          12,3557   77624 1           CALL
 1618   REF   2   LAST 1186    12,3560   11064 0                   PARAM
 1619                          12,3561   71200 0           BOV     DLOAD                                           PL AT 0
 1620   REF   2   LAST 1186    12,3562   24764 1                   COGAOVFL
 1621   REF   5   LAST 1195    12,3563   11043 0                   D1/32
 1622                          12,3564   41225 1           DSU     DMP
 1623   REF  12   LAST 1195    12,3565   02742 1                   R1A
 1624   REF  11   LAST 1197    12,3566   02740 0                   P
 1625                          12,3567   41366 1           SQRT    DMP
 1626   REF  16   LAST 1197    12,3570   02766 1                   CCGA
 1627                          12,3571   74212 0           SL4     VXSC
 1628   REF   5   LAST 1188    12,3572   02712 1                   U2
 1629                          12,3573   45325 1           PDDL    DSU                                             PL AT 6
 1630   REF   4   LAST 1190    12,3574   11035 1                   D1/64
 1631   REF  13   LAST 1198    12,3575   02742 1                   R1A
 1632                          12,3576   52361 1           VXSC    VSU                                             PL AT 0
 1633   REF   9   LAST 1197    12,3577   02722 1                   UR1
 1634                          12,3600   53512 1           VSL4    UNIT
 16345                         12,3601   77600 1           BOV
 16346  REF   1                12,3602   25660 0                   CIRCULAR
 1635                          12,3603   60325 0           PDDL    NORM          0D=UNIT(ECC) (+3)                 PL AT 6
 1636   REF   3   LAST  622    12,3604   02756 1                   RDESIRED      36D=ECC (+3)
 1637   REF  59   LAST 1197    12,3605   00047 1                   X1
 1638                          12,3606   41325 0           PDDL    DMP                                       PL AT 8
 1639   REF  17   LAST 1197    12,3607   00041 1                   C1
 1640   REF  12   LAST 1198    12,3610   02740 0                   P
 1641                          12,3611   56257 1           SL*     DDV                                       PL AT 6
 1642                          12,3612   20201 0                   0,1
 1643                          12,3613   56225 1           DSU     DDV
 1644   REF   2   LAST 1191    12,3614   11041 1                   D1/16
 1645                          12,3615   00045 0                   36D           36D=ECC (+3)
 1646   REF   1                12,3616   00031 0           STORE   COSF
 1647                          12,3617   63400 0           BOV     DSQ
 1648   REF   1                12,3620   25664 1                   BADR2
 1649                          12,3621   50021 1           BDSU    BMN
 1650   REF   4   LAST 1193    12,3622   11037 0                   D1/4
 16505  REF   2   LAST 1198    12,3623   25664 1                   BADR2
 1651                          12,3624   75366 0           SQRT    SIGN
 1652   REF   2   LAST  125    12,3625   02755 1                   SGNRDOT
 16525                         12,3626   77614 1           CLEAR
 1653   REF   1                12,3627   04272 1                   APSESW
 1654                          12,3630    76561 1  TERMNVEC VXSC     VSL1
 1655    REF    8  LAST 1197   12,3631    02674 0                    UN
 1656                          12,3632    63235 0           VXV      PDVL             VXCH WITH OD                      PL AT 0,6
 1657                          12,3633    00001 0                    OD
 1658                          12,3634    53361 0           VXSC     VAD                                                PL AT 0
 1659    REF    2  LAST 1198   12,3635    00031 0                    COSF
 1660                          12,3636    41572 1           VSL1     PUSH             OD=U2                             PL AT 6

 1661                          12,3637    56241 0           DOT      DDV              LIMITS RESULT TO POSMAX OR NEGMAX
 1662    REF   10  LAST 1198   12,3640    02722 1                    UR1
 16622   REF    1              12,3641    25756 1                    DP1/4
 16624                         12,3642    40142 1           SR1      BOV              SCALE BACK DOWN TO NORMAL
 16625                         12,3643    25644 0                    +1               CLEAR OVFIND IF SET
 1663    REF   10  LAST 1194   12,3644    26732 0           STOVL    CSTH             CSTH (+1)
 1664    REF   11  LAST 1199   12,3645    02722 1                    UR1
 1665                          12,3646    76435 1           VXV      VSL1
 1666                          12,3647    72441 0           DOT      SL1
 1667    REF    9  LAST 1199   12,3650    02674 0                    UN
 1668    REF   15  LAST 1194   12,3651    16730 1           STODL    SNTH             SNTH (+1)
 1669    REF   13  LAST 1198   12,3652    02740 0                    P
 1670                          12,3653    77624 1           CALL
 1671    REF    3  LAST 1195   12,3654    24767 1                    GETX
 1672                          12,3655    77614 1           CLRGO
 16725   REF    4  LAST 1196   12,3656    02634 1                    SOLNSW
 1673    REF    1              12,3657    24747 0                    COMMNOUT


 16734                         12,3660    43001 1  CIRCULAR SETPD    SETGO
 16735                         12,3661    00001 0                    0
 16736   REF    5  LAST 1199   12,3662    02434 0                    SOLNSW
 16737   REF    3  LAST 1186   12,3663    25742 1                    ABTCONIC


 1674                          12,3664    75345 1  BADR2    DLOAD    SIGN
 16741   REF    3  LAST  323   12,3665    24005 1                    LODPHALF
 16742   REF    3  LAST 1199   12,3666    00031 0                    COSF
 16743   REF    4  LAST 1199   12,3667    14031 0           STODL    COSF
 1675    REF    3  LAST 1175   12,3670    24007 0                    KEPZERO
 16755                         12,3671    77614 1           SETGO
 1676    REF    2  LAST 1198   12,3672    04032 1                    APSESW
 1677    REF    1              12,3673    25630 0                    TERMNVEC
 1678                           12,3674   40220 0  APSIDES   STQ     SETPD                                                PL AT  0
 1679   REF   1                 12,3675   02710 0                    RTNAPSE
 1680                           12,3676   00001 0                    0D
 16805                          12,3677   77600 1            BOV
 16806                          12,3700   25701 0                    +1
 1681                           12,3701   63375 0            VLOAD   PDVL                                                 PL AT  6
 1682   REF  11   LAST 1198     12,3702   02655 0                    RVEC
 1683   REF  16   LAST 1198     12,3703   02744 1                    VVEC
 1684                           12,3704   77624 1            CALL
 1685   REF   3   LAST 1198     12,3705   11064 0                    PARAM
 1686                           12,3706   77600 1            BOV                                                          PL AT  0
 1687   REF   1                 12,3707   25710 0                    GETECC
 1688                           12,3710   42405 0  GETECC    DMP     SL4
 1689   REF  14   LAST 1198     12,3711   02742 1                    R1A
 1690                           12,3712   75421 1            BDSU    SQRT
 1691   REF   5   LAST 1198     12,3713   11035 1                    D1/64
 1692   REF   3   LAST  635     12,3714   02752 0            STORE   ECC
 1693                           12,3715   65215 1            DAD     PDDL                                                 PL AT  2
 1694   REF   1                 12,3716   11031 0                    D1/8
 1695   REF  18   LAST 1198     12,3717   00041 1                    R1
 1696                           12,3720   72405 0            DMP     SL1
 1697   REF  14   LAST 1199     12,3721   02740 0                    P
 1698                           12,3722   77671 1            DDV                                                          PL AT  0
 1699                           12,3723   60325 0            PDDL    NORM               0D=RP (+29 OR +27)                PL AT  2
 1700   REF  15   LAST 1200     12,3724   02742 1                    R1A
 1701   REF  60   LAST 1198     12,3725   00047 1                    X1
 1702                           12,3726   53725 1            PDDL    SL*                                                  PL AT  4
 1703   REF  19   LAST 1200     12,3727   00041 1                    R1
 1704                           12,3730   20174 1                    0 -5,1
 1705                           12,3731   45271 1            DDV     DSU                                                  PL AT 2,0
 1706                           12,3732   50000 1            BOV     BMN
 1707   REF   1                 12,3733   25737 0                    INFINAPO
 1708   REF   2   LAST 1200     12,3734   25737 0                    INFINAPO
 1709                           12,3735   77650 1            GOTO
 1710   REF   2   LAST 1200     12,3736   02710 0                    RTNAPSE
 1711                           12,3737   52145 0  INFINAPO  DLOAD   GOTO               RETURNS WITH APOAPSIS IN MPAC,PERIAPSIS
 1712   REF   1                 12,3740   24020 0                    LDPOSMAX
 1713   REF   3   LAST 1200     12,3741   02710 0                    RTNAPSE            THAT PL IS AT 0.
 17136                          12,3742   77776 1  ABTCONIC EXIT
 17137  REF   5  LAST  826      12,3743  0 5652 0            TC       POODOO
 17138                          12,3744   00607 0            OCT      00607
 1725   REF   3  LAST  702   12,2017              LDPOSMAX EQUALS LODPMAX         DPPOSMAX IN LOW MEMORY.

R1727   ERASABLE ASSIGNMENTS


R1728   KEPLER SUBROUTINE

R1729      INPUT -
R1730   RRECT      ERASE  +5
R1731   VRECT      ERASE  +5
R1732   TAU.       ERASE  +1
R1733   XKEP       ERASE  +1
R1734   TC         ERASE  +1
R1735   XPREV      ERASE  +1
 1736                                 0016             1/MU      EQUALS 14D
 1737                                 0020             ROOTMU    EQUALS 16D
 1738                                 0022             1/ROOTMU  EQUALS 18D
R1739      OUTPUT -
R1740   RCV        ERASE  +5
R1741   VCV        ERASE  +5
R1742   RC         ERASE  +1
R1743   XPREV      ERASE  +1

R1744   DEBRIS -
 1745                                 0010             ALPHA     EQUALS 8D
 1746                                 0012             XMAX      EQUALS 10D
 1747                                 0014             XMIN      EQUALS 12D
 1748                                 0024             X         EQUALS 20D
 1749                                 0030             XI        EQUALS 24D
 1750                                 0032             S(XI)     EQUALS 26D
 1751                                 0034             XSQC(XI)  EQUALS 28D
 1752                                 0036             T         EQUALS 30D
 1753                                 0040             R1        EQUALS 32D
 1754                                 0042             KEPC1     EQUALS 34D
 1755                                 0044             KEPC2     EQUALS 36D
R1756   DELX       ERASE  +1
R1757   DELT       ERASE  +1
R1758   URRECT     ERASE  +5
R1759   RCNORM     ERASE  +1
R1760   XPREV      EQUALS XKEP


R1761   LAMBERT SUBROUTINE

R1762      INPUT-
R1763   R1VEC      ERASE  +5
R1764   R2VEC      ERASE  +5
R1765   TDESIRED   ERASE  +1
R1766   GEOMSGN    ERASE  +0
R1767   GUESSW                                   0 IF COGA GUESS AVAILABLE, 1 IF NOT
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R1768   COGA     ERASE   +1                     INPUT ONLY IF GUESSW IS ZERO.
R1769   NORMSW                                  0 IF UN TO BE COMPUTED, 1 IF UN INPUT
R1770   UN       ERASE   +5                     ONLY USED IF NORMSW IS 1
R1771   VTARGTAG ERASE   +0
R1772   TWEEKIT  EQUALS 40D                     ONLY USED IF GUESSW IS 0

R1773      OUTPUT -
R1774   VTARGET  ERASE   +5                     AVAILABLE ONLY IF VTARGTAG IS ZERO.
R1775   V1VEC    EQUALS MPAC

R1776      DEBRIS -
R1777   RTNLAMB  ERASE   +0
R1778   U2       ERASE   +5
R1779   MAGVEC2  ERASE   +1
R1780   UR1      ERASE   +5
R1781   R1       EQUALS 31D
R1782   UN       ERASE   +5
R1783   SNTH     ERASE   +1
R1784   CSTH     ERASE   +1
R1785   1-CSTH   ERASE   +1
R1786   CSTH-RHO ERASE   +1
 1787                            0016           COGAMAX  EQUALS 14D            CLOBBERS 1/MU
 1788                            0010           COGAMIN  EQUALS 8D
 1789                            0014           DCOGA    EQUALS 12D
R1790   TWEEKIT  EQUALS 40D
R1791   P        ERASE   +1
R1792   COGA     ERASE   +1
R1793   R1A      ERASE   +1
R1794   X        EQUALS 20D
R1795   XSQ      EQUALS 22D
R1796   XI       EQUALS 24D
R1797   S(XI)    EQUALS 26D
R1798   XSQC(XI) EQUALS 28D
R1799   T        EQUALS 30D
R1800   KEPC1    EQUALS 34D
R1801   KEPC2    EQUALS 36D
R1802   SLOPESW
R1803   SOLNSW
R1804   OTHERS -

R1805   RVEC     EQUALS R1VEC
R1806   VVEC     ERASE   +5
R1807   COGAFLAG
R1808   RVSW
R1809   INFINFLG
R1810   APSESW
R1811   360SW
R1812   RTNTT    EQUALS RTNLAMB
R1813   ECC      ERASE   +1
R1814   RTNTR    EQUALS RTNLAMB
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R1815    RTNAPSE   EQUALS  RTNLAMB
R1816    R2        EQUALS  MAGVEC2
 1817                                0030               COSF       EQUALS 24D
R1818    RTNPRM    ERASE   +0
R1819    SGNRDOT   ERASE   +0
R1820    RDESIRED  ERASE   +1


R1821    ITERATOR SUBROUTINE

R1822    ORDERSW
 1823                                0016               MAX        EQUALS 14D          CLOBBERS 1/MU
 1824                                0010               MIN        EQUALS 8D
R1825    INDEP     ERASE   +1
 1826                                0014               DELINDEP   EQUALS 12D
 1827                                0026               ITERCTR    EQUALS 22D
 1828                                0036               DEP        EQUALS 30D
R1829    DELDEP    ERASE   +1
R1830    DEPREV    ERASE   +1
 1831                                0050               TWEEKIT    EQUALS 40D


R1832    MORE KEPLER

R1833    EPSILONT  ERASE   +1


R1834    MORE LAMBERT

R1835    TERRLAMB  EQUALS  DELDEP
R1836    TPREV     EQUALS  DEPREV


R1837    EPSILONL  EQUALS  EPSILONT +2     DOUBLE PRECISION WORD
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R0006    1.0 INTRODUCTION
R0007    ----------------
R0008
R0009    FROM A USERS POINT OF VIEW, ORBITAL INTEGRATION IS ESSENTIALLY THE SAME AS THE 278 INTEGRATION
R0011    PROGRAM. THE SAME ENTRANCES TO THE PROGRAM WILL BE MAINTAINED, THE SAME STALLING ROUTINE WILL BE USED AND
R0013    OUTPUT WILL STILL BE VIA THE PUSHLIST. THE PRIMARY DIFFERENCES TO A USER INVOLVE THE ADDED CAPABILITY OF
R0015    TERMINATING INTEGRATION AT A SPECIFIC FINAL RADIUS AND THE DIFFERENCE IN STATE VECTOR SCALING INSIDE AND OUT-
R0017    SIDE THE LUNAR SPHERE OF INFLUENCE.
R0018
R0019    IN ORDER TO MAKE THE CSM(LEM)PREC AND CSM(LEM)CONIC ENTRANCES SIMILAR TO FLIGHT 278, THE INTEGRATION PROGRAM
R0021    WILL ITSELF SET THE FINAL RADIUS ( FINAL) TO 0 SO THAT REACHING THE DESIRED TIME ONLY WILL TERMINATE
R0023    INTEGRATION. THE DP REGISTER RFINAL MUST BE SET BY USERS OF INTEGRVS AND INTEGRV, AND MUST BE DONE AFTER THE
R0025    CALL TO INTSTALL.
R0026
R0027    WHEN THE LM IS ON THE LUNAR SURFACE (INDICATED BY LUNAR SURFACE FLAG SET) CALLS TO LEMCONIC, LEMPREC, AND
R0029    INTEGRV WITH VINFLAG = 0 WILL RESULT IN THE USE OF THE PLANETARY INERTIAL ORIENTATION SUBROUTINES TO PROVIDE
R0031    BOTH THE LMS POSITION AND VELOCITY IN THE REFERENCE COORDINATE  SYSTEM.
R0032    THE PROGRAM WILL PROVIDE OUTPUT AS IF INTEGRATION WAS USED. THAT IS, THE PUSHLIST WILL BE SET AS NOTED BELOW AND
R0034    THE PERMANENT STATE VECTOR UPDATED WHEN SPECIFIED BY AN INTEGRV CALL.
R0035
R0036    USERS OF INTEGRVS DESIRING INTEGRATION (INTYPFLG = 0) SHOULD NOTE THAT THE OBLATENESS PERTURBATION COMPUTATION
R0038    IN LUNAR ORBIT IS TIME DEPENDENT. THEREFORE, THE USER SHOULD SUPPLY AN INITIAL STATE VECTOR VALID AT SOME REAL
R0040    TIME AND THE DESIRED TIME (TDEC1) ALSO AT SOME REAL TIME. FOR CONIC ,,INTEGRATION,, THE USER MAY STILL USE ZERO
R0042    AS THE INITIAL TIME AND DELTA TIME AS THE DESIRED TIME.
R0043
R0044    2.0 GENERAL DESCRIPTION
R0045    ----------------------
R0046
R0047    THE INTEGRATION PROGRAM OPERATES AS A CLOSED INTERPRETIVE SUBROUTINE AND PERFORMS THESE FUNCTIONS---
R0049       1) INTEGRATES (PRECISION OR CONIC) EITHER CSM OR LM STATE VECTOR
R0050       2) INTEGRATES THE W-MATRIX
R0051       3) PERMANENT OR TEMPORARY UPDATE OF THE STATE VECTOR
R0052
R0053    THERE ARE SIX ENTRANCES TO THE INTEGRATION PROGRAM. FOUR OF THESE (CSMPREC, LEMPREC, CSMCONIC, LEMCONIC) SET
R0055    ALL THE FLAGS REQUIRED IN THE INTEGRATION PROGRAM ITSELF TO CAUSE THE PRECISION OR CONIC INTEGRATION (KEPLER) OF
R0057    THE LM OR CSM STATE VECTOR, AS THE NAMES SUGGEST. ONE ENTRANCE (INTEGRVS) PERMITS THE CALLING PROGRAM TO
R0059    PROVIDE A STATE VECTOR TO BE INTEGRATED. THE CALLING PROGRAM MUST SET THE FLAGS INDICATING (1) PRECISION OR
R0061    CONIC INTEGRATION, (2) IN OR OUT OF LUNAR SPHERE, (3) MIDCOURSE OR NOT, AND THE INTEGRATION PROGRAM COMPLETES
R0063    THE FLAG SETTING TO BYPASS W-MATRIX INTEGRATION. THE LAST ENTRANCE (INTEGRV, USED IN GENERAL BY THE
R0065    NAVIGATION PROGRAMS) PERMITS THE CALLER TO SET FIVE FLAGS (NOT MOONFLAG OR MIDFLAG) BUT NOT TO INPUT A STATE
R0067    VECTOR. ANY PROGRAM WHICH CALLS INTEGRVS OR INTEGRV MUST CALL INTSTALL BEFORE IT SETS THE INTEGRATION FLAGS
R0069    AND/OR STATE VECTOR.
R0070
R0071    THREE SETS OF 42 REGISTERS AND 2 FLAGS ARE USED FOR THE STATE VECTORS. TWO SETS, WHICH MAY NOT BE OVERLAYED, ARE
R0073    USED FOR THE PERMANENT STATE VECTORS FOR THE CSM AND LM. THE THIRD SET, WHICH MAY BE OVERLAYED WHEN INTEGRATION
R0075    IS NOT BEING DONE, IS USED IN THE COMPUTATIONS.
R0076
R0077    THE PERMANENT STATE VECTORS WILL BE PERIODICALLY UPDATED SO THAT THE VECTORS WILL NOT BE OLDER THAN 4 TIMESTEPS.
R0079    THE PERMANENT STATE VECTORS WILL ALSO BE UPDATED WHENEVER THE W-MATRIX IS INTEGRATED OR WHEN A CALLER OF INTEGRV
R0081    SETS STATEFLG (THE NAVIGATION PROGRAMS P20, P22.)
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R0082   APPENDIX B OF THE USERS GUIDE LISTS THE STATE VECTOR QUANTITIES.
R0083
R0084   2.1 RESTARTS
R0085
R0086   PHASE CHANGES WILL BE MADE IN THE INTEGRATION PROGRAM ONLY FOR THE INTEGRV ENTRANCE (I.E., WHEN THE W-MATRIX IS
R0088   INTEGRATED OR PERMANENT STATE VECTOR IS UPDATED.) THE GROUP NUMBER USED WILL BE THAT FOR THE P20-25 PROGRAMS
R0090   (I.E., GROUP2) SINCE THE INTEGRV ENTRANCE WILL ONLY BE USED BY THESE PROGRAMS. IF A RESTART OCCURS DURING AN
R0092   INTEGRATION OF THE STATE VECTOR ONLY, THE RECOVERY WILL BE TO THE LAST PHASE IN THE CALLING PROGRAM. CALLING
R0094   PROGRAMS WHICH USE THE INTEGRV OR INTEGRVS ENTRANCE OF INTEGRATION SHOULD ENSURE THAT IF PHASE CHANGING IS DONE
R0096   THAT IT IS PRIOR TO SETTING THE INTEGRATION INPUTS IN THE PUSHLIST.
R0097   THIS IS BECAUSE THE PUSHLIST IS LOST DURING A RESTART.
R0098
R0099   2.2 SCALING
R0100
R0101   THE INTEGRATION ROUTINE WILL MAINTAIN THE PERMANENT MEMORY STATE VECTORS IN THE SCALING AND UNITS DEFINED IN
R0103   APPENDIX B OF THE USERS GUIDE. THE SCALING OF THE OUTPUT POSITION VECTOR DEPENDS ON THE ORIGIN OF THE COORDINATE
R0105    SYSTEM AT THE DESIRED INTEGRATION TIME. THE COORDINATE SYSTEM TRANSFORMATION WILL BE DONE AUTOMATICALLY ON
R0107   MULTIPLE TIMESTEP ENCKE INTEGRATION ONLY. THUS IT IS POSSIBLE TO HAVE OUTPUT FROM SUCCESSIVE INTEGRATIONS IN
R0109   DIFFERENT SCALING.
R0110   HOWEVER, RATT, VATT WILL ALWAYS BE SCALED THE SAME.
R0111
R0112   3.0 INPUT/OUTPUT
R0113   ----------------
R0114
R0115   PROGRAM INPUTS ARE THE FLAGS DESCRIBED IN APPENDIX A AND THE PERMANENT STATE VECTOR QUANTITIES DESCRIBED IN AP-
R0117   PENDIX B OF THE USERS GUIDE, PLUS THE DESIRED TIME TO INTEGRATE TO IN TDEC1 (A PUSH LIST LOCATION).
R0119   FOR INTEGRVS, THE RCV,VCV, TET OF THE TEMPORARY STATE VECTOR MUST BE SET, PLUS MOONFLAG AND MIDFLAG
R0121
R0122   FOR SIMULATION THE FOLLOWING QUANTITIES MUST BE PRESET ---
R0123
R0124                                                                        EARTH  MOON
R0125                                                                         29     27
R0126      RRECTCSM(LEM)  - RECTIFIED POSITION VECTOR       METERS  2      2
R0127
R0128                                                                         7      5
R0129      VRECTCSM(LEM)  - RECTIFIED VELOCITY VECTOR       M/CSEC  2    2
R0130
R0131                                                                         28     28
R0132      TETCSM(LEM)    - TIME STATE VECTOR IS VALID      CSEC    2      2
R0133                       CUSTOMARILY 0, BUT NOTE LUNAR
R0134                       ORBIT DEPENDENCE ON REAL TIME.
R0135
R0136                                                                         22     18
R0137      DELTAVCSM(LEM) - POSITION DEVIATION              METERS  2      2
R0138                       0 IF TCCSM(LEM) = 0
R0139
R0140                                                                         3      -1
R0141      NUVCSM(LEM)    - VELOCITY DEVIATION              M/CSEC  2      2
R0142                       0 IF TCCSM(LEM) = 0
R0143
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                                                                 29       27
      RCVCSM(LEM)     - CONIC POSITION                   METERS   2        2
                        EQUALS RRECTCSM(LEM) IF
                        TCCSM(LEM) = 0

                                                                  7        5
      VCVCSM(LEM)     - CONIC VELOCITY                   M/CSEC   2        2
                        EQUALS VRECTCSM(LEM) IF
                        TCCSM(LEM) = 0

                                                                 28       28
      TCCSM(LEM)      - TIME SINCE RECTIFICATION         CSECS    2        2
                        CUSTOMARILY 0

                                                          1/2    17       16
      XKEPCSM(LEM)    - ROOT OF KEPLERS EQUATION         M        2        2
                        0 IF TCCSM(LEM) = 0

      CMOONFLG        - PERMANENT FLAGS CORRESPONDING             0        0
      CMIDFLAG          TO MOONFLAG AND MIDFLAG                   0,1      0,1
      LMOONFLG          C = CSM, L = LM                           0        0
      LMIDFLG                                                     0,1      0,1

      SURFFLAG        - LUNAR SURFACE FLAG                        0,1      0,1

   IN ADDITION, IF (L)CMIDFLAG IS SET, THE INITIAL INPUT VALUES FOR LUNAR
   SOLAR EPHEMERIDES SUBROUTINE AND PLANETARY INERTIAL ORIENTATION SUB-
   ROUTINE MUST BE PRESET.

   OUTPUT
   AFTER EVERY CALL TO INTEGRATION
                                                                  EARTH    MOON
                                                                 29       29
       0D    RATT    POSITION                            METERS   2        2
                                                                  7        7
       6D    VATT    VELOCITY                            M/CSEC   2        2
                                                                 28       28
      12D    TAT     TIME                                         2        2
                                                                 29       27
      14D    RATT1   POSITION                            METERS   2        2
                                                                  7        5
      20D    VATT1   VELOCITY                            M/CSEC   2        2
                                                          3   2  36       30
      26D    MU(P)   MU                                  M /CS    2        2

      X1             MUTABLE ENTRY                                -2       -10D

      X2             COORDINT
      X2             COORDINATE SYSTEM ORIGEN                     0        2
                     (THIS, NOT MOONFLAG, SHOULD BE
R0194                 USED TO DETERMINE ORIGIN.)
R0195
R0196   IN ADDITION TO THE ABOVE, THE PERMANENT STATE VECTOR IS UPDATED WHENEVER
R0197   STATEFLG WAS SET AND WHENEVER A W-MATRIX IS TO BE INTEGRATED. THE PUSH
R0198   COUNTER IS SET TO 0 AND OVERFLOW IS CLEARED BEFORE RETURNING TO THE
R0199   CALLING PROGRAM.
R0200
R0201   4.0 CALLING SEQUENCES AND SAMPLE CODE
R0202   -------------------------------------
R0203
R0204      A) PRECISION ORBITAL INTEGRATION. CSMPREC,LEMPREC ENTRANCES
R0205           L-X     STORE TIME TO 95T5791T5 T  95 PUS  L9ST (T4531)
R0206           L       CALL
R0207           L+1               CSMPREC (OR LEMPREC)
R0208           L+2     RETURN
R0209         INPUT                                                          28
R0210           TDEC1 (PD 32D) TIME TO INTEGRATE TO...CENTISECONDS SCALED 2
R0211         OUTPUT
R0212           THE DATA LISTED IN SECTION 3.0 PLUS
R0213           RQVV    POSITION VECTOR OF VEHICLE WITH RESPECT TO SECONDARY
R0214           BODY... METERS B-29 ONLY IF MIDFLAG = DIMOFLAG = 1
R0215      B) CONIC INTEGRATION. CSMCONIC, LEMCONIC ENTRANCES
R0216           L-X     STORE TIME IN PUSH LIST (TDEC1)
R0217           L       CALL
R0218           L+1               CSMCONIC (OR LEMCONIC)
R0219         INPUT/OUTPUT
R0220           SAME AS PRECISION INTEGRATION, EXCEPT RQVV NOT SET
R0221      C) INTEGRATE GIVEN STATE VECTOR. INTEGRVS ENTRANCE
R0222                   CALL
R0223                             INTSTALL
R0224                   VLOAD
R0225                             POSITION VECTOR
R0226                   STOVL     RCV
R0227                             VELOCITY VECTOR
R0228                   STODL     VCV
R0229                             TIME STATE VECTOR VALID
R0230                   STODL     TET
R0231                             FINAL RADIUS
R0232                   STORE     RFINAL
R0233                   SET(CLEAR)   SET(CLEAR)
R0234                                INTYPFLAG
R0235                                MOONFLAG
R0236                   SET(CLEAR)   DLOAD
R0237                                DESIRED TIME
R0238                   STCALL       TDEC1
R0239                                INTEGRVS
R0240         INPUT
R0241           RCV     POSITION VECTOR                      METERS
R0242           VCV     VELOCITY VECTOR                      M/CSEC
R0243           TET     TIME OF STATE VECTOR(MAY = ( )       CSEC B-28
R0244             TDEC1  TIME TO INTEGRATE TO              CSEC B-28 (PD 32D)
R0245                    (MAY BE INCREMENT IF TET=0)
R0246         OUTPUT
R0247             SAME AS FOR PRECISION OR CONIC INTEGRATION,
R0248             DEPENDING ON INTYPFLG.
R0249       D) INTEGRATE STATE VECTOR.INTGRV ENTRANCE
R0250             L-X    STORE TIME IN PUSH LIST (TDEC1)(MAY BE DONE AFTER CALL TO INTSTALL)
R0252             L-8    CALL
R0253             L-7
R0254             L-6    SET(CLEAR) SET(CLEAR)
R0255             L-5               VINTFLAG   1=CSM, 0=LM
R0256             L-4               INTYPFLAG  1=CONIC, 0=PRECISION
R0257             L-3    SET(CLEAR) SET(CLEAR)
R0258             L-2               DIMOFLAG   1=W-MATRIX, 0=NO W-MATRIX
R0259             L-1               D6OR9FLG   1=9X9, 0=6X6
R0260             L      SET        DLOAD
R0261             L+1               STATEFLG   DESIRE PERMANENT UPDATE
R0262             L+2               FINAL RAD. OF STATE VECTOR
R0263             L+3    STCALL     RFINAL
R0264             L+4               INTEGRV
R0265             L      CALL                  NORMAL USE-- WILL UPDATE STATE
R0266             L+1               INTEGRV    VECTOR IF DIMOFLAG=1.(STATEFLG IS
R0267             L+2    RETURN                ALWAYS RESET IN INTEGRATION AFTER
R0268                                          IT IS USED.)
R0269         INPUT
R0270             TDEC1 (PD 32D) TIME TO INTEGRATE TO    CSEC B-28
R0271         OUTPUT
R0272             SAME AS FOR PRECISION OR CONIC INTEGRATION
R0273         THE PROGRAM WILL SET MOONFLAG, MIDFLAG DEPENDING ON
R0274         THE PERMANENT STATE VECTOR REPRESENTATION.

 02741                       11,2376                        BANK    11
 02742  REF   3  LAST  236   13,2000                        SETLOC  INTINIT
 02743                       13,2604                        BANK
 02744  REF   7  LAST  983   E3,1554                        EBANK=  RRECTCSM
 02745  REF   3 LAST  236 TO  239:     34    36*            COUNT*  $$/INTIN
 0275   REF 105  LAST 1153   13,2604  0 5353 1  STATEINT TC      PHASCHNG
 0276                        13,2605   00052 0           OCT     00052
 0277   REF  10  LAST  781   13,2606  3 5017 1           CAF     PRIO5
 0278   REF  41  LAST  966   13,2607  0 5105 0           TC      FINDVAC
 0279   REF   8  LAST 1209   E3,1554                     EBANK=  RRECTCSM
 0280   REF   2  LAST  240   13,2610   02613 1           2CADR   STATINT1
 0280                        13,2611   26063 0
 0281   REF  72  LAST 1132   13,2612  0 5261 1           TC      TASKOVER
 0282   REF 229  LAST 1190   13,2613  0 6037 0  STATINT1 TC      INTPRET
 0283                        13,2614   47014 1           BON     RTB
 02831  REF   2  LAST  298   13,2615   04712 1                   QUITFLAG        KILL INTEGRATION UNTIL NEXT P00.
 02832  REF   1              13,2616   26653 0                   NOINT
 0284   REF  31  LAST  979   13,2617   21573 0                   LOADTIME
 0286   REF  55  LAST  976   13,2620   00041 1           STORE   TDEC1
 0323                              13,2621   77624 1               CALL
 0324   REF  28  LAST 1153         13,2622   27414 0                        INTSTALL
 0325                              13,2623   45014 0               SET      CALL
 03251  REF   4  LAST  236         13,2624   01076 1                        NODOFLAG
 0326   REF   7  LAST  583         13,2625   26644 0                        SETIFLGS
 0327                              13,2626   77650 1               GOTO
 0328   REF   1                    13,2627   26026 1                        STATEUP
 0356                              13,2630   00003 1  600SECS      2DEC     60000
 0356                              13,2631   25140 0
 0404                              13,2632   77414 0  ENDINT       CLEAR    EXIT
 0405   REF   4  LAST  583         13,2633   01672 0                        STATEFLG
 0408   REF 106  LAST 1209         13,2634 0 5353 1                TC       PHASCHNG
 0409                              13,2635   20032 1               OCT      20032
 0411                              13,2636 0 0006 1                EXTEND
 0412   REF   2  LAST  239         13,2637 3 2631 1                DCA      600SECS
 0413   REF   4  LAST  734         13,2640 0 5277 0                TC       LONGCALL
 0414   REF   4  LAST  297         E3,1626                         EBANK=   RRECTHIS
 0415   REF   3  LAST  239         13,2641   02604 1               2CADR    STATEINT
 0415                              13,2642   26063 0
 0416   REF 144  LAST  975         13,2643 0 5155 0                TC       ENDOFJOB
 0426                              13,2644   43014 0  SETIFLGS SET          CLEAR
 0427   REF   5  LAST 1210         13,2645   01472 1                        STATEFLG
 0428   REF  15  LAST  787         13,2646   01673 1                        INTYPFLG
 0429                              13,2647   43014 0               CLEAR    CLEAR
 0430   REF  14  LAST  656         13,2650   01676 1                        DIMOFLAG
 04301  REF   8  LAST  583         13,2651   01675 1                        D6OR9FLG
 04302                             13,2652   77616 0               RVQ
 04303                             13,2653   77776 1  NOINT        EXIT
 04304  REF 107  LAST 1210         13,2654 0 5353 1                TC       PHASCHNG
 04305                             13,2655   00002 0               OCT      00002

 04306  REF  90  LAST  980         13,2656 0 5516 0                TC       DOWNFLAG
 04307  REF   3  LAST 1209         13,2657   00221 0               ADRES    QUITFLAG
 04308  REF 145  LAST 1210         13,2660 0 5155 0                TC       ENDOFJOB

R0431   ATOPCSM TRANSFERS RRECT TO RRECT +41 TO RRECTCSM TO RRECTCSM +41

R0432   CALLING SEQUENCE
R0433      L    CALL
R0434      L+1          ATOPCSM

R0435   NORMAL EXIT AT L+2

 0436                              13,2661   47020 0  ATOPCSM      STO      RTB
 0437   REF  27  LAST 1189         13,2662   00051 0                        S2
 0438   REF   2  LAST 1157         13,2663   26674 0                        MOVEACSM
 0439                              13,2664   45014 0               SET      CALL
 0440   REF   7  LAST  711         13,2665   04063 0                        CMOONFLG
 0441   REF   3  LAST 1157         13,2666   26114 1                        SVDWN1
 0442                              13,2667   43014 0               BON      CLRGO
 0443   REF  14  LAST  787   13,2670   00303 1                      MOONFLAG
 0444   REF  28  LAST 1210   13,2671   00051 0                      S2
 0445   REF   3  LAST 1210   13,2672   04223 0                      CMOONFLG
 0446   REF  29  LAST 1211   13,2673   00051 0                      S2
 0447   REF   1              13,2674  0 3036 1  MOVEACSM TC         SETBANK
 0448   REF   2  LAST  110   13,2675  55'500 1           TS         DIFEQCNT          INITIALIZE INDEX
 0449   REF   3  LAST 1211   13,2676  51'500 0           INDEX      DIFEQCNT
 0450   REF   6  LAST 1174   13,2677  3 1502 1           CA         RRECT
 0451   REF   4  LAST 1211   13,2700  51'500 0           INDEX      DIFEQCNT
 0452   REF   9  LAST 1209   13,2701  55'554 0           TS         RRECTCSM
 0453   REF   5  LAST 1211   13,2702  11'500 1           CCS        DIFEQCNT          IS TRANSFER COMPLETE
 0454   REF   3  LAST 1210   13,2703  1 2675 0           TCF        MOVEACSM +1       NO-LOOP
 0455   REF  56  LAST 1183   13,2704  0 6061 0           TC         DANZIG            COMPLETE- RETURN

R0456   PTOACSM TRANSFERS RRECTCSM TO RRECTCSM +41 TO RRECT TO RRECT +41

R0457   CALLING SEQUENCE
R0458      L    CALL
R0459                 PTOACSM

R0460   NORMAL EXIT AT L+2
 0461                        13,2705   43034 1  PTOACSM  RTB        BON
 0462   REF   2  LAST 1157   13,2706   26723 0                      MOVEPCSM
 0463   REF   9  LAST 1211   13,2707   04303 0                      CMOONFLG
 0464   REF   1              13,2710   26716 0                      SETMOON
 0465                        13,2711   66214 0  CLRMOON  CLEAR      SSP
 0466   REF  15  LAST 1211   13,2712   00263 0                      MOONFLAG
 0467   REF   4  LAST 1156   13,2713   02031 1                      PBODY
 0468                        13,2714   00000 1                      0
 0469                        13,2715   77616 0           RVQ
 0470                        13,2716   66214 0  SETMOON  SET        SSP
 0471   REF  16  LAST 1211   13,2717   00063 1                      MOONFLAG
 0472   REF   5  LAST 1211   13,2720   02031 1                      PBODY
 0473                        13,2721   00002 0                      2
 0474                        13,2722   77616 0           RVQ
 0475   REF   2  LAST 1211   13,2723  0 3036 1  MOVEPCSM TC         SETBANK
 0476   REF   6  LAST 1211   13,2724  55'500 1           TS         DIFEQCNT
 0477   REF   7  LAST 1211   13,2725  51'500 0           INDEX      DIFEQCNT
 0478   REF  10  LAST 1211   13,2726  3 1554 1           CA         RRECTCSM
 0479   REF   8  LAST 1211   13,2727  51'500 0           INDEX      DIFEQCNT
 0480   REF   7  LAST 1211   13,2730  55'502 0           TS         RRECT
 0481   REF   9  LAST 1211   13,2731  11'500 1           CCS        DIFEQCNT
 0482   REF   3  LAST 1211   13,2732  1 2724 0           TCF        MOVEPCSM +1
 0483   REF  57  LAST 1211   13,2733  0 6061 0           TC         DANZIG

R0484   ATOPLEM  TRANSFERS RRECT TO RRECT +41 TO RRECTLEM TO RRECTLEM +41

 0485                        13,2734   47020 0  ATOPLEM  STQ        RTB
 0486   REF  30  LAST 1211   13,2735   00051 0                     S2
 0487   REF   3  LAST 1156   13,2736   26747 1                     MOVEALEM
 0488                        13,2737   45014 0           SET       CALL
 0489   REF   3  LAST  576   13,2740   04064 1                     LMOONFLG
 0490   REF   2  LAST 1156   13,2741   26070 1                     SVDWN2
 0491                        13,2742   43014 0           BON       CLRGO
 0492   REF  17  LAST 1211   13,2743   00303 1                     MOONFLAG
 0493   REF  31  LAST 1212   13,2744   00051 0                     S2
 0494   REF   4  LAST 1212   13,2745   04224 1                     LMOONFLG
 0495   REF  32  LAST 1212   13,2746   00051 0                     S2
 0496   REF   3  LAST 1211   13,2747  0 3036 1  MOVEALEM TC        SETBANK
 0497   REF  10  LAST 1211   13,2750  55'500 1           TS        DIFEQCNT
 0498   REF  11  LAST 1212   13,2751  51'500 0           INDEX     DIFEQCNT
 0499   REF   8  LAST 1211   13,2752  3 1502 1           CA        RRECT
 0500   REF  12  LAST 1212   13,2753  51'500 0           INDEX     DIFEQCNT
 0501   REF   2  LAST  111   13,2754  55'626 0           TS        RRECTLEM
 0502   REF  13  LAST 1212   13,2755  11'500 1           CCS       DIFEQCNT
 0503   REF   4  LAST 1212   13,2756  1 2750 0           TCF       MOVEALEM +1
 0504   REF  58  LAST 1211   13,2757  0 6061 0           TC        DANZIG


R0505   PTOALEM  TRANSFERS RRECTLEM TO RRECTLEM +41 TO RRECT TO RRECT +41

 0506                        13,2760   47014 1  PTOALEM  BON       RTB
 0507   REF  16  LAST  843   13,2761   04307 1                     SURFFLAG
 0508   REF   1              13,2762   27001 0                     USEPIOS
 0509   REF   2  LAST 1156   13,2763   26770 0                     MOVEPLEM
 0510                        13,2764   42014 0           BON       GOTO
 0511   REF   5  LAST 1212   13,2765   04304 1                     LMOONFLG
 0512   REF   2  LAST 1211   13,2766   26716 0                     SETMOON
 0513   REF   1              13,2767   26711 1                     CLRMOON
 0514   REF   4  LAST 1212   13,2770  0 3036 1  MOVEPLEM TC        SETBANK
 0515   REF  14  LAST 1212   13,2771  55'500 1           TS        DIFEQCNT
 0516   REF  15  LAST 1212   13,2772  51'500 0           INDEX     DIFEQCNT
 0517   REF   3  LAST 1212   13,2773  3 1626 1           CA        RRECTLEM
 0518   REF  16  LAST 1212   13,2774  51'500 0           INDEX     DIFEQCNT
 0519   REF   9  LAST 1212   13,2775  55'502 0           TS        RRECT
 0520   REF  17  LAST 1212   13,2776  11'500 1           CCS       DIFEQCNT
 0521   REF   3  LAST 1212   13,2777  1 2771 0           TCF       MOVEPLEM +1
 0522   REF  59  LAST 1212   13,3000  0 6061 0           TC        DANZIG


 0523                        13,3001   77201 1  USEPIOS  SETPD     VLOAD
 0524                        13,3002   00001 0                     0
 0525   REF  15  LAST 1139   13,3003   02023 1                     RLS
 0526                        13,3004   41525 0           PDDL      PUSH
 0527   REF  56  LAST 1209   13,3005   00041 1                     TDEC1
 0528   REF  13  LAST  787   13,3006   15517 0           STODL     TET
 0529   REF   1              13,3007   27712 0                     5/8
 0530                        13,3010   77624 1           CALL
 0531   REF    7  LAST 1135   13,3011   55716 1                     RP-TO-R
 0532   REF   16  LAST 1178   13,3012   25535 0           STOVL     RCV
 0533   REF    2  LAST   37   13,3013   24001 0                     ZUNIT
 0534                         13,3014   14001 0           STODL     0D
 0535   REF   14  LAST 1212   13,3015   01517 0                     TET
 0536                         13,3016   14007 0           STODL     6D
 0537   REF    2  LAST 1212   13,3017   27712 0                     5/8
 0538                         13,3020   45014 0           SET       CALL                NEEDED FOR SETTING X1 ON EXIT
 05381  REF   18  LAST 1212   13,3021   00063 1                     MCONFLAG
 0539   REF    8  LAST 1213   13,3022   55716 1                     RP-TO-R
 0540                         13,3023   74235 0           VXV       VXSC
 0541   REF   17  LAST 1213   13,3024   01535 0                     RCV
 0542   REF    1              13,3025   26001 1                     OMEGMOON
 0543   REF   14  LAST 1179   13,3026   25543 1           STCVL     VCV
 0544   REF    9  LAST 1135   13,3027   24007 0                     ZEROVEC
 0545   REF    6  LAST 1135   13,3030   01521 0           STORE     TDELTAV
 0546                         13,3031   67174 1           AXT,2     SXA,2
 0547                         13,3032   00002 0                     2
 0548   REF    6  LAST 1211   13,3033   02030 0                     PBODY
 0549   REF    6  LAST 1156   13,3034   35527 1           STCALL    TNUV
 0550   REF    1              13,3035   27157 1                     A-PCHK
 0552   REF    1              13,3036  3 3042 1  SETBANK  CAF       INTBANK
 0553   REF   39  LAST 112    13,3037  54 006 0           TS        BBANK
 0554   REF    1              13,3040  3 3452 1           CAF       FORTYONE
 0555   REF  323  LAST 1131   13,3041  0 0002 0           TC        Q
 0556   REF   11  LAST 1211   E3,1554                     EBANK=    RRECTCSM
 0557   REF   10  LAST  655   13,3042   26063 0  INTBANK  BBCON     INTEGRV


R0558    SPECIAL PURPOSE ENTRIES TO ORBITAL INTEGRATION. THESE ROUTINES PROVIDE ENTRANCES TO INTEGRATION WITH
R0560    APPROPRIATE SWITCHES SET OR CLEARED FOR THE DESIRED INTEGRATION.

R0561    CSMPREC AND LEMPREC PERFORM ORBIT INTEGRATION BY THE ENCKE METHOD TO THE TIME INDICATED IN TDEC1
R0563    ACCELERATIONS DUE TO OBLATENESS ARE INCLUDED. NO W-MATRIX INT. IS DONE.
R0564    THE PERMANENT STATE VECTOR IS NOT UPDATED.
R0565    CSMCONIC AND LEMCONIC PERFORM ORBIT INTEG. BY KEPLERS METHOD TO THE TIME INDICATED IN TDEC1
R0567    NO DISTURBING ACCELERATIONS ARE INCLUDED. IN THE PROGRAM FLOW THE GIVEN
R0568    STATE VECTOR IS RECTIFIED BEFORE SOLUTION OF KEPLERS EQUATION

R0569    THE ROUTINES ASSUME THAT THE CSM (LEM) STATE VECTOR IN P-MEM IS VALID.
R0570    SWITCHES SET PRIOR TO ENTRY TO THE MAIN INTEG. PROG ARE AS FOLLOWS
R0571                   CSMPREC  CSMCONIC   LEMPREC  LEMCONIC
R0572    VINTFLAG        SET         SET        CLEAR     CLEAR
R0573    INTYPFLG        CLEAR       SET        CLEAR     SET
R0574    DIMOFLAG        CLEAR       CLEAR      CLEAR     CLEAR


R0575    CALLING SEQUENCE
R0576       L-X   STORE TDEC1
R0577       L     CALL          (STCALL TDEC1)
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R0578      L+1          CSMPREC (CSMCONIC, LEMPREC, LEMCONIC)

R0579     NORMAL EXIT TO L+2


R0580     SUBROUTINES CALLED
R0581       INTEGRV1
R0582       PRECOUT FOR CSMPREC AND LEMPREC
R0583       CONICOUT  FOR CSMCONIC AND LEMCONIC


R0584     OUTPUT - SEE PAGE 2 OF THIS LOG SECTION
R0585     INPUT
R0586      TDEC1    TIME TO INTEGRATE TO . CSECS B-28
 0587                          13,3043   45020 1  CSMPREC   STQ      CALL
 0588     REF  61  LAST 1200   13,3044   00046 0                     X1
 0589     REF  29  LAST 1210   13,3045   27414 0                     INTSTALL
 0590                          13,3046   43130 1            SXA,1    SET
 0591     REF   2  LAST  114   13,3047   02102 0                     IRETURN
 0592     REF  19  LAST  655   13,3050   01474 1                     VINTFLAG

 0593                          13,3051   43014 0  IFLAGP    SET      CLEAR
 0594     REF   3  LAST  236   13,3052   01467 0                     PRECIFLG
 0595     REF  15  LAST 1210   13,3053   01676 1                     DIM0FLAG
 0596                          13,3054   77614 1            CLRGO
 05961    REF  16  LAST 1210   13,3055   01633 0                     INTYPFLG
 05962    REF   1              13,3056   27136 0                     INTEGRV1
 0597                          13,3057   45020 1  LEMPREC   STQ      CALL
 0598     REF  62  LAST 1214   13,3060   00046 0                     X1
 0599     REF  30  LAST 1214   13,3061   27414 0                     INTSTALL
 0600                          13,3062   43130 1            SXA,1    CLRGO
 0601     REF   3  LAST 1214   13,3063   02102 0                     IRETURN
 0602     REF  20  LAST 1214   13,3064   01634 1                     VINTFLAG
 0603     REF   1              13,3065   27051 0                     IFLAGP

 0604                          13,3066   45020 1  CSMCONIC  STQ      CALL
 0605     REF  63  LAST 1214   13,3067   00046 0                     X1
 0606     REF  31  LAST 1214   13,3070   27414 0                     INTSTALL
 0607                          13,3071   43130 1            SXA,1    SET
 0608     REF   4  LAST 1214   13,3072   02102 0                     IRETURN
 0609     REF  21  LAST 1214   13,3073   01474 1                     VINTFLAG
 0610                          13,3074   43014 0  IFLAGC    CLEAR    SETGO
 0611     REF  16  LAST 1214   13,3075   01676 1                     DIM0FLAG
 0612     REF  17  LAST 1214   13,3076   01433 1                     INTYPFLG
 0613     REF   2  LAST 1214   13,3077   27136 0                     INTEGRV1
 0614                          13,3100   45020 1  LEMCONIC  STQ      CALL
 0615     REF  64  LAST 1214   13,3101   00046 0                     X1
 0616     REF  32  LAST 1214   13,3102   27414 0                     INTSTALL
 0617                          13,3103   43130 1            SXA,1    CLRGO
 0618     REF   5  LAST 1214   13,3104   02102 0                     IRETURN
 0619    REF  22  LAST 1214   13,3105   01634 1                        VINTFLAG
 0620    REF   1              13,3106   27074 1                        IFLAGC

 0621                         13,3107   66214 0  INTEGRVS SET          SSP
 0622    REF   4  LAST 1214   13,3110   01467 0                        PRECIFLG
 0623    REF   7  LAST 1213   13,3111   02031 1                        PBODY
 0624                         13,3112   00000 1                        0
 0625                         13,3113   66214 0           BOF          SSP
 0626    REF  19  LAST 1213   13,3114   00343 0                        MOONFLAG
 0627                         13,3115   27120 1                        +3
 0628    REF   9  LAST 1215   13,3116   02031 1                        PBODY
 06281                        13,3117   00002 0                        2
 0629                         13,3120   77220 1           STQ          VLOAD
 0630    REF   6  LAST 1214   13,3121   02102 0                        IRETURN
 0631    REF  10  LAST 1213   13,3122   24007 0                        ZEROVEC
 0632    REF   7  LAST 1213   13,3123   01521 0           STORE        TDELTAV
 0633    REF   7  LAST 1213   13,3124   35527 1           STCALL       TNUV
 0634    REF   2  LAST 1156   13,3125   23441 1                        RECTIFY
 0635                         13,3126   43014 0           CLEAR        SET
 0636    REF  17  LAST 1214   13,3127   01676 1                        DIMOFLAG
 0637    REF   1              13,3130   04062 1                        NEWIFLG
 06371                        13,3131   77614 1           SETGO
 06372   REF   1              13,3132   04020 1                        RPQFLAG
 0638    REF   1              13,3133   27150 0                        ALOADED
R0639    INTEGRV IS AN ENTRY TO ORBIT INTEGRATION WHICH PERMITS THE CALLER ,
R0640    NORMALLY THE NAVIGATION PROGRAM ,TO SET THE INTEG. FLAGS. THE ROUTINE
R0641    IS ENTERED AT INTEGRV1 BY CSMPREC ET.AL. AND AT ALOADED BY INTEGRVS.
R0642    THE ROUTINE SETS UP A-MEMORY IF ENTERED AT INTEGRV,1 AND SETS THE INTEG.
R0643    PROGRAM FOR PRECISION OR CONIC

R0644    THE CALLER MUST FIRST CALL INTSTALL TO CHECK IF INTEG. IS IN USE BEFORE
R0645    SETTING ANY FLAGS.
R0646    THE FLAGS WHICH SHOULD BE SET OR CLEARED ARE
R0647      VINTFLAG     (IGNORED WHEN ENTERED FROM INTEGRVS)
R0648      INTYPFLG
R0649      DIMOFLAG
R0650      D6OR9FLG
R0651    CALLING SEQUENCE
R0652      L-X      CALL
R0653      L-Y            INTSTALL
R0654      L-1      SET OR CLEAR ALL FOUR FLAGS. ALSO CAN SET STATEFLG IF DESIRED
R0655               AND DIMOFLAG IS CLEAR.
R0656      L        CALL
R0657      L+1            INTEGRV
R0658    INITIALIZATION
R0659      FLAGS AS ABOVE
R0660      STORE TIME TO INTEGRATE TO IN TDEC1
R0661    OUTPUT
R0662      PATT   AS
R0663      VATT      DEFINED
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R0664      TAT                 BEFORE

 0665                          13,3134   77620 0  INTEGRV   STQ
 0666  REF   7  LAST 1215      13,3135   02102 0                      IRETURN
 0667                          13,3136   43014 0  INTEGRV1  SET       SET
 0668  REF   2  LAST 1215      13,3137   04060 0                      RPQFLAG
 0669  REF   2  LAST 1215      13,3140   04062 1                      NEWIFLG
 0670                          13,3141   77731 1  INTEGRV2  SSP
 0671  REF  14  LAST 1157      13,3142   00053 1                      QPRET
 0672  REF   2  LAST 1215      13,3143   27150 0                      ALOADED
 0673                          13,3144   52014 0            BON       GOTO
 0674  REF  23  LAST 1215      13,3145   01714 1                      VINTFLAG
 0675  REF   1                 13,3146   26705 1                      PTOACSM
 0676  REF   2  LAST  297      13,3147   26760 1                      PTOALEM
 0677                          13,3150   77745 1  ALOADED   DLOAD
 0678  REF  57  LAST 1212      13,3151   00041 1                      TDEC1
 0679  REF   2  LAST  104      13,3152   01116 0            STORE     TDEC
 0680                          13,3153   52014 0            BOFF      GOTO
 0681  REF  18  LAST 1214      13,3154   01753 1                      INTYPFLG
 0682  REF   1                 13,3155   27257 1                      TESTLOOP
 0683  REF   1                 13,3156   27243 1                      RVCON
 0684                          13,3157   77414 0  A-PCHK    BOF       EXIT
 0685  REF   6  LAST 1210      13,3160   01752 0                      STATEFLG
 0686  REF   1                 13,3161   27200 0                      RECTOUT
 0687  REF 108  LAST 1210      13,3162  0 5353 1            TC        PHASCHNG
 0688                          13,3163   04022 0            OCT       04022
 0689  REF  67  LAST 1154      13,3164  0 5504 0            TC        UPFLAG              PHASE CHANGE HAS OCCURRED BETWEEN
 0690  REF   3  LAST 1154      13,3165   00236 0            ADRES     REINTFLG            INTSTALL AND INTWAKE
 0692  REF 230  LAST 1209      13,3166  0 6037 0            TC        INTPRET
 0693                          13,3167   77731 1            SSP
 0694  REF  15  LAST 1216      13,3170   00053 1                      QPRET
 0695  REF   1                 13,3171   27176 1                      PHEXIT
 0696                          13,3172   52014 0            BON       GOTO
 0697  REF  24  LAST 1216      13,3173   01714 1                      VINTFLAG
 0698  REF   3  LAST  495      13,3174   26661 1                      ATOPCSM
 0699  REF   2  LAST   37      13,3175   26734 0                      ATOPLEM
 0700                          13,3176   77624 1  PHEXIT    CALL
 0701  REF  22  LAST 1157      13,3177   11244 0                      GRP2PC
 0702                          13,3200   45001 1  RECTOUT   SETPD     CALL
 0703                          13,3201   00001 0                      0
 0704  REF   3  LAST 1215      13,3202   23441 1                      RECTIFY
 0705                          13,3203   53775 1            VLOAD     VSL*
 0706  REF  10  LAST 1212      13,3204   01503 0                      RRECT
 0707                          13,3205   57576 1                      0,2
 0708                          13,3206   53715 1            PDVL      VSL*                RATT TO PD0
 0709  REF   7  LAST 1179      13,3207   01511 0                      VRECT
 0710                          13,3210   57576 1                      0,2
 0711                          13,3211   63325 0            PDDL      PDVL                VATT TO PD6    TAT TO PD12
 0712  REF  15  LAST 1213      13,3212   01517 0                      TET
 0713    REF  11  LAST 1216    13,3213    01503 0                     RRECT
 0714                          13,3214    64715 0           PDVL      PDDL*
 0715    REF   8  LAST 1216    13,3215    01511 0                     VRECT
 0716    REF   2  LAST  687    13,3216    51770 0                     MUEARTH,2
 0717                          13,3217    76006 0           PUSH      AXT,1
 0718                          13,3220    77765 0           DEC       -10
 0719                          13,3221    76014 0           BON       AXT,1
 0720    REF  20  LAST 1215    13,3222    00303 1                     MOONFLAG
 0721                          13,3223    27225 1                     +2
 0722                          13,3224    77775 1           DEC       -2
 0723                          13,3225    40001 1  INTEXIT  SETPD     BOV
 0724                          13,3226    00001 0                     0
 0725                          13,3227    27230 0                     +1
 07251                         13,3230    43014 0           CLEAR     CLEAR
 07252   REF   2  LAST  320    13,3231    04676 1                     AVEMIDSW          ALLOW UPDATE OF DOWNLINK STATE VECTOR
 07253   REF   5  LAST 1215    13,3232    01667 1                     PRECIFLG
 07254                         13,3233    77614 1           CLEAR
 07255   REF   7  LAST 1216    13,3234    01672 0                     STATEFLG
 0726                          13,3235    77535 1           SLOAD     EXIT
 0727    REF   8  LAST 1216    13,3236    02103 1                     IRETURN
 0728    REF 731  LAST 1195    13,3237   3 0154 1           CA        MPAC
 0729    REF  58  LAST 1183    13,3240   50 120 1           INDEX     FIXLOC
 0730    REF  16  LAST 1216    13,3241   54 052 1           TS        QPRET
 0731    REF   4  LAST 1157    13,3242   0 3425 1           TC        INTWAKE
R0732    RVCON SETS UP ORBIT INTEGRATION TO DO A CONIC SOLUTION FOR POSITION AND
R0733    VELOCITY FOR THE INTERVAL (TET-TDEC)

 0734                          13,3243    45345 1  RVCON    DLOAD     DSU
 0735    REF   3  LAST 1216    13,3244    01116 0                     TDEC
 0736    REF  16  LAST 1216    13,3245    01517 0                     TET
 0737    REF  10  LAST 1177    13,3246    36074 1           STCALL    TAU.
 0738    REF   4  LAST 1216    13,3247    23441 1                     RECTIFY
 0739                          13,3250    77624 1           CALL
 0740    REF   1               13,3251    22376 0                     KEPPREP
 0741                          13,3252    43345 1           DLOAD     DAD
 0742    REF   6  LAST 1179    13,3253    01551 1                     TC
 0743    REF  17  LAST 1217    13,3254    01517 0                     TET
 0744    REF  19  LAST 1217    13,3255    35517 1           STCALL    TET
 0745    REF   2  LAST 1216    13,3256    27200 0                     RECTOUT
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P07455          TESTLOOP

 0746                            13,3257   43014 0  TESTLOOP BOF     CLRGO
 07462  REF   4  LAST 1210       13,3260   04752 0                   QUITFLAG
 07463                           13,3261   27264 1                   +3
 07464  REF   8  LAST 1217       13,3262   01632 1                   STATEFLG
 07465  REF   1                  13,3263   27225 1                   INTEXIT            STOP INTEGRATION
 07466                           13,3264   73001 1   +3       SETPD  LXA,2
 0747                            13,3265   00013 0                   10D
 0748   REF   9  LAST 1215       13,3266   02030 0                   PBODY
 0749                            13,3267   51575 1            VLOAD  ABVAL
 0750   REF  18  LAST 1213       13,3270   01535 0                   RCV
 0751                            13,3271   43006 0            PUSH   CLEAR              RC TO 10D
 0752   REF   1                  13,3272   00262 1                   MIDFLAG
 0753                            13,3273   50023 0            DSU*   BMN                MIDFLAG=0 IF R G.T. RMP
 0754   REF   1                  13,3274   53755 0                   RME,2
 0755                            13,3275   27300 1                   +3
 0756                            13,3276   77614 1            SET
 0757   REF   2  LAST 1218       13,3277   00062 0                   MIDFLAG
 0758                            13,3300   41345 0  NORFINAL  DLOAD  DMP
 0759                            13,3301   00013 0                   10D
 0760                            13,3302   00043 0                   34D
 0761                            13,3303   55762 1            SR1R   DDV*
 0762   REF   3  LAST 1217       13,3304   51770 0                   MUEARTH,2
 0763                            13,3305   41366 1            SQRT   DMP
 0764   REF   1                  13,3306   25752 0                   .3D
 0765                            13,3307   40442 1            SR3    SR4                DT   IS TRUNCATED TO A MULTIPLE
 0766                            13,3310   54345 1            DLOAD  SL
 0767   REF 732  LAST 1217       13,3311   00155 0                   MPAC
 0768                            13,3312   20220 0                   15D                   OF 128 CSECS.
 0769                            13,3313   40006 0            PUSH   BOV
 0770   REF   1                  13,3314   27341 1                   MAXDT
 0771                            13,3315   50021 1            BDSU   BMN
 0772   REF   1                  13,3316   27413 1                   DT/2MAX
 0773   REF   2  LAST 1218       13,3317   27341 1                   MAXDT
 0774                            13,3320   45345 1  DT/2COMP  DLOAD  DSU
 0775   REF   4  LAST 1217       13,3321   01116 0                   TDEC
 0776   REF  19  LAST 1217       13,3322   01517 0                   TET
 0777                            13,3323   54234 0            RTB    SL
 0778   REF   6  LAST  946       13,3324   21612 1                   SGNAGREE
 0779                            13,3325   20211 1                   8D
 0780   REF   2  LAST  114       13,3326   02076 1            STORE  DT/2               B-19
 0781                            13,3327   51400 1            BOV    ABS
 0782   REF   1                  13,3330   27345 0                   GETMAXDT
 0783                            13,3331   50025 0            DSU    BMN                IS TIME TO INTEG. TO GR THAN MAXTIME
 0784                            13,3332   00015 0                   12D
 0785   REF   1                  13,3333   27351 0                   POOHCHK
 0786                            13,3334   75345 1  USEMAXDT  DLOAD  SIGN
 0787                            13,3335   00015 0                   12D
 0788   REF   3  LAST 1218       13,3336   02076 1                   DT/2
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L          INTEGRATION INITIALIZATION                                                      USER'S PAGE NO.  15       E3 S3

  0789   REF   4  LAST 1219   13,3337   36076 0            STCALL  DT/2
  0790   REF   2  LAST 1218   13,3340   27351 0                    POOHCHK
  0791                        13,3341   65345 0  MAXDT     DLOAD   PDDL            EXCHANGE DT/2MAX WITH COMPUTED MAX.
  0792   REF   2  LAST 1218   13,3342   27413 1                    DT/2MAX
  0793                        13,3343   77650 1            GOTO
  0794   REF   1              13,3344   27320 0                    DT/2COMP
  0795                        13,3345   77634 0  GETMAXDT  RTB
  0796   REF  13  LAST  362   13,3346   21712 0                    SIGNMPAC
  0797   REF   5  LAST 1219   13,3347   36076 0            STCALL  DT/2
  0798   REF   1              13,3350   27334 0                    USEMAXDT
  0799                        13,3351   51545 1  POOHCHK   DLOAD   ABS
  0800   REF   6  LAST 1219   13,3352   02076 1                    DT/2
  0801                        13,3353   50025 0            DSU     BMN
  0802   REF   1              13,3354   27411 0                    DT/2MIN
  0803   REF   2  LAST 1213   13,3355   27157 1                    A-PCHK
  0804                        13,3356   46135 1            SLOAD   BHIZ
  0805   REF  19  LAST  888   13,3357   01012 0                    MODREG
  0806                        13,3360   27363 1                    +3
  0807                        13,3361   77650 1            GOTO
  0808   REF   1              13,3362   23252 0                    TIMESTEP
  08081                       13,3363   77614 1            BON                     WAS THIS CALL VIA CSM(LEM)PREC
  08082  REF   6  LAST 1217   13,3364   01707 0                    PRECIFLG
  08083  REF   2  LAST 1219   13,3365   23252 0                    TIMESTEP        YES
  0809                        13,3366   45345 1            DLOAD   DSU
  0810   REF   7  LAST 1219   13,3367   02076 1                    DT/2
  0811                        13,3370   00015 0                    12D
  0812                        13,3371   43040 1            BMN     BOFCLR
  0813   REF   3  LAST 1219   13,3372   27157 1                    A-PCHK
  0814   REF   3  LAST 1216   13,3373   04242 1                    NEWIFLG
  0815   REF   3  LAST 1219   13,3374   23252 0                    TIMESTEP
  0816                        13,3375   45345 1            DLOAD   DSU
  0817   REF   5  LAST 1218   13,3376   01116 0                    TDEC
  0818   REF  20  LAST 1218   13,3377   01517 0                    TET
  08181                       13,3400   77640 0            BMN                     NO BACKWARD INTEGRATION
  08182  REF   2  LAST 1218   13,3401   27225 1                    INTEXIT
  0819                        13,3402   40525 1            PDDL    SR4
  0820   REF   8  LAST 1219   13,3403   02076 1                    DT/2            IS 4(DT) LS(TDEC - TET)
  0821                        13,3404   44322 1            SR2R    BDSU            NO
  0822                        13,3405   52040 1            BMN     GOTO
  0823   REF   3  LAST 1219   13,3406   27225 1                    INTEXIT
  0824   REF   4  LAST 1219   13,3407   23252 0                    TIMESTEP
  0825                        13,3410   00000 1  DT/2MIN   2DEC    3 B-20
  0825                        13,3411   01400 1
  0826                        13,3412   14152 1  DT/2MAX   2DEC    4000 E2 B-20
  0826                        13,3413   00000 1
  0828                        13,3414   77776 1  INTSTALL  EXIT
  0831   REF   1              13,3415   3 0106 0           CA      RASFLAG
  0833   REF   1              13,3416   7 3466 1           MASK    INTBITAB        IS THIS STALL AREA FREE
  0834                        13,3417   0 0006 1           EXTEND
  0835   REF   1              13,3420   1 3460 1           BZF     OKTOGRAB        YES
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 0837    REF    1              13,3421   3 3465 0              CAF      WAKESTAL
 0838    REF    4   LAST  464  13,3422   0 5133 0              TC       JOBSLEEP
 0839                          13,3423    77776 1   INTWAKE0   EXIT
 08395   REF    2   LAST  711  13,3424   1 3445 0              TCF      INTWAKE1

 0840    REF    2   LAST 1219  13,3425   4 0106 1   INTWAKE    CS       RASFLAG        IS THIS INTSTALLED ROUTINE TO BE
 0841    REF    1              13,3426   7 4745 1              MASK     REINTBIT            RESTARTED
 0842    REF  376   LAST 1131  13,3427   10 000 0              CCS      A
 0843    REF    3   LAST 1220  13,3430   0 3445 1              TC       INTWAKE1       NO

 0844    REF   59   LAST 1217  13,3431   50 120 1              INDEX    FIXLOC
 0845    REF   17   LAST 1217  13,3432   3 0052 0              CA       QPRET
 0848    REF    5   LAST  898  13,3433   55'055 1              TS       TBASE2         YES, DONT RESTART WITH SOMEONE ELSES Q

 0849    REF  109   LAST 1216  13,3434   0 5353 1              TC       PHASCHNG
 0850                          13,3435    04022 0              OCT      04022

 0851    REF    6   LAST 1220  13,3436   3 1055 0              CA       TBASE2
 0852    REF   60   LAST 1220  13,3437   50 120 1              INDEX    FIXLOC
 0853    REF   18   LAST 1220  13,3440   54 052 1              TS       QPRET

 0854    REF    2   LAST 1220  13,3441   3 4745 0              CAF      REINTBIT
 0855    REF    3   LAST 1220  13,3442   7 0106 1              MASK     RASFLAG
 0856                          13,3443   0 0006 1              EXTEND
 0857    REF    1              13,3444   1 3463 1              BZF      GOBAC          DONT INTWAKE IF WE CAME HERE VIA RESTART

 0861    REF    2   LAST 1220  13,3445   3 3465 0   INTWAKE1   CAF      WAKESTAL
 0862                          13,3446   0 0004 0              INHINT
 0863    REF    5   LAST  465  13,3447   0 5137 1              TC       JOBWAKE
 0864    REF   22   LAST 1111  13,3450   10 064 1              CCS      LOCCTR
 0865    REF    4   LAST 1220  13,3451   1 3445 0              TCF      INTWAKE1
 0866                          13,3452    00051 0   FORTYONE   DEC      41
 0868    REF    2   LAST 1219  13,3453   4 3466 1              CS       INTBITAB
 0869    REF    4   LAST 1220  13,3454   7 0106 1              MASK     RASFLAG
 0870    REF    5   LAST 1220  13,3455   54 106 1              TS       RASFLAG        RELEASE STALL AREA
 0871                          13,3456   0 0003 1              RELINT
 0872    REF    2   LAST 1220  13,3457   1 3463 1              TCF      GOBAC
 0874    REF    2   LAST  215  13,3460   3 4736 1   OKTOGRAB   CAF      INTFLBIT
 08745                         13,3461   0 0004 0              INHINT
 0875    REF    6   LAST 1220  13,3462   26 106 1              ADS      RASFLAG
 0876    REF  231   LAST 1216  13,3463   0 6037 0   GOBAC      TC       INTPRET
 0877                          13,3464    77616 0              RVQ
 0888    REF   33   LAST 1214  13,3465    27415 1   WAKESTAL   CADR     INTSTALL +1
 0892                          13,3466    20100 1   INTBITAB   OCT      20100
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P0895   AVETOMID

R0896   THIS ROUTINE PERFORMS THE TRANSITION FROM A THRUSTING PHASE TO THE COAST
R0897   PHASE BY INITIALIZING THIS VEHICLES PERMANENT STATE VECTOR WITH THE
R0898   VALUES LEFT BY THE AVERAGEG ROUTINE IN RN,VN,PIPTIME.

R0899   BEFORE THIS IS DONE THE W-MATRIX, IF ITS  VALID (ORWFLAG OR RENDWFLG IS
R0900   SET) IS INTEGRATED FORWARD TO PIPTIME WITH THE PRE-THRUST STATE VECTOR.

R0901   IN ADDITION, THE OTHER VEHICLE IS INTEGRATED (PERMANENT) TO PIPTIME.

R0902   FINALLY TRKMKCNT IS ZEROED


 0903   REF   4  LAST 1209   13,2000                        SETLOC INTINIT
 0904                        13,3467                        BANK

 0905   REF   4 LAST 1209 TO 1221:    435    471*           COUNT* $$/INTIN
 0906                        13,3467   43020 1  AVETOMID STQ    BON
 0907   REF   6  LAST 1157   13,3470   02772 1                  EGRESS
 0908   REF  11  LAST  843   13,3471   02716 0                  RENDWFLG
 0909   REF   1              13,3472   27536 1                  INT/W          W-MATRIX VALID ,GO INTEGRATE IT
 0910                        13,3473   77614 1           BON
 0911   REF   1              13,3474   01711 1                  ORBWFLAG
 0912   REF   2  LAST 1221   13,3475   27536 1                  INT/W          W-MATRIX VALID ,GO INTEGRATE IT

 0913                        13,3476   45145 0  OTHERS   DLOAD  CALL           GET SET FOR OTHER VEHICLE INTEGRATION
 0914   REF  24  LAST  973   13,3477   01235 1                  PIPTIME        DESIRED TIME
 0915   REF  34  LAST 1220   13,3500   27414 0                  INTSTALL
 0916                        13,3501   45014 0           SET    CALL
 0917   REF  25  LAST 1216   13,3502   01474 1                  VINTFLAG       CM
 0918   REF   8  LAST 1210   13,3503   26644 0                  SETIFLGS       SETS UP NONE W-MAT. PERMANENT INTEG.
 0923   REF  58  LAST 1216   13,3504   34041 0           STCALL TDEC1
 0924   REF  11  LAST 1213   13,3505   27134 1                  INTEGRV

 0925                        13,3506   45174 1           AXT,2  CALL           NOW MOVE PROPERLY SCALE RN,UN AS WELL AS
 0926                        13,3507   00002 0                  2              PIPTIME TO INTEGRATION ERASABLES.
 0927   REF  35  LAST 1221   13,3510   27414 0                  INTSTALL
 0928                        13,3511   77014 1           BON    AXT,2
 0929   REF   6  LAST 1156   13,3512   04304 1                  MOONTHIS
 0930                        13,3513   27515 0                  +2
 0931                        13,3514   00000 1                  0
 0932                        13,3515   53775 1           VLOAD  VSR*
 0933   REF  16  LAST  973   13,3516   01221 1                  RN
 0934                        13,3517   57176 0                  0,2
 0935   REF  12  LAST 1217   13,3520   01503 0           STORE  RRECT
 0936   REF  19  LAST 121[illegible]   13,3521   15535 0           STODL  RCV
 0937   REF  25  LAST 1221   13,3522   01235 1                  PIPTIME
 0938   REF  21  LAST 1219   13,3523   25517 0           STOVL  TET
 0939   REF  10  LAST  881   13,3524   01227 1                  VN
 0940                             13,3525   45057 1           VSR*    CALL
 0941                             13,3526   57176 0                   0,2
 0942   REF    3  LAST   710      13,3527   23455 1                   MINIRECT        FINISH SETTING UP STATE VECTOR
 0943                             13,3530   66234 1           RTB     SSP
 0944   REF    1                  13,3531   26747 1                   MOVATHIS        PUT TEMP STATE VECTOR INTO PERMANENT
 0945   REF   11  LAST   838      13,3532   03463 0                   TRKMKCNT
 0946                             13,3533   00000 1                   0
 0947                             13,3534   77650 1           GOTO
 0948   REF    2  LAST  1157      13,3535   47226 1                   FAZAB5

 0949                             13,3536   45145 0  INT/W    DLOAD   CALL
 0950   REF   26  LAST  1221      13,3537   01235 1                   PIPTIME         INTEGRATE W THRU BURN
 0951   REF   36  LAST  1221      13,3540   27414 0                   INTSTALL
 0952                             13,3541   43014 0           SET     SET
 0953   REF   18  LAST  1215      13,3542   01476 0                   DIMOFLAG        DO W-MATRIX
 0954   REF    3  LAST  1217      13,3543   04476 0                   AVEMIDSW        SO WONT CLOBBER RN,VN,PIPTIME
 0955                             13,3544   43014 0           SET     CLEAR
 0956   REF    9  LAST  1210      13,3545   01475 0                   D6OR9FLG        9X9 FOR LM
 0957   REF   26  LAST  1221      13,3546   01674 0                   VINTFLAG        LM
 0964   REF   59  LAST  1221      13,3547   34041 0           STCALL  TDEC1
 0965   REF   12  LAST  1221      13,3550   27134 1                   INTEGRV
 0966                             13,3551   77650 1           GOTO
 0967   REF    1                  13,3552   27476 1                   OTHERS          NOW GO DO THE OTHER VEHICLE
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P0968    MIDTOAV1

R0969    THIS ROUTINE INTEGRATES (PRECISION) TO THE TIME SPECIFIED IN TDEC1.
R0970    IF, AT THE END OF AN INTEGRATION TIME STEP, CURRENT TIME PLUS A DELTA
R0971    TIME (SEE TIMEDELT.....BASED ON THE COMPUTATUON TIME FOR ONE TIME STEP)
R0972    IS GREATER THAN THE DESIRED TIME, ALARM 1703 IS SET AND THE INTEGRATION
R0973    IS DONE TO THE CURRENT TIME.
R0974    RETURN IS IN BASIC TO THE RETURN ADDRESS PLUS ONE.

R0975    IF THE INTEGRATION IS FINISHED TO THE DESIRED TIME, RETURN IS IN BASIC
R0976    TO THE RETURN ADDRESS

R0977    IN EITHER CASE , BEFORE RETURNING, THE EXTRAPOLATED STATE VECTOR IS TRAN
R0978    FERRED FROM R,VATT TO R,VN1-PIPTIME1 IS SET TO THE FINISHING INTEGRA-
R0979    TION TIME AND MPAC IS SET TO THE DELTA TIME---
R0980                                            TAT MINUS CURRENT TIME.


R0981    MIDTOAV2

R0982    THIS ROUTINE INTEGRATES THIS VEHICLES STATE VECTOR TO THE CURRENT TIME.
R0983    NO INPUTS ARE REQUIRED OF THE CALLER. RETURN IS IN BASIC TO THE RETURN
R0984    ADDRESS WITH THE ABOVE TRANSFERS TO R,VN1-PIPTIME1-AND MPAC DONE

  0985   REF   2  LAST  152   E7,1744                          EBANK=  IRETURN1
  0986                        13,3553   43020 1  MIDTOAV2 STQ     CLRGO              INTEGRATE TO PRESENT TIME PLUS TIMEDELT
  0987   REF   3  LAST 1223   13,3554   03744 0                   IRETURN1
  0988   REF   1              13,3555   04634 1                   MID1FLAG
  0989   REF   1              13,3556   27572 1                   ENTMID2

  0990                        13,3557   43020 1  MIDTOAV1 STQ     SET                 INTEGRATE TO TDEC1
  0991   REF   4  LAST 1223   13,3560   03744 0                   IRETURN1
  0992   REF   2  LAST 1223   13,3561   04474 1                   MID1FLAG
  0993                        13,3562   43234 0           RTB     DAD                INITIAL CHECK, IS TDEC1 IN THE FUTURE
  0994   REF  32  LAST 1209   13,3563   21573 0                   LOADTIME
  0995   REF   1              13,3564   27674 1                   TIMEDELT
  0996                        13,3565   51021 0           BDSU    BPL
  0997   REF  60  LAST 1222   13,3566   00041 1                   TDEC1
  0998   REF   1              13,3567   27576 0                   ENTMID1             YES
  0999                        13,3570   77624 1           CALL
  1000   REF   1              13,3571   27662 0                   NOTIME             NO, SET ALARM, SWITCH TO MIDTOAV2

  1001                        13,3572   43234 0  ENTMID2  RTB     DAD
  1002   REF  33  LAST 1223   13,3573   21573 0                   LOADTIME
  1003   REF   2  LAST 1223   13,3574   27674 1                   TIMEDELT
  1004   REF  61  LAST 1223   13,3575   00041 1           STORE   TDEC1

  1005                        13,3576   77624 1  ENTMID1  CALL
  1006   REF  37  LAST 1222   13,3577   27414 0                   INTSTALL
  1007                        13,3600   45014 0           CLEAR   CALL
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 1008   REF  19  LAST 1222   13,3601    01676 1                       DIMOFLAG        NO W-MATRIX
 1009   REF   1              13,3602    26066 0                       THISVINT
 1010                        13,3603    43014 0             CLEAR     SET
 1011   REF  19  LAST 1216   13,3604    01673 1                       INTYPFLG
 1012   REF   1              13,3605    04475 0                       MIDAVFLG        LET INTEG. KNOW THE CALL IS FOR MIDTOAV.
 1013                        13,3606    77624 1             CALL
 1014   REF  13  LAST 1222   13,3607    27134 1                       INTEGRV          GO INTEGRATE
 1015                        13,3610    77214 0             CLEAR     VLOAD
 1016   REF   2  LAST 1224   13,3611    04675 1                       MIDAVFLG
 1017   REF  36  LAST  976   13,3612    00001 0                       RATT
 1018   REF   7  LAST  881   13,3613    27545 0             STOVL     RN1
 1019   REF  25  LAST  954   13,3614    00007 0                       VATT
 1020   REF   7  LAST  881   13,3615    17553 1             STODL     VN1
 1021   REF  16  LAST  786   13,3616    00015 0                       TAT
 1022   REF  11  LAST  3 3   13,3617    03561 0             STORE     PIPTIME1
 10221                       13,3620    66134 1             SXA,2     SXA,1
 10222  REF  14  LAST  880   13,3621    02777 1                       RTX2
 10223  REF  14  LAST  766   13,3622    02776 0                       RTX1
 1023                        13,3623    77776 1             EXIT

 1024                        13,3624  0 0004 0              INHINT
 1025                        13,3625  0 0006 1              EXTEND
 1026   REF  30  LAST  991   13,3626  + 0025 1              DCS       TIME2
 1027   REF 733  LAST 1218   13,3627  20 155 1              DAS       MPAC
 1028   REF  14  LAST 1057   13,3630  0 7257 0              TC        TPAGREE

 1029   REF   5  LAST 1223   13,3631  3 1744 1              CA        IRETURN1
 1030   REF  16  LAST  896   13,3632  0 4640 1              TC        BANKJUMP
 1031                        13,3633    47014 1  CKMID2     BOF       RTB
 1032   REF   3  LAST 1223   13,3634    04754 0                       MIDIFLAG
 1033   REF   1              13,3635    27652 0                       MID2
 1034   REF  34  LAST 1223   13,3636    21573 0                       LOADTIME
 1035                        13,3637    44215 1             DAD       BDSU
 1036   REF   3  LAST 1223   13,3640    27674 1                       TIMEDELT
 1037   REF   6  LAST 1219   13,3641    01116 0                       TDEC
 1038                        13,3642    45044 0             BPL       CALL
 1039   REF   2  LAST 1216   13,3643    27257 1                       TESTLOOP         YES
 1040   REF   2  LAST 1223   13,3644    27662 0                       NOTIME

 1041                        13,3645    43234 0  TIMEINC    RTB       DAD
 1042   REF  35  LAST 1224   13,3646    21573 0                       LOADTIME
 1043   REF   4  LAST 1224   13,3647    27674 1                       TIMEDELT
 1044   REF   7  LAST 1224   13,3650    35116 1             STCALL    TDEC
 1045   REF   3  LAST 1224   13,3651    27257 1                       TESTLOOP

 1046                        13,3652    45345 1  MID2       DLOAD     DSU
 1047   REF   8  LAST 1224   13,3653    01116 0                       TDEC
 1048   REF  22  LAST 1221   13,3654    01517 0                       TET
 1049                        13,3655    45246 0             ABS       DSU
 1050   REF   1              13,3656    27672 1                       3CSECS
 1051                           13,3657   52040 1           BMN     GOTO
 1052   REF   4  LAST 1219      13,3660   27157 1                   A-PCHK
 1053   REF   1                 13,3661   27645 0                   TIMEINC

 1054                           13,3662   77414 0  NOTIME   CLEAR   EXIT               TOO LATE
 1055   REF   4  LAST 1224      13,3663   04674 0                   MIDIFLAG
 1056   REF   6  LAST 1224      13,3664   25744 1           INCR    IRETURN1           SET ERROR EXIT  (CALLOC +2)
 1057   REF  41  LAST  983      13,3665  0 5567 0           TC      ALARM              INSUFFICIENT TIME FOR INTEGRATION --
 1058                           13,3666   01703 1           OCT     1703     963          TIG WILL BE SLIPPED...
 1059   REF 232  LAST 1220      13,3667  0 6037 0           TC      INTPRET
 1060                           13,3670   77616 0           RVQ

 1061                           13,3671   00000 1  3CSECS   2DEC    3
 1061                           13,3672   00003 1
 1062                           13,3673   00000 1  TIMEDELT 2DEC    2000
 1062                           13,3674   03720 1
 1063                           27,3360                     BANK    27
 1064   REF   1                 04,2000                     SETLOC  UPDATE2
 1065                           04,2165                     BANK
 1066   REF   1                    1167                     EBANK=  INTWAKUQ


 1067   REF   1                                             COUNT*  $$/INTIN

 1068   REF   1                    1167        INTWAKUQ =           INTWAK1Q           TEMPORARY UNTIL NAME OF INTWAK1Q IS CHNG

 1069                           04,3165  0 0003 1  INTWAKEU RELINT
 1070                           04,3166  0 0006 1           EXTEND
 1071   REF   2  LAST 1225      04,3167   23167 0           QXCH    INTWAKUQ           SAVE Q FOR RETURN

 1072   REF 233  LAST 1225      04,3170  0 6037 0           TC      INTPRET

 1073                           04,3171   53135 0           SLOAD   BZE                IS THIS A CSM/LEM STATE VECTOR UPDATE
 1074   REF   3  LAST  212      04,3172   01502 1                   UPSVFLAG           REQUEST. IF NOT GO TO INTWAKUP.
 1075   REF   1                 04,3173   11232 1                   INTWAKUP

 1076                           04,3174   77775 1           VLOAD                      MOVE RRECT(6) AND VRECT(6) INTO
 1077   REF  13  LAST 1221      04,3175   01503 0                   RRECT                   RCV(6)   AND VCV(6)   RESPECTIVELY.
 1078   REF  20  LAST 1221      04,3176   25535 0           STOVL   RCV
 1079   REF   9  LAST 1217      04,3177   01511 0                   VRECT              NOW GO TO 'RECTIFY +13D' TO
 1080                           04,3200   77624 1           CALL                       STORE VRECT INTO VCV  AND ZERO OUT
 1081   REF   5  LAST 1217      04,3201   23456 1                   RECTIFY +13D       TDELTAV(6),TNUV(6),TC(2) AND XKEP(2)
 1082                           04,3202   51535 0           SLOAD   ABS                COMPARE ABSOLUTE VALUE OF 'UPSVFLAG'
 1083   REF   4  LAST 1225      04,3203   01502 1                   UPSVFLAG           TO 'UPDATE MOON STATE VECTOR CODE'
 1084                           04,3204   53025 0           DSU     BZE                TO DETERMINE WHETHER THE STATE VECTOR TO
 1085   REF   1                 04,3205   11243 1                   UPMNSVCD           BE UPDATED IS IN THE EARTH OR LUNAR
 1086   REF   1                 04,3206   11213 1                   INTWAKEM           SPHERE OF INFLUENCE.........
 1087                           04,3207   43174 1           AXT,2   CLRGO              EARTH SPHERE OF INFLUENCE.
 1088                           04,3210   00000 1           DEC     0
 1089   REF  21  LAST 1217      04,3211   00223 1                   MOONFLAG
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L         INTEGRATION INITIALIZATION                                                                   USER'S PAGE NO.  22       E2 S3

 1090    REF    1                04,3212    11216 1                        INTWAKEC
 1091                            04,3213    43174 1  INTWAKEM AXT,2   SET                  LUNAR SPHERE OF INFLUENCE.
 1092                            04,3214    00002 0           DEC      2
 1093    REF   22  LAST 1225     04,3215    00063 1                    MOONFLAG
 1094                            04,3216    50135 0  INTWAKEC SLOAD   BMN                  COMMON CODING AFTER X2 INITIALIZED AND
A1095                                                                                      MOONFLAG SET(OR CLEARED).
 1096    REF    5  LAST 1225     04,3217    01502 1                    UPSVFLAG             IS THIS A REQUEST FOR A LEM OR CSM
 1097    REF    1                04,3220    11226 1                    INTWAKLM              STATE VECTOR UPDATE......
 1098                            04,3221    77624 1           CALL                          UPDATE CSM STATE VECTOR
 1099    REF    4  LAST 1216     04,3222    26651 1                    ATOPCSM

 1100                            04,3223    52014 0           CLEAR   GOTO
 1101    REF    2  LAST 1221     04,3224    01671 0                    ORBWFLAG
 1102    REF    1                04,3225    11230 0                    INTWAKEX

 1103                            04,3226    77624 1  INTWAKLM CALL                          UPDATE  LM STATE VECTOR
 1104    REF    3  LAST 1216     04,3227    26734 0                    ATOPLEM

 1105                            04,3230    77614 1  INTWAKEX CLEAR
 1106    REF   12  LAST 1221     04,3231    02676 1                    RENDWFLG

 1107                            04,3232    45131 0  INTWAKUP SSP      CALL                 REMOVE :UPDATE STATE VECTOR INDICATOR:
 1108    REF    6  LAST 1226     04,3233    01502 1                    UPSVFLAG
 1109                            04,3234    00000 1                    0
 1110    REF    2  LAST  495     04,3235    27423 1                    INTWAKE0             RELEASE :GRAB: OF ORBIT INTEG
 1111                            04,3236    77776 1           EXIT

 1112    REF  110  LAST 1220     04,3237   0 5353 1           TC       PHASCHNG
 1113                            04,3240    04026 1           OCT      04026
 1114    REF    3  LAST 1225     04,3241   0 1167 0           TC       INTWAKU0

 1115                            04,3242    00002 0  UPMNSVCD OCT      2
 1116                            04,3243    00000 1           OCT      0


 1117                            04,3244    77420 1  GRP2PC   STQ      EXIT
 1118    REF    2  LAST  126     04,3245    02711 1                    GRP2SVQ
 1119    REF  111  LAST 1226     04,3246   0 5353 1           TC       PHASCHNG
 1120                            04,3247    04022 0           OCT      04022
 1121    REF  234  LAST 1225     04,3250   0 6037 0           TC       INTPRET
 1122                            04,3251    77650 1           GOTO
 1123    REF    3  LAST 1226     04,3252    02711 1                    GRP2SVQ
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L         ORBITAL INTEGRATION                                                              USER'S PAGE NO.   1       EO S3

R0001                 DELETE
 0002                           13,3675                         BANK     13
 0003    REF   1                11,2000                         SETLOC ORBITAL
 0004                           11,2376                         BANK
 0005    REF   1                                                COUNT*  $$/ORBIT
R0006                 DELETE
 0007                           11,2376   40354 1   KEPPREP    LXA,2    SETPD
 0008    REF  10   LAST 1218    11,2377   02030 0                       PBODY
 0009                           11,2400   00001 0                       0
 0010                           11,2401   75543 1              DLOAD*   SQRT              SQRT(MU) (+18 OR +15)  0D         PL   2D
 0011    REF   4   LAST 1218    11,2402   51770 0                       MUEARTH,2
 0012                           11,2403   53515 0              PDVL     UNIT                                                PL   8D
 0013    REF  21   LAST 1225    11,2404   01535 0                       RCV
 0014                           11,2405   60325 0              PDDL     NORM              NORM F  (+29 OR +27 - N1) 2D      PL   4D
 0015                           11,2406   00045 0                       36D
 0016    REF  65   LAST 1214    11,2407   00047 1                       X1
 0017                           11,2410   77715 1              PDVL
 0018                           11,2411   65241 0              DOT      PDDL              F*SQRT(MU)(+7 OR+5) 4D           PL   6D
 0019    REF  15   LAST 1213    11,2412   01543 1                       VCV
 0020    REF  11   LAST 1217    11,2413   02074 0                       TAU.              (+28)
 0021                           11,2414   60225 1              DSU      NORM
 0022    REF   7   LAST 1217    11,2415   01551 1                       TC
 0023    REF   1   LAST 1155    11,2416   00051 0                       S1
 0024                           11,2417   77742 0              SR1
 0025                           11,2420   65271 0              DDV      PDDL
 0026                           11,2421   00003 1                       2D
 0027                           11,2422   41405 0              DMP      PUSH              FS(+6 +N1-N2) 6D                 PL   8D
 0028                           11,2423   00005 1                       4D
 0029                           11,2424   65316 0              DSQ      PDDL              (FS)SQ(+12 +2(N1-N2)) 8D         PL  10D
 0030                           11,2425   00005 1                       4D
 0031                           11,2426   64716 0              DSQ      PDDL*             SSQ/MU(-2OR +2(N1-N2)) 10D        PL  12D
 0032    REF   5   LAST 1227    11,2427   51770 0                       MUEARTH,2
 0033                           11,2430   40442 1              SR3      SR4
 0034                           11,2431   47515 0              PDVL     VSQ               PREALIGN MU (+43 OR +37) 12D     PL  14D
 0035    REF  16   LAST 1227    11,2432   01543 1                       VCV
 0036                           11,2433   44205 0              DMP      BDSU                                               PL  12D
 0037                           11,2434   00045 0                       36D
 0038                           11,2435   41271 0              DDV      DMP                                                PL  10D
 0039                           11,2436   00003 1                       2D                -(1/R-ALPHA)(+12 +3N1-2N2)
 0040                           11,2437   53605 1              DMP      SL*
 0041    REF   1                11,2440   25774 1                       DP2/3
 0042                           11,2441   20176 0                       0 -3,1            10L(1/R-ALPHA)(+13 +2(N1-N2))
 0043                           11,2442   43260 1              XSU,1    DAD               2(FS)SQ - ETCETRA          PL 8D
 0044    REF  20   LAST 1227    11,2443   00050 1                       S1                X1 = N2-N1
 0045                           11,2444   45257 0              SL*      DSU               -FS+2(FS)SQ ETC (+6 +N1-N2)      PL   6D
 0046                           11,2445   20211 1                       8D,1
 0047                           11,2446   41205 0              DMP      DMP
 0048                           11,2447   00001 0                       0D
 0049                           11,2450   00005 1                       4D
 0050                           11,2451   53657 0              SL*      SL*
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L         ORBITAL INTEGRATION                                                                     USER'S PAGE NO.   2        EO S3

 0051                              11,2452    20211 1                        8D,1
 0052                              11,2453    20201 0                        0,1             S(-FS(1-2FS)-1/6...)(+17 OR +16)
 0053                              11,2454    65215 1              DAD       PDDL                                          PL   6D
 0054    REF    2  LAST   125      11,2455    01553 0                        XKEP
 0055                              11,2456    53605 1              DMP       SL*             S(+17 OR +16)
 0056                              11,2457    00001 0                        0D
 0057                              11,2460    20202 0                        1,1
 0058                              11,2461    43204 0              BOVB      DAD
 0059    REF    3  LAST 1156       11,2462    57753 1                        TCDANZIG
 0060                              11,2463    77626 0              STADR
 0061    REF    3  LAST 1175       11,2464    75647 0              STORE     XKEPNEW
 0062                              11,2465    74020 0              STQ       AXC,1
 0063    REF    3  LAST 1179       11,2466    02112 1                        KEPRTN
 0064                              11,2467    00012 1              DEC       10
 0065                              11,2470    74014 1              BON       AXC,1
 0066    REF   23  LAST 1226       11,2471    00303 1                        MOONFLAG
 0067    REF    1                  11,2472    24023 0                        KEPLERN
 0068                              11,2473    00002 0              DEC       2
 0069                              11,2474    77650 1              GOTO
 0070    REF    2  LAST 1228       11,2475    24023 0                        KEPLERN
 0071                              11,2476   66350 1   FBR3       LXA,1   SSP
 0072   REF  18   LAST 1212        11,2477   01500 0                      DIFEQCNT
 0073   REF  21   LAST 1227        11,2500   00051 0                      S1
 0074                              11,2501   77762 1              DEC     -13
 0075                              11,2502   54345 1              DLOAD   SP
 0076   REF   9   LAST 1219        11,2503   02076 1                      DT/2
 0077                              11,2504   20612 0                      9D
 0078                              11,2505   61500 0              TIX,1   FOUND
 0079                              11,2506   22507 0                      +1
 0080                              11,2507   43206 1              PUSH    DAD
 0081   REF   5   LAST 1227        11,2510   01551 1                      TC
 0082   REF  12   LAST 1227        11,2511   16074 0              STODL   TAU.
 0083                              11,2512   77615 0              DAD
 0084   REF  23   LAST 1224        11,2513   01517 0                      TET
 0085   REF  24   LAST 1229        11,2514   35517 1              STCALL  TET
 0086   REF   2   LAST 1217        11,2515   22376 0                      KEPPREP
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P0087 * AGC ROUTINE TO COMPUTE ACCELERATION COMPONENTS.

 0088                         11,2516   73150 1  ACCOMP   LXA,1  LXA,2
 0089   REF 11  LAST 1227     11,2517   02030 0                  PBODY
 0090   REF 12  LAST 1230     11,2520   02030 0                  PBODY
 0091                         11,2521   77775 1           VLOAD
 0092   REF 11  LAST 1215     11,2522   24007 0                  ZEROVEC
 0093   REF  2  LAST  114     11,2523   26062 1           STOVL  FV
 0094   REF 20  LAST 1136     11,2524   02032 1                  ALPHAV
 0095                         11,2525   53257 1           VSL*   VAD
 0096                         11,2526   57605 0                  0 -7,2
 0097   REF 22  LAST 1227     11,2527   01535 0                  FCV
 0098   REF  2  LAST  114     11,2530   02040 1           STORE  BETAV
 0099                         11,2531   65014 1           BOF    XCHX,2
 0100   REF 20  LAST 1224     11,2532   01756 1                  DIMOFLAG
 0101                         11,2533   22540 0                  +5
 0102   REF 19  LAST 1229     11,2534   01500 0                  DIFEQCNT
 0103   REF  8  LAST  115     11,2535   12132 1           STORE  VECTAB,2
 0104                         11,2536   77724 0           XCHX,2
 0105   REF 20  LAST 1230     11,2537   01500 0                  DIFEQCNT
 0106                         11,2540   53575 0           VLOAD  UNIT
 0107   REF 21  LAST 1230     11,2541   02032 1                  ALPHAV
 0108   REF 22  LAST 1230     11,2542   16032 1           STODL  ALPHAV
 0109                         11,2543   00045 0                  36D
 0110   REF  4  LAST 1134     11,2544   02070 1           STORE  ALPHAM
 0111                         11,2545   77624 1           CALL
 0112   REF  1                11,2546   22650 1                  GAMCOMP
 0113                         11,2547   66175 1           VLOAD  SXA,1
 0114   REF  3  LAST 1230     11,2550   02040 1                  BETAV
 0115   REF 33  LAST 1212     11,2551   00051 0                  S2
 0116   REF 23  LAST 1230     11,2552   16032 1           STODL  ALPHAV
 0117   REF  2  LAST  114     11,2553   02072 0                  BETAM
 0118   REF  5  LAST 1230     11,2554   02070 1           STORE  ALPHAM
 0119                         11,2555   71214 0           BOF    DLOAD
 0120   REF  3  LAST 1218     11,2556   00342 1                  MIDFLAG
 0121   REF  1                11,2557   23022 0                  OBLATE
 0122   REF 25  LAST 1229     11,2560   01517 0                  TET
 0123                         11,2561   77624 1           CALL
 0124   REF  3  LAST  985     11,2562   33664 0                  LSPOS
 0125                         11,2563   72174 0           AXT,2  LXA,1
 0126                         11,2564   00002 0                  2
 0127   REF 34  LAST 1230     11,2565   00051 0                  S2
 0128                         11,2566   77614 1           BOF
 0129   REF 24  LAST 1228     11,2567   00343 0                  MOONFLAG
 0130                         11,2570   22573 0                  +3
 0131                         11,2571   77076 0           VCOMP  AXT,2
 0132                         11,2572   00000 1                  0
 0133   REF  4  LAST 1230     11,2573   02040 1           STORE  BETAV
 0134   REF  3  LAST  115     11,2574   26105 1           STOVL  RPQV
 0135                           11,2575   00003 1                    2D
 0136   REF   2  LAST  114      11,2576   02122 1           STORE    RPSV
 0137                           11,2577   45335 0           SLOAD    DSU
 0138   REF  20  LAST 1219      11,2600   01012 0                    MODREG
 0139   REF   1                 11,2601   25776 0                    OCT27
 0140                           11,2602   43030 0           BHIZ     BOF
 0141                           11,2603   22606 1                    +3
 0142   REF  21  LAST 1230      11,2604   01750 1                    DIMOFLAG
 0143   REF   1                 11,2605   22622 1                    GETRPSV
 0144                           11,2606   74375 0           VLOAD    VXSC
 0145   REF  24  LAST 1230      11,2607   02032 1                    ALPHAV
 0146   REF   6  LAST 1230      11,2610   02070 1                    ALPHAM
 0147                           11,2611   52257 0           VSR*     VSU
 0148                           11,2612   57175 0                    1,2
 0149   REF   5  LAST 1230      11,2613   02040 1                    BETAV
 0150                           11,2614   77724 0           XCHX,2
 0151   REF  21  LAST 1230      11,2615   01500 0                    DIFEQCNT
 0152   REF   9  LAST 1230      11,2616   12140 1           STORE    VECTAB +6,2
 0154   REF   7  LAST  115      11,2617   02114 1           STORE    RQVV
 0155                           11,2620   77724 0           XCHX,2
 0156   REF  22  LAST 1231      11,2621   01500 0                    DIFEQCNT
 0157                           11,2622   62175 0  GETRPSV  VLOAD    INCR,1
 0158   REF   4  LAST 1230      11,2623   02105 1                    RPQV
 0159                           11,2624   00004 0                    4
 0160                           11,2625   43014 0           CLEAR    BOF
 0161   REF   3  LAST 1216      11,2626   04260 1                    RPQFLAG
 0162   REF  25  LAST 1230      11,2627   00343 0                    MOONFLAG
 0163                           11,2630   22635 1                    +5
 0164                           11,2631   53261 1           VSR      VAD
 0165                           11,2632   20612 0                    9D
 0166   REF   3  LAST 1231      11,2633   02122 1                    RPSV
 0167   REF   4  LAST 1231      11,2634   02122 1           STORE    RPSV
 0168                           11,2635   77624 1           CALL
 0169   REF   2  LAST 1230      11,2636   22650 1                    GAMCOMP
 0170                           11,2637   62174 1           AXT,2    INCR,1
 0171                           11,2640   00004 0                    4
 0172                           11,2641   00004 0                    4
 0173                           11,2642   77775 1           VLOAD
 0174   REF   5  LAST 1231      11,2643   02122 1                    RPSV
 0175   REF   6  LAST 1231      11,2644   36040 0           STCALL   BETAV
 0176   REF   3  LAST 1231      11,2645   22650 1                    GAMCOMP
 0177                           11,2646   77650 1           GOTO
 0178   REF   2  LAST 1230      11,2647   23022 0                    OBLATE
 0179                           11,2650   74575 0  GAMCOMP  VLOAD    VSR1
 0180   REF   7  LAST 1231      11,2651   02040 1                    BETAV
 0181                           11,2652   40236 1           VSQ      SETPD
 0182                           11,2653   00001 0                    0
 0183                           11,2654   61501 1           NORM     ROUND
 0184                           11,2655   00040 0                    31D
 0185                           11,2656   60325 0           PDDL     NORM          NORMED B SQUARED TO PD LIST
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0186   REF   7  LAST 1231   11,2657   02070 1                 ALPHAM     NORMALIZE (LESS ONE) LENGTH OF ALPHA
0187                        11,2660   00041 1                 32D        SAVING NORM SCALE FACTOR IN X1
0188                        11,2661   63342 1        SR1      PDVL
0189   REF   8  LAST 1231   11,2662   02040 1                 BETAV      C(PDL+2) = ALMOST NORMED ALPHA
0190                        11,2663   77656 1        UNIT
0191   REF   9  LAST 1232   11,2664   16040 1        STODL    BETAV
0192                        11,2665   00045 0                 36D
0193   REF   3  LAST 1230   11,2666   02072 0        STORE    BETAM
0194                        11,2667   55301 0        NORM     BDDV       FORM NORMALIZED QUOTIENT ALPHAM/BETAM
0195                        11,2670   00042 1                 33D
0196                        11,2671   41562 0        SR1R     PUSH       C(PDL+2) = ALMOST NORMALIZED RHO.
0197                        11,2672   77743 1        DLOAD*
0198   REF   1              11,2673   27710 1                 ASCALE,1
0199   REF  22  LAST 1229   11,2674   00051 0        STORE    S1
0200                        11,2675   57124 1        XCHX,2   XAD,2
0201   REF  23  LAST 1232   11,2676   00050 1                 S1
0202                        11,2677   00040 0                 32D
0203                        11,2700   71264 1        XSU,2    DLOAD
0204                        11,2701   00041 1                 33D
0205                        11,2702   00003 1                 2D
0206                        11,2703   65057 0        SR*      XCHX,2
0207                        11,2704   57177 1                 0 -1,2
0208   REF  24  LAST 1232   11,2705   00050 1                 S1
0209                        11,2706   74406 0        PUSH     SR1R       RHO/4 TO 4D
0210                        11,2707   50315 0        PDVL     DOT
0211   REF  25  LAST 1231   11,2710   02032 1                 ALPHAV
0212   REF  10  LAST 1232   11,2711   02040 1                 BETAV
0213                        11,2712   44372 1        SL1R     BDSU       (RHO/4) - 2(ALPHAV/2.BETAV/2)
0214                        11,2713   57206 1        PUSH     DMPR       TO PDL+6
0215                        11,2714   00005 1                 4
02155                       11,2715   77752 1        SL1
0216                        11,2716   43206 1        PUSH     DAD
0217   REF   1              11,2717   25756 1                 DQUARTER
0218                        11,2720   75406 1        PUSH     SQRT
0219                        11,2721   41475 1        DMPR     PUSH
0220                        11,2722   00013 0                 10D
0221                        11,2723   43352 1        SL1      DAD
0222   REF   2  LAST 1232   11,2724   25756 1                 DQUARTER
0223                        11,2725   43325 1        PDDL     DAD        (1/4)+2((Q+1)/4)     TO PD+14D
0224                        11,2726   00013 0                 10D
0225   REF   3  LAST  938   11,2727   24005 1                 HALFDP
0226                        11,2730   72475 1        DMPR     SL1
0227                        11,2731   00011 1                 8D
0228                        11,2732   56215 1        DAD      DDV
0229   REF   1              11,2733   25750 1                 THREE/8
0230                        11,2734   00017 1                 14D
0231                        11,2735   74275 1        DMPR     VXSC
0232                        11,2736   00007 0                 6
0233   REF  11  LAST 1232   11,2737   02040 1                 BETAV                     -
0234                        11,2740   64515 1        PDVL     VSR3       (G/2)(C(PD+4))B/2 TO PD+16D
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 0235    REF  26  LAST 1232   11,2741   02032 1                      ALPHAV
 0236                         11,2742   41455 0            VAD       PUSH          A12 + C(PD+16D) TO PD+16D
 0237                         11,2743   41345 0            DLOAD     DMP
 0238                         11,2744   00001 0                      0
 0239                         11,2745   00015 0                      12D           -
 0240                         11,2746   61501 1            NORM      ROUND
 0241                         11,2747   00037 0                      30D
 0242                         11,2750   40665 0            BDDV      DMP*
 0243                         11,2751   00003 1                      2
 0244    REF   6  LAST 1227   11,2752   51770 0                      MUEARTH,2
 0245                         11,2753   74276 1            DCOMP     VXSC
 0246                         11,2754   57124 1            XCHX,2    XAD,2
 0247    REF  25  LAST 1232   11,2755   00050 1                      S1
 0248    REF  35  LAST 1230   11,2756   00051 0                      S2
 0249                         11,2757   55064 0            XSU,2     XSU,2
 0250                         11,2760   00036 1                      30D
 0251                         11,2761   00037 0                      31D
 02513                        11,2762   77600 1            BOV                     CLEAR OVIND
 02516                        11,2763   22764 1                      +1
 0252                         11,2764   65057 0            VSR*      XCHX.2
 0253                         11,2765   57177 1                      0 -1,2
 0254    REF  26  LAST 1233   11,2766   00050 1                      S1
 0255                         11,2767   77655 1            VAD
 0256    REF   3  LAST 1230   11,2770   02062 1                      FV
 0257    REF      LAST 1233   11,2771   02062 1            STORE     FV
 025805                       11,2772   43400 1            BOV       RVQ           RETURN IF NO OVERFLOW
 02581                        11,2773   22774 0                      +1
 025815                       11,2774   51575 1  GOBAQUE   VLOAD     ABVAL
 025816 REF       LAST 1215   11,2775   01521 0                      TDELTAV
 025817                       11,2776   77654 0            BZE
 025818 REF    1              11,2777   23017 0                      INT-ABRT
 025819                       11,3000   54345 1            DLOAD     SR
 02582   REF   2  LAST  114   11,3001   02100 1                      H
 025825                       11,3002   20612 0                      9D
 02583                        11,3003   44206 0            PUSH      BDSU
 025835 REF    9  LAST 1229   11,3004   01551 1                      TC
 02584   REF  13  LAST 1229   11,3005   16074 0            STODL     TAU.
 025845 REF   26  LAST 1230   11,3006   01517 0                      TET
 02585                        11,3007   45425 0            DSU       STADR
 025855 REF   27  LAST 1233   11,3010   42260 0            STCALL    TET
 02586   REF   3  LAST 1229   11,3011   22376 0                      KEPPREP
 025865                       11,3012   77624 1            CALL
 02587   REF   6  LAST 1225   11,3013   23441 1                      RECTIFY
 025875                       11,3014   77614 1            SETGO
 02588   REF   4  LAST 1231   11,3015   04020 1                      RPQFLAG
 025885 REF    4  LAST 1224   11,3016   27257 1                      TESTLOOP

 025886                       11,3017   77776 1  INT-ABRT  EXIT
 025887 REF    6  LAST 1201   11,3020   0 5652 0           TC        POODOO
 025888                       11,3021   00430 0            OCT       00430
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P0259   THE OBLATE ROUTINE COMPUTES THE ACCELERATION DUE TO OBLATENESS. IT USES THE UNIT OF THE VEHICLE
R0261   POSITION VECTOR FOUND IN ALPHAV AND THE DISTANCE TO THE CENTER IN ALPHAM. THIS IS ADDED TO THE SUM OF THE
R0263   DISTURBING ACCELERATIONS IN FV AND THE PROPER DIFEQ STAGE IS CALLED VIA X1.
 0265                        11,3022   71354 0  OBLATE   LXA,2  DLOAD
 0266   REF  13  LAST 1230   11,3023   02030 0                  PBODY
 0267   REF   8  LAST 1232   11,3024   02070 1                  ALPHAM
 0268                        11,3025   44601 0           SETPD  DSU*
 0269                        11,3026   00001 0                  0
 0270   REF   1              11,3027   50053 1                  RDE,2
 0271                        11,3030   43044 0           BPL    BOF               GET URPV
 0272   REF   1              11,3031   23232 0                  NBRANCH
 0273   REF  26  LAST 1231   11,3032   00343 0                  MOONFLAG
 0274   REF   1              11,3033   23241 1                  COSPHIE
 0275                        11,3034   65375 0           VLOAD  PDDL
 0276   REF  27  LAST 1233   11,3035   02032 1                  ALPHAV
 0277   REF  28  LAST 1233   11,3036   01517 0                  TET
 0278                        11,3037   45125 0           PDDL   CALL
 0279   REF   1              11,3040   25746 0                  3/5
 0280   REF   6  LAST 1133   11,3041   51670 1                  R-TO-RP
 0284   REF   1              11,3042   00017 1           STORE  URPV
 0285                        11,3043   47375 0           VLOAD  VXV
 0286   REF   3  LAST 1142   11,3044   02013 1                  504LM
 0287   REF   3  LAST 1213   11,3045   24001 0                  ZUNIT
 0288                        11,3046   61255 1           VAD    VXM
 0289   REF   4  LAST 1234   11,3047   24001 0                  ZUNIT
 0290   REF   8  LAST 1145   11,3050   00025 0                  MMATRIX
 0291                        11,3051   77656 1           UNIT                     POSSIBLY UNNECESSARY
 0292   REF   1              11,3052   00025 0  COMTERM  STORE  UZ
 0293                        11,3053   57345 1           DLOAD  DMPR
 0294   REF   1              11,3054   00023 0                  COSPHI/2
 0295   REF   1              11,3055   25760 1                  3/32
 0296                        11,3056   63525 0           PDDL   DSQ               P2/64 TO PD0
 0297   REF   2  LAST 1234   11,3057   00023 0                  COSPHI/2
 0298                        11,3060   45275 0           DMPR   DSU
 0299   REF   1              11,3061   25762 0                  15/16
 0300   REF   1              11,3062   25754 0                  3/64
 0301                        11,3063   57206 1           PUSH   DMPR              P3/32 TO PD2
 0302   REF   3  LAST 1234   11,3064   00023 0                  COSPHI/2
 0303                        11,3065   76405 1           DMP    SL1R
 0304   REF   1              11,3066   25766 1                  7/12
 0305                        11,3067   57325 1           PDDL   DMPR
 0306                        11,3070   00001 0                  0
 0307   REF   1              11,3071   25774 1                  2/3
 0308                        11,3072   41421 0           BDSU   PUSH              P4/128 TO PD4
 0309                        11,3073   57275 0           DMPR   DMPR
 0310   REF   4  LAST 1234   11,3074   00023 0                  COSPHI/2          BEGIN COMPUTING P5/1024
 0311   REF   1              11,3075   25770 0                  9/16
 0312                        11,3076   57325 1           PDDL   DMPR
 0313                        11,3077   00003 1                  2
 0314   REF   1              11,3100   25772 1                  5/128
 0315                          11,3101   77621 1            BDSU
 0316                          11,3102   77603 1            DMP*
 0317   REF    1               11,3103   51764 0                   J4REQ/J3,2
 0318                          11,3104   43271 1            DDV    DAD                           -3
 0319   REF    9  LAST 1234    11,3105   02070 1                   ALPHAM           (((P5/256)B 2 /R+P4/32)  /R+P3/8)ALPHAV
 0320                          11,3106   00005 1                   4                           4              3
 0321                          11,3107   56273 1            DMPR*  DDV
 0322   REF    1               11,3110   51760 1                   2J3RE/J2,2
 0323   REF   10  LAST 1235    11,3111   02070 1                   ALPHAM
 0324                          11,3112   74215 1            DAD    VXSC
 0325                          11,3113   00003 1                   2
 0326   REF   28  LAST 1234    11,3114   02032 1                   ALPHAV
 0327   REF    1               11,3115   14033 1            STODL  TVEC
 0328                          11,3116   70403 1            DMP*   SR1
 0329   REF    2  LAST 1235    11,3117   51764 0                   J4REQ/J3,2
 0330                          11,3120   43271 1            DDV    DAD
 0331   REF   11  LAST 1235    11,3121   02070 1                   ALPHAM                          -3
 0332                          11,3122   50473 1            DMPR*  SR3
 0333   REF    2  LAST 1235    11,3123   51760 1                   2J3RE/J2,2          3          4
 0334                          11,3124   43271 1            DDV    DAD
 0335   REF   12  LAST 1235    11,3125   02070 1                   ALPHAM
 0336                          11,3126   76561 1            VXSC   VSL1
 0337   REF    2  LAST 1234    11,3127   00025 0                   UZ
 0338                          11,3130   77645 0            BVSU
 0339   REF    2  LAST 1235    11,3131   00033 1                   TVEC
 0340   REF    3  LAST 1235    11,3132   14033 1            STODL  TVEC
 0341   REF   13  LAST 1235    11,3133   02070 1                   ALPHAM
 0342                          11,3134   63501 0            NORM   DSQ
 0343   REF   66  LAST 1227    11,3135   00047 1                   X1
 0344                          11,3136   60316 0            DSQ    NORM
 0345   REF   27  LAST 1233    11,3137   00051 0                   S1                        4
 0346                          11,3140   54606 0            PUSH   BDDV*            NORMED R  TO 0D
 0347   REF    1               11,3141   51754 0                   J2REQSQ,2
 0348                          11,3142   40161 0            VXSC   BOV
 0349   REF    4  LAST 1235    11,3143   00033 1                   TVEC
 0350                          11,3144   23145 0                   +1               (RESET OVERFLOW INDICATOR)
 0351                          11,3145   56070 0            XAD,1  XAD,1
 0352   REF   67  LAST 1235    11,3146   00046 0                   X1
 0353   REF   68  LAST 1235    11,3147   00046 0                   X1
 0354                          11,3150   53670 0            XAD,1  VSL*
 0355   REF   28  LAST 1235    11,3151   00050 1                   S1
 0356                          11,3152   20153 1                   0 -22D,1
 0357                          11,3153   40055 0            VAD    BOV
 0358   REF    5  LAST 1233    11,3154   02062 1                   FV
 0359   REF    1               11,3155   22774 0                   GOBAQUE
 0360   REF    6  LAST 1235    11,3156   36062 0            STCALL FV
 0361   REF    1               11,3157   27725 1                   QUALITY1

 0362                          11,3160   77716 1  QUALITY3 DSQ                     J22 TERM X R**4 IN 2D, SCALED B61
A0363                                                                               AS VECTOR.
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 0364                        11,3161   41206 0        PUSH     DMP          STORE COSPHI**2 SCALED B2 IN 8D
 0365   REF    3  LAST 1213  11,3162   27712 0                 5/8          5 SCALED B3
 0366                        11,3163   60525 0        PDDL     SR2          PUT 5 COSPHI**2, D5, IN 8D, GET
A0367                                                                       COSPHI**2 D2 FROM 8D
 0368                        11,3164   44215 1        DAD      BDSU         END UP WITH (1-7 COSPHI**2), B5
 0369                        11,3165   00011 1                 8D           ADDING COSPHI**2 B4 SAME AS COSPHI**2
A0370                                                                       X 2 D5
 0371   REF    6  LAST 1199  11,3166   11043 0                 D1/32        1 SCALED B5
 0372                        11,3167   41205 0        DMP      DMP
 0373   REF    2  LAST 1234  11,3170   00017 1                 URPV         X COMPONENT
 0374   REF    4  LAST 1236  11,3171   27712 0                 5/8          5 SCALED B3
 0375                        11,3172   56561 0        VXSC     VSL5         AFTER SHIFT, SCALED B5
 0376   REF    3  LAST 1236  11,3173   00017 1                 URPV         VECTOR, B1.
 0377                        11,3174   77725 1        PDDL                  VECTOR INTO 8D, 10D, 12D, SCALED B5.
A0378                                                                       GET 5 COSPHI**2 OUT OF 8D
 0379                        11,3175   43225 0        DSU      DAD
 0380   REF    7  LAST 1236  11,3176   11043 0                 D1/32        1 B5
 0381                        11,3177   00011 1                 8D           X COMPONENT (SAME AS MULTIPLYING
A0382                                                                       BY UNITX)
 0383                        11,3200   14011 1        STODL    8D
 0384   REF    4  LAST 1236  11,3201   00017 1                 URPV         X COMPONENT
 0385                        11,3202   41205 0        DMP      DMP
 0386   REF    5  LAST 1236  11,3203   00023 0                 URPV +4      Z COMPONENT
 0387   REF    5  LAST 1236  11,3204   27712 0                 5/8          5 B3 ANSWER B5
 0388                        11,3205   43352 1        SL1      DAD          FROM 12D FOR Z COMPONENT (SL1 GIVES 10
A0389                                                                       INSTEAD OF 5 FOR COEFFICIENT)
 0390                        11,3206   60325 0        PDDL     NORM         BACK INTO 12D FOR Z COMPONENT.
 0391   REF   14  LAST 1235  11,3207   02070 1                 ALPHAM       SCALED B27 FOR MOON
 0392   REF   28  LAST 1192  11,3210   00050 1                 X2
 0393                        11,3211   67206 1        PUSH     SLOAD        STORE IN 14D, DESTROYING URPV
A0394                                                                       X COMPONENT
 0395   REF    1             11,3212   01354 1                 E32C31RM
 0396                        11,3213   74271 0        DDV      VXSC         IF X2 = 0, DIVISION GIVES B53, VXSC
A0397                                                                       OUT OF 8D B5 GIVES B58
 0398                        11,3214   53257 1        VSL*     VAD          SHIFT MAKES B61, FOR ADDITION OF
A0399                                                                       VECTOR IN 2D
 0400                        11,3215   57601 1                 0 -3,2
 0401                        11,3216   70257 0        VSL*     V/SC         OPERAND FROM 0D, B108 FOR X1 = 0
 0402                        11,3217   20146 0                 0 -27D,1     FOR X1 = 0, MAKES B88, GIVING B-20
A0403                                                                       FOR RESULT.
 0404                        11,3220   65325 0        PDDL     PDDL
 0405   REF   29  LAST 1234  11,3221   01517 0                 TET
 0406   REF    6  LAST 1236  11,3222   27712 0                 5/8          ANY NON-ZERO CONSTANT
 0407                        11,3223   45154 0        LXA,2    CALL         POSITION IN 0D, TIME IN 6D. X2 LEFT
A0408                                                                       ALONE.
 0409   REF   14  LAST 1234  11,3224   02030 0                 PBODY
 0410   REF    9  LAST 1213  11,3225   55716 1                 RP-TO-R
 0411                        11,3226   40055 0        VAD      BOV          OVERFLOW INDICATOR RESET IN "RP-TO-R"
 0412   REF    7  LAST 1235  11,3227   02062 1                 FV
 0413   REF    2  LAST 1235  11,3230   22774 0                 GOBAQUF
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0414  REF   8  LAST 1236   11,3231   02062 1                   STORE   FV
0415                       11,3232   72135 0  NBRANCH          SLOAD   LXA,1
0416  REF  23  LAST 1231   11,3233   01501 1                           DIFEQCNT
0417  REF 734  LAST 1224   11,3234   00154 1                           MPAC
0418                       11,3235   73205 1                   DMP     CGOTO
0419  REF   1              11,3236   27714 0                           -1/12
0420  REF 735  LAST 1237   11,3237   00155 0                           MPAC
0421  REF   1              11,3240   23247 1                           DIFEQTAB
0422                       11,3241   77745 1  COSPHIE          DLOAD
0423  REF  29  LAST 1235   11,3242   02036 0                           ALPHAV +4
0424  REF   5  LAST 1234   11,3243   24023 0                   STOVL   COSPHI/2
0425  REF   5  LAST 1234   11,3244   24001 0                           ZUNIT
0426                       11,3245   77650 1                   GOTO
0427  REF   1              11,3246   23052 1                           COMTERM
0428  REF   1              11,3247   23466 1  DIFEQTAB         CADR    DIFEQ+0
0429  REF   1              11,3250   23472 1                   CADR    DIFEQ+1
0430  REF   1              11,3251   23503 0                   CADR    DIFEQ+2
0431                       11,3252   77214 0  TIMESTEP         BOF     VLOAD
0432  REF   4  LAST 1230   11,3253   00342 1                           MIDFLAG
0433  REF   1              11,3254   23303 0                           RECTEST
0434  REF  23  LAST 1230   11,3255   01535 0                           RCV
0435                       11,3256   41241 0                   DOT     DMP
0436  REF  17  LAST 1227   11,3257   01543 1                           VCV
0437  REF  10  LAST 1229   11,3260   02076 1                           DT/2          (R.V) X (DELTA T)
0438                       11,3261   77640 0                   BMN
0439  REF   2  LAST 1237   11,3262   23303 0                           RECTEST
0440                       11,3263   43014 0                   BON     BOF
0441  REF  27  LAST 1234   11,3264   00303 1                           MOONFLAG
0442  REF   1              11,3265   23360 0                           LUNSPH
0443  REF   5  LAST 1233   11,3266   04340 1                           RPQFLAG
0444  REF   1              11,3267   23355 0                           EARSPH
0445                       11,3270   45145 0                   DLOAD   CALL
0446  REF  30  LAST 1236   11,3271   01517 0                           TET
0447  REF   4  LAST 1230   11,3272   33664 0                           LSPOS         RPOV IN MPAC
0448  REF   5  LAST 1231   11,3273   02105 1                   STORE   RPQV          RPQV
0449                       11,3274   77754 1                   LXA,2
0450  REF  15  LAST 1236   11,3275   02030 0                           PBODY
0451                       11,3276   51445 0  INLUNCHK         BVSU    ABVAL
0452  REF  24  LAST 1237   11,3277   01535 0                           RCV
0453                       11,3300   50025 0                   DSU     BMN
0454  REF   1              11,3301   27720 1                           RSPHERE
0455  REF   1              11,3302   23375 1                           DOSWITCH
0456                       11,3303   51575 1  RECTEST          VLOAD   ABVAL         RECTIFY IF
0457  REF   9  LAST 1233   11,3304   01521 0                           TDELTAV
0458                       11,3305   77600 1                   BOV
0459  REF   1              11,3306   23331 1                           CALLRECT
0460                       11,3307   51025 1                   DSU     BPL              1) EITHER TDELTAV OR TNUV EQUALS OR
0461  REF   2  LAST  958   11,3310   25764 0                           3/4                 EXCEEDS 3/4 IN MAGNITUDE
0462  REF   2  LAST 1237   11,3311   23331 1                           CALLRECT
0463                       11,3312   53615 0                   DAD     SL*                           OR
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0464   REF    3  LAST 1237    11,3313    25764 0                     3/4
0465                          11,3314    57605 0                     0 -7,2                  2) ABVAL(TDELTAV) EQUALS OR EXCEEDS
0466                          11,3315    45271 1            DDV      DSU                        .01(ABVAL(RCV))
0467                          11,3316    00013 0                     10D
0468   REF    1               11,3317    27716 1                     RECRATIO
0469                          11,3320    77244 0            BPL      VLOAD
0470   REF    3  LAST 1237    11,3321    23331 1                     CALLRECT
0471   REF    8  LAST 1215    11,3322    01527 0                     TNUV
0472                          11,3323    45246 0            ABVAL    DSU
0473   REF    4  LAST 1238    11,3324    25764 0                     3/4
0474                          11,3325    77600 1            BOV
0475   REF    4  LAST 1238    11,3326    23331 1                     CALLRECT
0476                          11,3327    77640 0            BMN
0477   REF    1               11,3330    23333 0                     INTGRATE
0478                          11,3331    77624 1  CALLRECT  CALL
0479   REF    7  LAST 1233    11,3332    23441 1                     RECTIFY
0480                          11,3333    77775 1  INTGRATE  VLOAD
0481   REF    9  LAST 1238    11,3334    01527 0                     TNUV
0482   REF    1               11,3335    25135 1            STOVL    ZV
0483   REF   10  LAST 1237    11,3336    01521 0                     TDELTAV
0484   REF    2  LAST  104    11,3337    01127 1            STORE    YV
0485                          11,3340    77614 1            CLEAR
0486   REF    1               11,3341    00261 1                     JSWITCH
0487                          11,3342    66375 0  DIFEQ0    VLOAD    SSP
0488   REF    3  LAST 1238    11,3343    01127 1                     YV
0489   REF   24  LAST 1237    11,3344    01501 1                     DIFEQCNT
0490                          11,3345    00000 1                     0
0491   REF   30  LAST 1237    11,3346    16032 1            STODL    ALPHAV
0492   REF    3  LAST 1137    11,3347    24007 0                     DPZERO
0493   REF    3  LAST 1233    11,3350    02100 1            STORE    H                   START H AT ZERO. GOES 0(DELT/2)DELT.
0494                          11,3351    52014 0            BON      GOTO
0495   REF    2  LAST 1238    11,3352    00301 0                     JSWITCH
0496   REF    1               11,3353    23705 1                     DOW..
0497   REF    1               11,3354    22516 0                     ACCOMP
0498                          11,3355    52175 0  EARSPH    VLOAD    GOTO
0499   REF    6  LAST 1237    11,3356    02105 1                     RPQV
0500   REF    1               11,3357    23276 0                     INLUNCHK
0501                          11,3360    60545 0  LUNSPH    DLOAD    SR2
0502                          11,3361    00013 0                     10D
0503                          11,3362    50025 0            DSU      BMN
0504   REF    2  LAST 1237    11,3363    27720 1                     RSPHERE
0505   REF    3  LAST 1237    11,3364    23303 0                     RECTEST
0506                          11,3365    71214 0            BOF      DLOAD
0507   REF    6  LAST 1237    11,3366    04340 1                     RPQFLAG
0508   REF    2  LAST 1237    11,3367    23375 1                     DOSWITCH
0509   REF   31  LAST 1237    11,3370    01517 0                     TET
0510                          11,3371    77624 1            CALL
0511   REF    2  LAST  487    11,3372    33664 0                     LUNPOS
0512                          11,3373    77676 0            VCOMP
0513   REF    7  LAST 1238    11,3374    02105 1            STORE    RPQV
```

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 0514                          11,3375    77624 1   DOSWITCH CALL
 0515     REF    1             11,3376    23401 0                     ORIGCHNG
 0516                          11,3377    77650 1            GOTO
 0517     REF    2  LAST 1239  11,3400    23333 0                     INTGRATE
 0518                          11,3401    45020 1   ORIGCHNG STQ      CALL
 0519     REF    3  LAST  114  11,3402    02112 1                     ORIGEX
 0520     REF    8  LAST 1238  11,3403    23441 1                     RECTIFY
 0521                          11,3404    53775 1            VLOAD    VSL*
 0522     REF   25  LAST 1237  11,3405    01535 0                     RCV
 0523                          11,3406    57576 1                     0,2
 0524                          11,3407    53651 0            VSU      VSL*
 0525     REF    8  LAST 1238  11,3410    02105 1                     RPQV
 0526                          11,3411    57574 0                     2,2
 0527     REF   14  LAST 1225  11,3412    01503 0            STORE    RRECT
 0528     REF   26  LAST 1239  11,3413    15535 0            STODL    RCV
 0529     REF   32  LAST 1239  11,3414    01517 0                     TET
 0530                          11,3415    77624 1            CALL
 0531     REF    1             11,3416    33775 1                     LUNVEL
 0532                          11,3417    57414 1            BOF      VCOMP
 0533     REF   28  LAST 1237  11,3420    00343 0                     MOONFLAG
 0534                          11,3421    23422 1                     +1
 0535                          11,3422    53715 1            PDVL     VSL*
 0536     REF   18  LAST 1237  11,3423    01543 1                     VCV
 0537                          11,3424    57576 1                     0,2
 0538                          11,3425    77651 0            VSU
 0539                          11,3426    77657 0            VSL*
 0540                          11,3427    57574 0                     0 +2,2
 0541     REF   10  LAST 1225  11,3430    01511 0            STORE    VRECT
 0542     REF   19  LAST 1239  11,3431    01543 1            STORE    VCV
 0543                          11,3432    67154 0            LXA,2    SXA,2
 0544     REF    4  LAST 1239  11,3433    02112 1                     ORIGEX
 0545     REF   19  LAST 1220  11,3434    00052 0                     QPRET
 0546                          11,3435    52014 0            BON      GOTO
 0547     REF   29  LAST 1239  11,3436    00303 1                     MOONFLAG
 0548     REF    2  LAST 1212  11,3437    26711 1                     CLRMOON
 0549     REF    3  LAST 1212  11,3440    26716 0                     SETMOON
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P0550    THE RECTIFY SUBROUTINE IS CALLED BY THE INTEGRATION PROGRAM AND OCCASIONALLY BY THE MEASUREMENT INCORPORATION
R0552    ROUTINES TO ESTABLISH A NEW CONIC.


 0553                            11,3441    77354 0  RECTIFY  LXA,2   VLOAD
 0554    REF  16  LAST 1237      11,3442    02030 0                   PBODY
 0555    REF  11  LAST 1238      11,3443    01521 0                   TDELTAV
 0556                            11,3444    53257 1           VSL*    VAD
 0557                            11,3445    57605 0                   0 -7,2
 0558    REF  27  LAST 1239      11,3446    01535 0                   RCV
 0559    REF  15  LAST 1239      11,3447    01503 0           STORE   RRECT
 0560    REF  28  LAST 1240      11,3450    25535 0           STOVL   RCV
 0561    REF  10  LAST 1238      11,3451    01527 0                   TNUV
 0562                            11,3452    53257 1           VSL*    VAD
 0563                            11,3453    57602 1                   0 -4,2
 0564    REF  20  LAST 1239      11,3454    01543 1                   VCV
 0565    REF  11  LAST 1239      11,3455    01511 0  MINIRECT STORE   VRECT
 0566    REF  21  LAST 1240      11,3456    25543 1           STOVL   VCV
 0567    REF  12  LAST 1230      11,3457    24007 0                   ZEROVEC
 0568    REF  12  LAST 1240      11,3460    01521 0           STORE   TDELTAV
 0569    REF  11  LAST 1240      11,3461    15527 0           STODL   TNUV
 0570    REF  13  LAST 1240      11,3462    24007 0                   ZEROVEC
 0571    REF  10  LAST 1233      11,3463    01551 1           STORE   TC
 0572    REF   3  LAST 1228      11,3464    01553 0           STORE   XKEP
 0573                            11,3465    77616 0           RVQ
```

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P0574   THE THREE DIFEQ ROUTINES - DIFEQ+0, DIFEQ+12, AND DIFEQ+24 - ARE ENTEREDTO PROCESS THE CONTRIBUTIONS AT THE
R0576   BEGINNING, MIDDLE, AND END OF THE TIMESTEP, RESPECTIVELY. THE UPDATING IS DONE BY THE NYSTROM METHOD.
 0578                        11,3466   64575 1  DIFEQ+0   VLOAD   VSR3
 0579   REF   9  LAST 1237   11,3467   02062 1                    FV
 0580   REF   2  LAST  114   11,3470   36046 0            STCALL  PHIV
 0581   REF   1              11,3471   23646 1                    DIFEQCOM
 0582                        11,3472   74575 0  DIFEQ+1   VLOAD   VSR1
 0583   REF  10  LAST 1241   11,3473   02062 1                    FV
 0584                        11,3474   53206 0            PUSH    VAD
 0585   REF   3  LAST 1241   11,3475   02046 1                    PHIV
 0586   REF   2  LAST  114   11,3476   26054 1            STOVL   PSIV
 0587                        11,3477   53362 0            VSR1    VAD
 0588   REF   4  LAST 1241   11,3500   02046 1                    PHIV
 0589   REF   5  LAST 1241   11,3501   36046 0            STCALL  PHIV
 0590   REF   2  LAST 1241   11,3502   23646 1                    DIFEQCOM
 0591                        11,3503   57345 1  DIFEQ+2   DLOAD   DMPR
 0592   REF   4  LAST 1238   11,3504   02100 1                    H
 0593   REF   2  LAST 1227   11,3505   25774 1                    DP2/3
 0594                        11,3506   74206 0            PUSH    VXSC
 0595   REF   6  LAST 1241   11,3507   02046 1                    PHIV
 0596                        11,3510   53372 1            VSL1    VAD
 0597   REF   2  LAST 1238   11,3511   01135 1                    ZV
 0598                        11,3512   53361 0            VXSC    VAD
 0599   REF   5  LAST 1241   11,3513   02100 1                    H
 0600   REF   4  LAST 1238   11,3514   01127 1                    YV
 0601   REF   5  LAST 1241   11,3515   25127 1            STOVL   YV
 0602   REF  11  LAST 1241   11,3516   02062 1                    FV
 0603                        11,3517   53322 1            VSR3    VAD
 0604   REF   3  LAST 1241   11,3520   02054 1                    PSIV
 0605                        11,3521   76561 1            VXSC    VSL1
 0606                        11,3522   77655 1            VAD
 0607   REF   3  LAST 1241   11,3523   01135 1                    ZV
 0608   REF   4  LAST 1241   11,3524   01135 1            STORE   ZV
 0609                        11,3525   45014 0            BOFF    CALL
 0610   REF   3  LAST 1238   11,3526   00341 1                    JSWITCH
 0611   REF   1              11,3527   23577 0                    ENDSTATE
 0612   REF  23  LAST 1216   11,3530   11244 0                    GRP2PC
 0613                        11,3531   77354 0            LXA,2   VLOAD
 0614   REF   2  LAST  104   11,3532   01117 1                    COLREG
 0615   REF   5  LAST 1241   11,3533   01135 1                    ZV
 0616                        11,3534   77732 1            VSL3                         ADJUST W-POSITION FOR STORAGE
 0617   REF  31  LAST 1155   11,3535   12467 1            STORE   W +54D,2
 0618                        11,3536   77775 1            VLOAD
 0619   REF   6  LAST 1241   11,3537   01127 1                    YV
 0620                        11,3540   40132 0            VSL3    BOV
 0621   REF   1              11,3541   23671 0                    WMATEND
 0622   REF  32  LAST 1241   11,3542   12401 1            STORE   W,2

 0623                        11,3543   77624 1            CALL
 0624   REF  24  LAST 1241   11,3544   11244 0                    GRP2PC
 0625                         11,3545   66354 0             LXA,2  SSP
 0626   REF   3  LAST 1241    11,3546   01117 1                    COLREG
 0627   REF  36  LAST 1233    11,3547   00052 0                    S2
 0628                         11,3550   00000 1                    0
 0629                         11,3551   67114 1             INCR,2 SXA,2
 0630                         11,3552   00006 1                    6
 0631   REF   7  LAST 1241    11,3553   01126 0                    YV
 0632                         11,3554   45104 0             TIX,2  CALL
 0633   REF   1               11,3555   23642 0                    RELOADSV
 0634   REF  25  LAST 1241    11,3556   11244 0                    GRP2PC
 0635                         11,3557   67154 0             LXA,2  SXA,2
 0636   REF   8  LAST 1242    11,3560   01126 0                    YV
 0637   REF   4  LAST 1242    11,3561   01117 1                    COLREG

 0638                         11,3562   77624 1   NEXTCOL   CALL
 0639   REF  26  LAST 1242    11,3563   11244 0                    GRP2PC
 0640                         11,3564   76754 0             LXA,2  VLOAD*
 0641   REF   5  LAST 1242    11,3565   01117 1                    COLREG
 0642   REF  33  LAST 1241    11,3566   75376 1                    W,2
 0643                         11,3567   77722 0             VSR3                        ADJUST W-POSITION FOR INTEGRATION
 0644   REF   9  LAST 1242    11,3570   01127 1             STORE  YV
 0645                         11,3571   76173 0             VLOAD* AXT,1
 0646   REF  34  LAST 1242    11,3572   75310 1                    W +54D,2
 0647                         11,3573   00000 1                    0
 0648                         11,3574   77722 0             VSR3                        ADJUST W-VELOCITY FOR INTEGRATION
 0649   REF   6  LAST 1241    11,3575   35135 0             STCALL ZV
 0650   REF   1               11,3576   23342 0                    DIFEQ0

 0651                         11,3577   77200 0   ENDSTATE  BOV    VLOAD
 0652   REF   3  LAST 1236    11,3600   22774 0                    GOBAQUE
 0653   REF   7  LAST 1242    11,3601   01135 1                    ZV
 0654   REF  12  LAST 1240    11,3602   25527 0             STOVL  TNUV
 0655   REF  10  LAST 1242    11,3603   01127 1                    YV
 0656   REF  13  LAST 1240    11,3604   01521 0             STORE  TDELTAV
 0657                         11,3605   43014 0             BON    BOFF
 0658   REF   3  LAST 1224    11,3606   04715 0                    MIDAVFLG
 0659   REF   1               11,3607   27633 1                    CKMID2               CHECK FOR MID2 BEFORE GOING TO TIMEINC
 0660   REF  22  LAST 1231    11,3610   01756 1                    DIMOFLAG
 0661   REF   5  LAST 1233    11,3611   27257 1                    TESTLOOP
 0662                         11,3612   77776 1             EXIT
 0663   REF 112  LAST 1226    11,3613  0 5353 1             TC     PHASCHNG
 0664                         11,3614   04022 0             OCT    04022                PHASE 1
 0665   REF  68  LAST 1216    11,3615  0 5504 0             TC     UPFLAG               PHASE CHANGE HAS OCCURRED BETWEEN
 0666   REF   4  LAST 1216    11,3616   00236 0             ADRES  REINTFLG             INTSTALL AND INTWAKE
 0667   REF 235  LAST 1226    11,3617  0 6037 0             TC     INTPRET
 0668                         11,3620   77731 1             SSP
 0669   REF  20  LAST 1234    11,3621   00053 1                    QPRET
 0670   REF   1               11,3622   23627 0                    AMOVED
 0671                         11,3623   52014 0             BON    GOTO
 0672   REF  27  LAST 1222    11,3624   01714 1                    VINTFLAG
 0673   REF   5  LAST 1226    11,3625    26661 1                     ATOPCSM
 0674   REF   4  LAST 1226    11,3626    26734 0                     ATOPLEM
 0675                         11,3627    66214 0  AMOVED    SET      SSP
 0676   REF   4  LAST 1241    11,3630    00061 0                     JSWITCH
 0677   REF   6  LAST 1242    11,3631    01120 0                     COLREG
 0678                         11,3632    77741 0            DEC      -30
 0679                         11,3633    66214 0            BOFF     SSP
 0680   REF  10  LAST 1222    11,3634    01755 1                     D6OR9FLG
 0681   REF   1               11,3635    23562 1                     NEXTCOL
 0682   REF   7  LAST 1243    11,3636    01120 0                     COLREG
 0683                         11,3637    77717 0            DEC      -48
 0684                         11,3640    77650 1            GOTO
 0685   REF   2  LAST 1243    11,3641    23562 1                     NEXTCOL

 0686                         11,3642    77745 1  RELOADSV  DLOAD                      RELOAD TEMPORARY STATE VECTOR
 0687   REF   9  LAST 1224    11,3643    01116 0                     TDEC              FROM PERMANENT IN CASE OF
 0688   REF  62  LAST 1223    11,3644    34041 0            STCALL   TDEC1
 0689   REF   1               11,3645    27141 0                     INTEGRV2          BY STARTING AT INTEGRV2.
 0690                         11,3646    43345 1  DIFEQCOM  DLOAD    DAD               INCREMENT H AND DIFEQCNT.
 0691   REF  11  LAST 1237    11,3647    02076 1                     DT/2
 0692   REF   6  LAST 1241    11,3650    02100 1                     H
 0693                         11,3651    66110 1            INCR,1   SXA,1
 0694                         11,3652    77763 0            DEC      -12
 0695   REF  25  LAST 1238    11,3653    01500 0                     DIFEQCNT          DIFEQCNT SET FOR NEXT ENTRY.
 0696   REF   7  LAST 1243    11,3654    02100 1            STORE    H
 0697                         11,3655    74561 0            VXSC     VSR1
 0698   REF  12  LAST 1241    11,3656    02062 1                     FV
 0699                         11,3657    74255 0            VAD      VXSC
 0700   REF   8  LAST 1242    11,3660    01135 1                     ZV
 0701   REF   8  LAST 1243    11,3661    02100 1                     H
 0702                         11,3662    77655 1            VAD
 0703   REF  11  LAST 1242    11,3663    01127 1                     YV
 0704   REF  31  LAST 1238    11,3664    02032 1            STORE    ALPHAV
 0705                         11,3665    52014 0            BON      GOTO
 0706   REF   5  LAST 1243    11,3666    00301 0                     JSWITCH
 0707   REF   2  LAST 1238    11,3667    23705 1                     DOW..
 0708   REF   1               11,3670    22476 1                     FBR3

 0709                         11,3671    43014 0  WMATEND   CLEAR    CLEAR
 0710   REF  23  LAST 1242    11,3672    01676 1                     DIMOFLAG          DONT INTEGRATE W THIS TIME
 0711   REF   3  LAST 1226    11,3673    01671 0                     ORBWFLAG          INVALIDATE W
 0712                         11,3674    77614 1            CLEAR
 0713   REF  13  LAST 1226    11,3675    02676 1                     RENDWFLG
 0714                         11,3676    77414 0            SET      EXIT
 0715   REF   9  LAST 1218    11,3677    01472 1                     STATEFLG          PICK UP STATE VECTOR UPDATE
 0716   REF  42  LAST 1225    11,3700   0 5567 0            TC       ALARM
 0717                         11,3701    00421 0            OCT      421
 0718   REF 236  LAST 1242    11,3702   0 6037 0            TC       INTPRET
 0719                         11,3703   77650 1          GOTO
 0720   REF   6  LAST 1242    11,3704   27257 1                      TESTLOOP          FINISH INTEGRATING STATE VECTOR
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P0721    ORBITAL ROUTINE FOR EXTRAPOLATION OF THE W MATRIX. IT COMPUTES THE SECOND DERIVATIVE OF EACH COLUMN POSITION
R0723    VECTOR OF THE MATRIX AND CALLS THE NYSTROM INTEGRATION ROUTINES TO SOLVETHE DIFFERENTIAL EQUATIONS. THE PROGRAM
R0725    USES A TABLE OF VEHICLE POSITION VECTORS COMPUTED DURING THE INTEGRATION OF THE VEHICLES POSITION AND VELOCITY.
 0727                          11,3705   70754 0  DOW..      LXA,2   DLOAD*
 0728    REF  17  LAST 1240    11,3706   02030 0                     PBODY
 0729    REF   7  LAST 1233    11,3707   51770 0                     MUEARTH,2
 0730    REF   4  LAST 1232    11,3710   36072 1             STCALL  BETAM
 0731    REF   1               11,3711   23733 1                     DOW..1
 0732    REF  13  LAST 1243    11,3712   02062 1             STORE   FV
 0733                          11,3713   62014 0             BOF     INCR,1
 0734    REF   5  LAST 1237    11,3714   00342 1                     MIDFLAG
 0735    REF   2  LAST 1234    11,3715   23232 0                     NBRANCH
 0736                          11,3716   77771 0             DEC     -6
 0737                          11,3717   70744 1             LXC,2   DLOAD*
 0738    REF  18  LAST 1245    11,3720   02030 0                     PBODY
 0739    REF   8  LAST 1245    11,3721   51772 1                     MUEARTH -2,2
 0740    REF   5  LAST 1245    11,3722   36072 1             STCALL  BETAM
 0741    REF   2  LAST 1245    11,3723   23733 1                     DOW..1
 0742                          11,3724   50414 0             BON     VSR6
 0743    REF  30  LAST 1239    11,3725   00303 1                     MOONFLAG
 0744                          11,3726   23727 1                     +1
 0745                          11,3727   77655 1             VAD
 0746    REF  14  LAST 1245    11,3730   02062 1                     FV
 0747    REF  15  LAST 1245    11,3731   36062 0             STCALL  FV
 0748    REF   3  LAST 1245    11,3732   23232 0                     NBRANCH
 0749                          11,3733   60575 0  DOW..1     VLOAD   VSR4
 0750    REF  32  LAST 1243    11,3734   02032 1                     ALPHAV
 0751                          11,3735   53513 0             PDVL*   UNIT
 0752    REF  10  LAST 1231    11,3736   02132 0                     VECTAB,1
 0753                          11,3737   46315 1             PDVL    VPROJ
 0754    REF  33  LAST 1245    11,3740   02032 1                     ALPHAV
 0755                          11,3741   52361 1             VXSC    VSU
 0756    REF   5  LAST 1238    11,3742   25764 0                     3/4
 0757                          11,3743   60325 0             PDDL    NORM
 0758                          11,3744   00045 0                     36D
 0759    REF  37  LAST 1242    11,3745   00052 0                     S2
 0760                          11,3746   63406 0             PUSH    DSQ
 0761                          11,3747   77605 1             DMP
 0762                          11,3750   65301 0             NORM    PDDL
 0763                          11,3751   00043 0                     34D
 0764    REF   6  LAST 1245    11,3752   02072 0                     BETAM
 0765                          11,3753   56342 1             SR1     DDV
 0766                          11,3754   77761 1             VXSC
 0767                          11,3755   57154 0             LXA,2   XAD,2
 0768    REF  38  LAST 1245    11,3756   00051 0                     S2
 0769    REF  39  LAST 1245    11,3757   00051 0                     S2
 0770                          11,3760   57074 0             XAD,2   XAD,2
 0771    REF  40  LAST 1245    11,3761   00051 0                     S2
 0772                          11,3762   00042 1                     34D
 0773                          11,3763   43457 0             VSL*    RVQ
 0774                        11,3764   57606 0                  0 -8D,2
R07741 *****************************************************************************************************************
R07743 *****************************************************************************************************************

 07745 *                     11,3765   43131 0  SETITCTR SSP    BOFF            SET ITERCTR FOR LAMBERT CALLS.  THIS
 07746 *REF    4  LAST 1183   11,3766   00027 1                  ITERCTR         CODING BELONGS IN INITVEL AND IS HERE
 07747 *                     11,3767   00024 1                  20D             FOR PURPOSES OF A ONE-MODULE
 07748 *REF    3  LAST  713   11,3770   03752 1                  AVEGFLAG        REMANUFACTURE ONLY.  CODING SHOULD
 07749 *REF    1             11,3771   25212 1                  LAMBERT         BE MOVED BACK TO INITVEL FOR LUMINARY 1B
 077491*                     11,3772   52131 0           SSP    GOTO
 077492*REF    5  LAST 1246   11,3773   00027 1                  ITERCTR
 077493*                     11,3774   00005 1                  5
 077494*REF    2  LAST 1246   11,3775   25212 1                  LAMBERT

R077495*****************************************************************************************************************
R077497*****************************************************************************************************************


 0775   REF    1             12,2000                     SETLOC ORBITAL1
 0776                        12,3745                     BANK

 0777                        12,3745   04631 1  3/5      2DEC   .6 B-2
 0777                        12,3746   23146 0
 0778                        12,3747   14000 1  THREE/8  2DEC   .375
 0778                        12,3750   00000 1
 0779                        12,3751   02314 0   .3D      2DEC   .3 B-2
 0779                        12,3752   31463 1
 0780                        12,3753   01400 1  3/64     2DEC   3 B-6
 0780                        12,3754   00000 1
 0781                        12,3755   10000 0  DP1/4    2DEC   .25
 0781                        12,3756   00000 1
 0782   REF    2  LAST 1199   12,3755            DQUARTER EQUALS DP1/4
 0783   REF    3  LAST 1246   12,3755            POS1/4   EQUALS DP1/4
 0784                        12,3757   03000 1  3/32     2DEC   3 B-5
 0784                        12,3760   00000 1
 0785                        12,3761   36000 1  15/16    2DEC   15. B -4
 0785                        12,3762   00000 1
 0786                        12,3763   30000 1  3/4      2DEC   3.0 B -2
 0786                        12,3764   00000 1
 0787                        12,3765   22525 0  7/12     2DEC   .5833333333
 0787                        12,3766   12525 0
 0788                        12,3767   22000 1  9/16     2DEC   9 B -4
 0788                        12,3770   00000 1
 0789                        12,3771   01200 1  5/128    2DEC   5 B-7
 0789                        12,3772   00000 1
 0790   REF   14  LAST 1240   12,2006            DPZERO   EQUALS ZEROVEC
 0791                        12,3773   25252 0  DP2/3    2DEC   .6666666667
 0791                        12,3774   25253 1
 0792   REF    3  LAST 1241   12,3773            2/3      EQUALS DP2/3
 0793                        12,3775   00027 1  OCT27    OCT    27
 0794                           13,3675                       BANK    13
 0795   REF    2  LAST     4    13,2000                       SETLOC ORBITAL2
 0796                           13,3675                       BANK
R0797   IT IS VITAL THAT THE FOLLOWING CONSTANTS NOT BE SHUFFLED
 0798                           13,3675  77764 1              DEC     -11
 0799                           13,3676  77775 1              DEC     -2
 0800                           13,3677  77766 0              DEC     -9
 0801                           13,3700  77771 0              DEC     -6
 0802                           13,3701  77775 1              DEC     -2
 0803                           13,3702  77775 1              DEC     -2
 0804                           13,3703  00000 1              DEC     0
 0805                           13,3704  77763 0              DEC     -12
 0806                           13,3705  77766 0              DEC     -9
 0807                           13,3706  77773 1              DEC     -4
 0808                           13,3707  77770 1  ASCALE      DEC     -7
 0809                           13,3710  77771 0              DEC     -6
 0810                           13,3711  24000 1  5/8         2DEC    5 B-3
 0810                           13,3712  00000 1
 0811                           13,3713  74631 0  -1/12       2DEC    -.1
 0811                           13,3714  63145 1
 0812                           13,3715  00243 1  RECRATIO 2DEC       .C1
 0812                           13,3716  32703 1
 0813                           13,3717  03654 0  RSPHERE     2DEC    64373.76 E3 B-29
 0813                           13,3720  21000 1
 0814                           13,3721  03654 0  RDM         2DEC    16093.44 E3 B-27
 0814                           13,3722  21000 1
 0815                           13,3723  04627 0  RDE         2DEC    80467.20 E3 B-29
 0815                           13,3724  25200 1
 0816                              0000           RATT        EQUALS 0D
 0817                              0006           VATT        EQUALS 6D
 0818                              0014           TAT         EQUALS 12D
 0819                              0016           RATT1       EQUALS 14D
 0820                              0024           VATT1       EQUALS 20D
 0821                              0032           MU(P)       EQUALS 26D
 0822                              0040           TDEC1       EQUALS 32D
 0823                              0016           URPV        EQUALS 14D
 0824   REF    4  LAST 1236        0022           COSPHI/2 EQUALS URPV +4
 0825                              0024           UZ          EQUALS 20D
 0826                              0032           TVEC        EQUALS 26D
 0827                           13,3725  71214 0  QUALITY1 BOF        DLOAD
 0828   REF   31  LAST 1245     13,3726  00343 0                      MOONFLAG
 0829   REF    4  LAST 1245     13,3727  23232 0                      NBRANCH
 0830   REF    7  LAST 1247     13,3730  00017 1                      URPV
 0831                           13,3731  77716 1              DSQ
 0832                           13,3732  63525 0  QUALITY2 PDDL       DSQ                SQUARE INTO 2D, B2
 0833   REF    8  LAST 1247     13,3733  00021 1                      URPV +2            Y COMPONENT, B1
 0834                           13,3734  77625 0              DSU
 0835                           13,3735  74205 0              DMP     VXSC               5(Y**2-X**2)UR
 0836   REF    7  LAST 1236     13,3736  27712 0                      5/8                CONSTANT, 5B3
 0837   REF    9  LAST 1247     13,3737  00017 1                      URPV               VECTOR. RESULT MAXIMUM IS 5, SCALING
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A0838                                                                           HERE B6
 0839                        13,3740   65332 0           VSL3   PDDL            STORE SCALED B3 IN 2D, 4D, 6D FOR XYZ
 0840   REF  10  LAST 1247   13,3741   00017 1                  URPV            X COMPONENT, B1
 0841                        13,3742   43342 0           SR1    DAD             2 X X COMPONENT FOR B3 SCALING
 0842                        13,3743   00003 1                  2D              ADD TO VECTOR X COMPONENT OF ANSWER,
A0843                                                                           SAME AS MULTIPLYING BY UNITX. MAX IS 7.
 0844                        13,3744   14003 1           STODL  2D
 0845   REF  11  LAST 1248   13,3745   00021 1                  URPV +2         Y COMPONENT, B1
 0846                        13,3746   44342 1           SR1    BDSU            2 X Y COMPONENT FOR B3 SCALING
 0847                        13,3747   00005 1                  4D              SUBTRACT FROM VECTOR Y COMPONENT OF
A0848                                                                           ANSWER, SAME AS MULTIPLYING BY UNITY.
A0849                                                                           MAX IS 7.
 0850                        13,3750   00005 1           STORE  4D              2D HAS VECTOR, B3.
 0851                        13,3751   74335 1           SLOAD  VXSC            MULTIPLY COEFFIECIENT TIMES VECTOR IN 2D
 0852   REF   1              13,3752   01353 0                  E3J22R2M
 0853                        13,3753   43525 1           PDDL   RVQ             J22 TERM X R**4 IN 2D, SCALED B61
 0854   REF   6  LAST 1237   13,3754   00023 0                  COSPHI/2        SAME AS URPV +4  Z COMPONENT
 0001                             22,3773                               BANK    22
 0002   REF    2  LAST   324      23,2000                               SETLOC  INFLIGHT
 0003                             23,3247                               BANK

 0004   REF   23  LAST   974      E5,1642                               EBANK=  XSM

R0005   CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0007   THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0009   HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0010   THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0012   MGC, AND OGC RESPECTIVELY.

 0013   REF    1                                                        COUNT*  $$/INFLT
 0014                             23,3247    71220 1   CALCGTA  ITA     DLOAD           PUSHDOWN  00-03,16D-27D,34D-37D
 0015   REF   41  LAST  1245      23,3250    00051 0                    S2              XDC = (XD1 XD2 XD3)
 0016   REF    6  LAST   974      23,3251    02665 0                    XDC             YDC = (YD1 YD2 YD3)
 0017                             23,3252    65325 0                    PDDL    PDDL    ZDC = (ZD1 ZD2 ZD3)
 0018   REF   15  LAST  1146      23,3253    06522 1                    HI6ZEROS
 0019   REF    7  LAST  1249      23,3254    02671 0                    XDC +4
 0020                             23,3255    55476 1                    DCOMP   VDEF
 0021                             23,3256    77656 1                    UNIT
 0022   REF    1                  23,3257    14027 1                    STODL   ZPRIME          ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
 0023   REF    2  LAST  1249      23,3260    00027 1                    ZPRIME

 0024                             23,3261    77742 0                    SR1
 0025   REF   12  LAST  1137      23,3262    14023 0                    STODL   SINTH           SIN(IGC) = ZP1
 0026   REF    3  LAST  1249      23,3263    00033 1                    ZPRIME +4
 0027                             23,3264    77742 0                    SR1
 0028   REF   11  LAST  1137      23,3265    34021 0                    STCALL  COSTH           COS(IGC) = ZP3
 0029   REF    4  LAST   322      23,3266    47320 0                    ARCTRIG

 0030   REF    2  LAST   123      23,3267    16742 1                    STODL   IGC             Y GYRO TORQUING ANGLE   FRACTION OF REV.
 0031   REF    8  LAST  1249      23,3270    02667 1                    XDC +2
 0032                             23,3271    77742 0                    SR1
 0033   REF   13  LAST  1249      23,3272    14023 0                    STODL   SINTH           SIN(MGC) = XD2
 0034   REF    4  LAST  1249      23,3273    00027 1                    ZPRIME

 0035                             23,3274    65205 0                    DMP     PDDL
 0036   REF    9  LAST  1249      23,3275    02671 0                    XDC +4                  PD00 = (ZP1)(XD3)
 0037   REF    5  LAST  1249      23,3276    00033 1                    ZPRIME +4

 0038                             23,3277    45205 1                    DMP     DSU
 0039   REF   10  LAST  1249      23,3300    02665 0                    XDC                     MPAC = (ZP3)(XD1)
 0040                             23,3301    77626 0                    STADR
 0041   REF   12  LAST  1249      23,3302    43756 1                    STCALL  COSTH           COS(MGC) = MPAC - PD00
 0042   REF    5  LAST  1249      23,3303    47320 0                    ARCTRIG
 0043    REF   2  LAST  123    23,3304    26744 1          STOVL   MGC             Z GYRO TORQUING ANGLE   FRACTION OF REV.
 0044    REF   6  LAST 1249    23,3305    00027 1                  ZPRIME
 0045                          23,3306    77641 1          DOT
 0046    REF   4  LAST  931    23,3307    02701 0                  ZDC
 0047    REF  13  LAST 1249    23,3310    24021 1          STOVL   COSTH           COS(OGC) = ZP . ZDC
 0048    REF   7  LAST 1250    23,3311    00027 1                  ZPRIME
 0049                          23,3312    77641 1          DOT
 0050    REF   4  LAST  931    23,3313    02673 1                  YDC
 0051    REF  14  LAST 1249    23,3314    34023 1          STCALL  SINTH           SIN(OGC) = ZP . YDC
 0052    REF   6  LAST 1249    23,3315    47320 0                  ARCTRIG

 0053    REF  14  LAST  971    23,3316    36740 1          STCALL  OGC             X GYRO TORQUING ANGLE   FRACTION OF REV.
 0054    REF  42  LAST 1249    23,3317    00051 0                  S2
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R0055    ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0056    THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0057    THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0058    AVAILABLE AT MPAC.


 0060                           23,3320   51545 1  ARCTRIG  DLOAD   ABS                PUSHDOWN  16D-21D
 0061    REF  15  LAST 1250     23,3321   00023 0                   SINTH
 0062                           23,3322   50025 0           DSU     BMN
 0063    REF   1                23,3323   07534 1                   QTSN45             ABS(SIN/4) - SIN(45)/4
 0064    REF   1                23,3324   47333 1                   TRIG1              IF (-45,45) OR (135,-135)


 0065                           23,3325   72545 0           DLOAD   SL1                (45,135) OR (-135,-45)
 0066    REF  14  LAST 1250     23,3326   00021 1                   COSTH
 0067                           23,3327   75326 1           ACOS    SIGN
 0068    REF  16  LAST 1251     23,3330   00023 0                   SINTH
 0069    REF   7  LAST 1137     23,3331   00025 0           STORE   THETA              X = ARCCOS(COS) WITH SIGN(SIN)
 0070                           23,3332   77616 0           RVQ


 0071                           23,3333   72545 0  TRIG1    DLOAD   SL1                (-45,45) OR (135,-135)
 0072    REF  17  LAST 1251     23,3334   00023 0                   SINTH
 0073                           23,3335   77736 0           ASIN
 0074    REF   8  LAST 1251     23,3336   14025 0           STODL   THETA              X = ARCSIN(SIN) WITH SIGN(SIN)
 0075    REF  15  LAST 1251     23,3337   00021 1                   COSTH
 0076                           23,3340   77640 0           BMN
 0077    REF   1                23,3341   47344 1                   TRIG2              IF (135,-135)

 0078                           23,3342   43545 1           DLOAD   RVQ
 0079    REF   9  LAST 1251     23,3343   00025 0                   THETA              X = ARCSIN(SIN)    (-45,45)


 0080                           23,3344   75345 1  TRIG2    DLOAD   SIGN               (135,-135)
 0081    REF   6  LAST 1146     23,3345   06520 0                   HIDPHALF
 0082    REF  18  LAST 1251     23,3346   00023 0                   SINTH
 0083                           23,3347   77625 0           DSU
 0084    REF  10  LAST 1251     23,3350   00025 0                   THETA
 0085    REF  11  LAST 1251     23,3351   00025 0           STORE   THETA              X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
 0086                           23,3352   77616 0           RVQ                                     (+) - (+) OR (-) - (-)
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R0087        SMNB, NBSM, AND AXISROT, WHICH USED TO APPEAR HERE, HAVE BEEN
R0088   COMBINED IN A ROUTINE CALLED AX*SR*T, WHICH APPEARS AMONG THE POWERED
R0089   FLIGHT SUBROUTINES.
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R0090   CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0092   THE INPUTS ARE  1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0094   VECTORS ARE STORED AT XNB,YNB, AND ZNB.  2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0096   COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0097   THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.

 0099                          23,3353   77601 0  CALCGA    SETPD                    PUSHDOWN  00-05, 16D-21D, 34D-37D
 0100                          23,3354   00001 0                      0
 0101                          23,3355   47375 0            VLOAD     VXV
 0102   REF   8  LAST  968     23,3356   02665 0                      XNB            XNB = OGA (OUTER GIMBAL AXIS)
 0103   REF   2  LAST  122     23,3357   02651 1                      YSM            YSM = IGA (INNER GIMBAL AXIS)
 0104                          23,3360   41456 0            UNIT      PUSH           PDO = UNIT(OGA X IGA) = MGA

 0105                          23,3361   44041 1            DOT       ITA
 0106   REF   6  LAST  981     23,3362   02701 0                      ZNB
 0107   REF  43  LAST 1250     23,3363   00051 0                      S2
 0108   REF  16  LAST 1251     23,3364   24021 1            STOVL     COSTH          COS(OG) = MGA . ZNB
 0109                          23,3365   00001 0                      0
 0110                          23,3366   77641 1            DOT
 0111   REF   6  LAST  981     23,3367   02673 1                      YNB
 0112   REF  19  LAST 1251     23,3370   34023 1            STCALL    SINTH          SIN(OG) = MGA . YNB
 0113   REF   7  LAST 1250     23,3371   47320 0                      ARCTRIG
 0114   REF  15  LAST 1250     23,3372   26740 0            STOVL     OGC
 0115                          23,3373   00001 0                      0

 0116                          23,3374   50235 0            VXV       DOT            PROVISION FOR MG ANGLE OF 90 DEGREES
 0117   REF   9  LAST 1253     23,3375   02665 0                      XNB
 0118   REF   3  LAST 1253     23,3376   02651 1                      YSM
 0119                          23,3377   77752 1            SL1
 0120   REF  17  LAST 1253     23,3400   24021 1            STOVL     COSTH          COS(MG) = IGA . (MGA X OGA)
 0121   REF      LAST 1253     23,3401   02651 1                      YSM
 0122                          23,3402   77641 1            DOT
 0123   REF  10  LAST 1253     23,3403   02665 0                      XNB
 0124   REF  20  LAST 1253     23,3404   34023 1            STCALL    SINTH          SIN(MG) = IGA . OGA
 0125   REF   8  LAST 1253     23,3405   47320 0                      ARCTRIG
 0126   REF   3  LAST 1250     23,3406   02744 1            STORE     MGC

 0127                          23,3407   45246 0            ABS       DSU
 0128   REF   1                23,3410   07536 0                      .166...
 0129                          23,3411   77644 1            BPL
 0130   REF   1                23,3412   47431 1                      GIMLOCK1       IF ANGLE GREATER THAN 60 DEGREES

 0131                          23,3413   50375 0  CALCGA1   VLOAD     DOT
 0132   REF   2  LAST  122     23,3414   02657 1                      ZSM
 0133                          23,3415   00001 0                      0
 0134   REF  18  LAST 1253     23,3416   24021 1            STOVL     COSTH          COS(IG) = ZSM . MGA
 0135   REF  24  LAST 1249     23,3417   02643 1                      XSM
 0136                         23,3420   45441 1                  DOT     STADR
 0137   REF  21  LAST 1253    23,3421   43754 0                  STCALL  SINTH             SIN(IG) = XSM . MGA
 0138   REF   9  LAST 1253    23,3422   47320 0                          ARCTRIG

 0139   REF   3  LAST 1249    23,3423   26742 1                  STOVL   IGC
 0140   REF  16  LAST 1253    23,3424   02740 0                          OGC
 0141                         23,3425   77634 0                  RTB
 0142   REF   4  LAST  483    23,3426   21620 0                          VIST02S
 0143   REF  20  LAST  968    23,3427   34322 0                  STCALL  THETAD
 0144   REF  44  LAST 1253    23,3430   00051 0                          S2

 0145                         23,3431   77776 1  GIMLOCK1        EXIT                1
 0146   REF  43  LAST 1243    23,3432  0 5567 0                  TC      ALARM
 0147                         23,3433   00401 1                  OCT     00401     25
 0148   REF  69  LAST 1242    23,3434  0 5504 0                  TC      UPFLAG            GIMBAL LOCK HAS OCCURED
 0149   REF   2  LAST  374    23,3435   00056 1                  ADRES   GLOKFAIL

 0150   REF 237  LAST 1243    23,3436  0 6037 0                  TC      INTPRET
 0151                         23,3437   77650 1                  GOTO
 0152   REF   1               23,3440   47413 1                          CALCGA1
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R0153   AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0155   THE INPUTS ARE  1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD.  2) THE STAR2 VECTOR
R0157   REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6.  3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0159   AT LOCATION 6 OF THE VAC AREA.  4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0161   THE VAC AREA.

R0162   THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0164   AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.


 0165                          23,3441   66370 0  AXISGEN   AXT,1   SSP               PUSHDOWN  00-30D,34D-37D
 0166   REF  32  LAST  971     23,3442   02714 1                    STARAD +6
 0167   REF  29  LAST 1235     23,3443   00051 0                    S1
 0168   REF  33  LAST 1255     23,3444   02700 1                    STARAD -6

 0169                          23,3445   77601 0            SETPD
 0170                          23,3446   00001 0                    0
 0171                          23,3447   46773 0  AXISGEN1  VLOAD*  VXV*              06D   UA = S1
 0172   REF  34  LAST 1255     23,3450   02723 0                    STARAD +12D,1         STARAD +00D   UB = S1
 0173   REF  35  LAST 1255     23,3451   02731 0                    STARAD +18D,1
 0174                          23,3452   77656 1            UNIT                      12D   VA = UNIT(S1 X S2)
 0175   REF  36  LAST 1255     23,3453   06731 1            STORE   STARAD +18D,1         STARAD +06D   VB = UNIT(S1 X S2)
 0176                          23,3454   77773 1            VLOAD*
 0177   REF  37  LAST 1255     23,3455   02723 0                    STARAD +12D,1

 0178                          23,3456   76433 1            VXV*    VSL1
 0179   REF  38  LAST 1255     23,3457   02731 0                    STARAD +18D,1     18D   WA = UA X VA
 0180   REF  39  LAST 1255     23,3460   06737 1            STORE   STARAD +24D,1         STARAD +12D   WB = UB X VB

 0181                          23,3461   77700 0            TIX,1
 0182   REF   1                23,3462   47447 0                    AXISGEN1

 0183                          23,3463   66160 0            AXC,1   SXA,1
 0184                          23,3464   00006 1                    6
 0185                          23,3465   00036 1                    30D

 0186                          23,3466   66370 0            AXT,1   SSP
 0187                          23,3467   00022 1                    18D
 0188   REF  30  LAST 1255     23,3470   00051 0                    S1
 0189                          23,3471   00006 1                    6

 0190                          23,3472   66374 1            AXT,2   SSP
 0191                          23,3473   00006 1                    6
 0192   REF  45  LAST 1254     23,3474   00052 0                    S2
 0193                          23,3475   00002 0                    2

 0194                          23,3476   76720 0  AXISGEN2  XCHX,1  VLOAD*
 0195                          23,3477   00036 1                    30D               X1=-6  X2=+6    X1=-6  X2=+4    X1=-6  X2=+2
 0196                          23,3500   00001 0                    0,1
 0197                         23,3501   62757 0           VXSC*   PDVL*            J=(UA)(UB1)   J=(UA)(UB2)   J=(UA)(UB3)
 0198   REF  40  LAST 1255    23,3502   75062 1                   STARAD +6,2
 0199                         23,3503   00007 0                   6,1
 0200                         23,3504   77757 1           VXSC*
 0201   REF  41  LAST 1256    23,3505   75054 1                   STARAD +12D,2
 0202                         23,3506   30031 0           STOVL*  24D              K=(VA)(VB1)   J=(VA)(VB2)   J=(VA)(VB3)
 0203                         23,3507   00015 0                   12D,1

 0204                         23,3510   53357 0           VXSC*   VAD
 0205   REF  42  LAST 1256    23,3511   75046 1                   STARAD +18D,2    L=(WA)(WB1)   J=(WA)(WB2)   J=(WA)(WB3)
 0206                         23,3512   76455 1           VAD     VSL1
 0207                         23,3513   00031 0                   24D
 0208                         23,3514   53520 0           XCHX,1  UNIT
 0209                         23,3515   00036 1                   30D
 0210   REF  11  LAST 1249    23,3516   06707 1           STORE   XDC +18D,1       XDC = L+J+K   YDC = L+J+K   ZDC = L+J+K

 0211                         23,3517   77700 0           TIX,1
 0212   REF   1               23,3520   47521 1                   AXISGEN3

 0213                         23,3521   77704 1 AXISGEN3  TIX,2
 0214   REF   1               23,3522   47476 1                   AXISGEN2

 0215                         23,3523   77775 1           VLOAD
 0216   REF  12  LAST 1256    23,3524   02665 0                   XDC
 0217   REF  43  LAST 1256    23,3525   26707 0           STOVL   STARAD
 0218   REF   5  LAST 1250    23,3526   02673 1                   YDC
 0219   REF  44  LAST 1256    23,3527   26715 0           STOVL   STARAD +6
 0220   REF   5  LAST 1250    23,3530   02701 0                   ZDC
 0221   REF  45  LAST 1256    23,3531   02723 0           STORE   STARAD +12D

 0222                         23,3532   77616 0           RVQ
 0281                        23,3533   05520 0  QTSN45    2DEC     .1768
 0281                        23,3534   26075 1
 0282                        23,3535   05252 1  .166...   2DEC     .1666666667
 0282                        23,3536   25253 1
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L       POWERED FLIGHT SUBROUTINES                                                     USER'S PAGE NO.   1       EO S3

 0001                             14,3774                  BANK    14               SAME FBANK AS THE FINDCDUD SUB-PROGRAM
 0002   REF    1                  23,2000                  SETLOC POWFLITE
 0003                             23,3537                  BANK

 0004   REF    1                     0142                  EBANK= DEXDEX
 0005   REF    1                                           COUNT* $$/POWFL

R0006       CDUTRIG, CDUTRIG1, CDUTRIG2, AND CD*TR*GS ALL COMPUTE THE SINES AND
R0007   COSINES OF THREE 2'S COMPLEMENT ANGLES AND PLACE THE RESULT, DOUBLE
R0008   PRECISION, IN THE SAME ORDER AS THE INPUTS, AT SINCDU AND COSCDU.   AN
R0009   ADDITIONAL OUTPUT IS THE 1'S COMPLEMENT ANGLES AT CDUSPOT.   THESE
R0010   ROUTINES GO OUT OF THEIR WAY TO LEAVE THE MPAC AREA AS THEY FIND IT,
R0011   EXCEPT FOR THE GENERALLY UNIMPORTANT MPAC +2.   THEY DIFFER ONLY IN
R0012   WHERE THEY GET THE ANGLES, AND IN METHOD OF CALLING.

R0013       CDUTRIG (AND CDUTRIG1, WHICH CAN BE CALLED IN BASIC) COMPUTE THE
R0014   SINES AND COSINES FROM THE CURRENT CONTENTS OF THE CDU REGISTERS.
R0015   THE CONTENTS OF CDUTEMP, ETC., ARE NOT TOUCHED SO THAT THEY MAY
R0016   CONTINUE TO FORM A CONSISTENT SET WITH THE LATEST PIPA READINGS.

R0017       CDUTRIG1 IS LIKE CDUTRIG EXCEPT THAT IT CAN BE CALLED IN BASIC.

R0018       CD*TR*GS FINDS CDU VALUES IN CDUSPOT RATHER THAN IN CDUTEMP.   THIS
R0019   ALLOWS USERS TO MAKE TRANSFORMATIONS USING ARBITRARY ANGLES, OR REAL
R0020   ANGLES IN AN ORDER OTHER THAN X Y Z.   A CALL TO THIS ROUTINE IS
R0021   NECESSARY IN PREPARATION FOR A CALL TO AX*SR*T IN EITHER OF ITS TWO
R0022   MODES (SMNB OR NBSM).   SINCE AX*SR*T EXPECTS TO FIND THE SINES AND
R0023   COSINES IN THE ORDER Y Z X THE ANGLES MUST HAVE BEEN PLACED IN CDUSPOT
R0024   IN THIS ORDER.   CD*TR*GS NEED NOT BE REPEATED WHEN AX*SR*T IS CALLED
R0025   MORE THAN ONCE, PROVIDED THE ANGLES HAVE NOT CHANGED.   NOTE THAT SINCE
R0026   IT CLOBBERS BUF2 (IN THE SINE AND COSINE ROUTINES) CD*TR*GS CANNOT BE
R0027   CALLED USING BANKCALL.   SORRY.

R0028       CD*TR*G IS LIKE CD*TR*GS EXCEPT THAT IT CAN BE CALLED IN
R0029   INTERPRETIVE.

 0030                             23,3537   77776 1  CDUTRIG   EXIT
 0031   REF    1                  23,3540  0 3547 1            TC       CDUTRIGS
 0032   REF  238   LAST 1254      23,3541  0 6037 0            TC       INTPRET
 0033                             23,3542   77616 0            RVQ

 0034                             23,3543   77776 1  CD*TR*G   EXIT
 0035   REF    1                  23,3544  0 3555 1            TC       CD*TR*GS
 0036   REF  239   LAST 1259      23,3545  0 6037 0            TC       INTPRET
 0037                             23,3546   77616 0            RVQ

 0038   REF   17   LAST  948      23,3547  3 0032 0  CDUTRIGS  CA       CDUX
 0039   REF   26   LAST  948      23,3550  54 772 1            TS       CDUSPOT +4
 0040   REF    8   LAST  948      23,3551  3 0033 1            CA       CDUY
 0041   REF   27   LAST 1259      23,3552  54 766 1            TS       CDUSPOT
 0042   REF  11  LAST  948   23,3553  3 0034 0             CA      CDUZ
 0043   REF  28  LAST 1259   23,3554  54 770 0             TS      CDUSPOT +2

 0044                        23,3555  0 0006 1  CD*TR*GS   EXTEND
 0045   REF  26  LAST  922   23,3556  22 142 0             QXCH    TEM2
 0046   REF  23  LAST 1077   23,3557  3 4751 0             CAF     FOUR
 0047   REF  21  LAST 1047   23,3560  7 6242 1  TR*GL**P   MASK    SIX                  MAKE IT EVEN AND SMALLER
 0048   REF  13  LAST  922   23,3561  54 143 0             TS      TEM3
 0049   REF  14  LAST 1260   23,3562  50 143 1             INDEX   TEM3
 0050   REF  23  LAST 1260   23,3563  3 0766 0             CA      CDUSPOT
 0051   REF 736  LAST 1237   23,3564  52 155 1             DXCH    MPAC                 STORING 2'S COMP ANGLE, LOADING MPAC
 0052   REF  65  LAST 1073   23,3565  52 127 1             DXCH    VBUF +4              STORING MPAC FOR LATER RESTORATION
 0053   REF   5  LAST  824   23,3566  0 4713 0             TC      USPRCADR
 0054   REF  15  LAST  570   23,3567   21576 0             CADR    CDULOGIC
 0055                        23,3570  0 0006 1             EXTEND
 0056   REF 737  LAST 1260   23,3571  3 0155 0             DCA     MPAC
 0057   REF  15  LAST 1260   23,3572  50 143 1             INDEX   TEM3
 0058   REF  30  LAST 1260   23,3573  52 767 0             DXCH    CDUSPOT              STORING 1'S COMPLEMENT ANGLE
 0059   REF   6  LAST 1260   23,3574  0 4713 0             TC      USPRCADR
 0060   REF   2  LAST 1013   23,3575   01517 0             CADR    COSINE
 0061   REF 738  LAST 1260   23,3576  52 155 1             DXCH    MPAC
 0062   REF  16  LAST 1260   23,3577  50 143 1             INDEX   TEM3
 0063   REF   4  LAST  100   23,3600  52 745 0             DXCH    COSCDU               STORING COSINE
 0064                        23,3601  0 0006 1             EXTEND
 0065   REF  17  LAST 1260   23,3602  5 0143 1             INDEX   TEM3
 0066   REF  31  LAST 1260   23,3603  3 0767 1             DCA     CDUSPOT              LOADING 1'S COMPLEMENT ANGLE
 0067   REF   7  LAST 1260   23,3604  0 4713 0             TC      USPRCADR
 0068   REF   2  LAST 1013   23,3605   01531 1             CADR    SINE +1              SINE +1 EXPECTS ARGUMENT IN A AND L
 0069   REF  66  LAST 1260   23,3606  52 127 1             DXCH    VBUF +4              BRINGING UP PRIOR MPAC TO BE RESTORED
 0070   REF 739  LAST 1260   23,3607  52 155 1             DXCH    MPAC
 0071   REF  18  LAST 1260   23,3610  50 143 1             INDEX   TEM3
 0072   REF   4  LAST  100   23,3611  52 737 0             DXCH    SINCDU
 0073   REF  19  LAST 1260   23,3612  10 143 0             CCS     TEM3
 0074   REF   1              23,3613  1 3560 0             TCF     TR*GL**P
 0075   REF  27  LAST 1260   23,3614  0 0142 0             TC      TEM2
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R0076     ******************************************************************************************************

R0078         QUICTRIG, INTENDED FOR GUIDANCE CYCLE USE WHERE TIME IS CRITICAL, IS A MUCH FASTER VERSION OF CD*TR*GS.
R0080     QUICTRIG COMPUTES AND STORES THE SINES AND COSINES OF THE 2'S COMPLEMENT ANGLES AT CDUSPOT, CDUSPOT +2,
R0082     AND CDUSPOT +4.   UNLIKE CD*TR*GS, QUICTRIG DOES NOT LEAVE THE 1'S COMPLEMENT VERSIONS OF THE ANGLES IN
R0084     CDUSPOT.   QUICTRIG'S EXECUTION TIME IS 4.1 MS;   THIS IS 10 TIMES AS FAST AS CD*TR*GS.   QUICTRIG MAY BE
R0086     CALLED FROM INTERPRETIVE AS AN RTB OP-CODE, OR FROM BASIC VIA BANKCALL OR IBNKCALL.

 0090                         23,3615  0 0004 0  QUICTRIG INHINT                    INHINT SINCE DAP USES THE SAME TEMPS
 00901                        23,3616  0 0006 1           EXTEND
 00902  REF  38  LAST  903    23,3617  22 061 0           DXCH    ITEMP1
 0091   REF  24  LAST 1260    23,3620  3 4751 0           CAF     FOUR
 0092   REF  22  LAST 1260    23,3621  7 6242 1      +    MASK    SIX
 0093   REF  14  LAST  903    23,3622  54 062 1           TS      ITEMP2
 0094   REF  15  LAST 1261    23,3623  50 062 0           INDEX   ITEMP2
 0095   REF  32  LAST 1260    23,3624  3 0766 0           CA      CDUSPOT
 0096   REF   5  LAST  602    23,3625  0 5033 1           TC      SPSIN
 0097                         23,3626  0 0006 1           EXTEND
 0098   REF  68  LAST 1132    23,3627  7 4736 0           MP      BIT14             SCALE DOWN TO MATCH INTERPRETER OUTPUTS
 0099   REF  16  LAST 1261    23,3630  50 062 0           INDEX   ITEMP2
 0100   REF   5  LAST 1260    23,3631  52 737 0           DXCH    SINCDU
 0101   REF  17  LAST 1261    23,3632  50 062 0           INDEX   ITEMP2
 0102   REF  33  LAST 1261    23,3633  3 0766 0           CA      CDUSPOT
 0103   REF   5  LAST  602    23,3634  0 5032 0           TC      SPCOS
 0104                         23,3635  0 0006 1           EXTEND
 0105   REF  69  LAST 1261    23,3636  7 4736 0           MP      BIT14
 0106   REF  18  LAST 1261    23,3637  50 062 0           INDEX   ITEMP2
 0107   REF   5  LAST 1260    23,3640  52 745 0           DXCH    COSCDU
 0108   REF   1  LAST 1261    23,3641  10 062 1           CCS     ITEMP2
 0109   REF   5  LAST  912    23,3642  1 3621 0           TCF     QUICTRIG +4
 01091  REF  39  LAST 1261    23,3643  3 0061 0           CA      ITEMP1
 0110                         23,3644  0 0003 1           RELINT
 01101  REF 377  LAST 1220    23,3645  0 0000 1           TC      A
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R0111   *****************************************************************************************************

R0113       THESE INTERFACE ROUTINES MAKE IT POSSIBLE TO CALL AX*SR*T, ETC., IN
R0114   INTERPRETIVE.   LATER, WHERE POSSIBLE, THEY WILL BE ELIMINATED.

R0127       THESE INTERFACE ROUTINES ARE PERMANENT.   ALL RESTORE USER'S EBANK
R0128   SETTING.   ALL ARE STRICT INTERPRETIVE SUBROUTINES, CALLED USING "CALL",
R0129   RETURNING VIA QPRET.   ALL EXPECT AND RETURN THE VECTOR TO BE TRANSFOR-
R0130   MED INTERPRETER-STYLE IN MPAC; COMPONENTS AT MPAC, MPAC +3, AND MPAC +5.

R0131       TRG*SMNB AND TRG*NBSM BOTH EXPECT TO SEE THE 2'S COMPLEMENT ANGLES
R0132   AT CDUSPOT (ORDER Y Z X, AT CDUSPOT, CDUSPOT +2, AND CDUSPOT +4: ODD
R0133   LOCATIONS NEED NOT BE ZEROED).   TRG*NBSM DOES THE NB TO SM TRANSFOR-
R0134   MATION;  TRG*SMNB, VICE VERSA.

R0135       CDU*NBSM DOES ITS TRANSFORMATION USING THE PRESENT CONTENTS OF
R0136   THE CDU COUNTERS.   OTHERWISE IT IS LIKE TRG*NBSM.

R01361      CDU*SMNB IS THE COMPLEMENT OF CDU*NBSM.

 01362                            23,3646    77776 1  CDU*SMNB EXIT
 01363  REF    2  LAST 1259       23,3647  0 3547 1            TC       CDUTRIGS
 01364  REF    1                  23,3650  1 3653 0            TCF      C*MM*N1

 0137                             23,3651    77776 1  TRG*SMNB EXIT
 0138   REF    2  LAST 1259       23,3652  0 3555 1            TC       CD*TR*GS
 0139   REF    4  LAST 1070       23,3653  0 7532 1  C*MM*N1   TC       MPACVBUF          AX*SR*T EXPECTS VECTOR IN VBUF
 0140   REF   32  LAST 1099       23,3654  4 6245 0            CS       THREE             SIGNAL FOR SM TO NB TRANSFORMATION
 0141   REF    2  LAST  601       23,3655  0 3675 0  C*MM*N2   TC       AX*SR*T
 0142   REF  240  LAST 1259       23,3656  0 6037 0            TC       INTPRET
 0143                             23,3657    43575 1            VLOAD    RVQ
 0144   REF   67  LAST 1260       23,3660    00123 1                     VBUF

 0145                             23,3661    77776 1  CDU*NBSM EXIT
 0146   REF    3  LAST 1262       23,3662  0 3547 1            TC       CDUTRIGS
 0147   REF    1                  23,3663  1 3666 0            TCF      C*MM*N3

 0148                             23,3664    77776 1  TRG*NBSM EXIT
 0149   REF    3  LAST 1262       23,3665  0 3555 1            TC       CD*TR*GS
 0150   REF    5  LAST 1262       23,3666  0 7532 1  C*MM*N3   TC       MPACVBUF          FOR AX*SR*T
 0151   REF   33  LAST 1262       23,3667  3 6245 1            CA       THREE             SIGNAL FOR NB TO SM TRANSFORMATION
 0152   REF    1                  23,3670  1 3655 0            TCF      C*MM*N2

R0153       *NBSM* AND *SMNB* EXPECT TO SEE THE SINES AND COSINES (AT SINCDU
R0154   AND COSCDU) RATHER THAN THE ANGLES THEMSELVES.   OTHERWISE THEY ARE
R0155   LIKE TRG*NBSM AND TRG*SMNB.

R0156       NOTE THAT JUST AS CD*TR*GS NEED BE CALLED ONLY ONCE FOR EACH SERIES
R0157   OF TRANSFORMATIONS USING THE SAME ANGLES, SO TOO ONLY ONE OF TRG*NBSM
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R0158   AND TRG*SMNB NEED BE CALLED FOR EACH SERIES.   FOR SUBSEQUENT TRANSFOR-
R0159   MATIONS USE *NBSM* AND *SMNB*.

 0160                        23,3671   77776 1  *SMNB*    EXIT
 0161   REF   2  LAST 1262   23,3672  1 3653 0            TCF     C*MM*N1

 0162                        23,3673   77776 1  *NBSM*    EXIT
 0163   REF   2  LAST 1262   23,3674  1 3666 0            TCF     C*MM*N3

R0164         AX*SR*T COMBINES THE OLD SMNB AND NBSM.   FOR THE NB TO SM
R0165   TRANSFORMATION, ENTER WITH +3 IN A.   FOR SM TO NB, ENTER WITH -3.
R0166   THE VECTOR TO BE TRANSFORMED ARRIVES, AND IS RETURNED, IN VBUF.
R0167   AX*SR*T EXPECTS TO FIND THE SINES AND COSINES OF THE ANGLES OF ROTATION
R0168   AT SINCDU AND COSCDU, IN THE ORDER Y Z X.   A CALL TO CD*TR*GS, WITH
R0169   THE 2'S COMPLEMENT ANGLES (ORDER Y Z X) AT CDUSPOT, WILL TAKE CARE OF
R0170   THIS.   HERE IS A SAMPLE CALLING SEQUENCE:-

R0171                                    TC      CDUTRIGS
R0172                                    CS      THREE         ("CA  THREE" FOR NBSM)
R0173                                    TC      AX*SR*T

R0174   THE CALL TO CD*TR*GS NEED NOT BE REPEATED, WHEN AX*SR*T IS CALLED MORE
R0175   THAN ONCE, UNLESS THE ANGLES HAVE CHANGED.

R0176        AX*SR*T IS GUARANTEED SAFE ONLY FOR VECTORS OF MAGNITUDE LESS THAN
R0177   UNITY.   A LOOK AT THE CASE IN WHICH A VECTOR OF GREATER MAGNITUDE
R0178   HAPPENS TO LIE ALONG AN AXIS OF THE SYSTEM TO WHICH IT IS TO BE TRANS-
R0179   FORMED CONVINCES ONE THAT THIS IS A RESTRICTION WHICH MUST BE ACCEPTED.

 0180   REF   2  LAST 1259   23,3675  54 142 1  AX*SR*T   TS      DEXDEX              WHERE IT BECOMES THE INDEX OF INDEXES
 0181                        23,3676  0 0006 1            EXTEND
 0182   REF   1              23,3677  22 145 1            QXCH    RTNSAVER

 0183   REF   3  LAST 1263   23,3700  10 142 1  R*TL**P   CCS     DEXDEX                     +3 --> 0      -3 --> 2
 0184   REF   4  LAST 1263   23,3701  4 0142 1            CS      DEXDEX              THUS:  +2 --> 1      -2 --> 1
 0185   REF  34  LAST 1262   23,3702  6 6245 1            AD      THREE                      +1 --> 2      -1 --> 0
 0186                        23,3703  0 0006 1            EXTEND
 0187   REF 378  LAST 1261   23,3704  5 0000 1            INDEX   A
 0188   REF   1              23,3705  3 3764 1            DCA     INDEXI
 0189   REF   1              23,3706  52 144 1            DXCH    DEXI

 0190   REF 127  LAST 1183   23,3707  3 4753 1            CA      ONE
 0191   REF 160  LAST 1115   23,3710  54 130 1            TS      BUF
 0192                        23,3711  0 0006 1            EXTEND
 0193   REF   2  LAST   98   23,3712  5 0143 1            INDEX   DEXI
 0194   REF  68  LAST 1262   23,3713  4 0123 0            DCS     VBUF
 0195   REF   1              23,3714  1 3716 0            TCF     LOOP1                 REALLY BE A SUBTRACT, AND VICE VERSA

 0196   REF 151  LAST 1263   23,3715  52 131 0  LOOP2     DXCH    BUF                 LOADING VECTOR COMPONENT, STORING INDEX
 0197   REF 740  LAST 1260    23,3716  52 155 1  LOOP1      DXCH    MPAC
 0198   REF   1               23,3717  3 3762 1             CA      SINESLOC
 0199   REF   3  LAST 1263    23,3720  6 0143 1             AD      DEX1
 0200   REF  81  LAST 1076    23,3721  54 116 0             TS      ADDRWD

 0201   REF  21  LAST 1085    23,3722  0 7107 0             TC      DMPSUB          MULTIPLY BY SIN(CDUANGLE)
 0202   REF   5  LAST 1263    23,3723  10 142 1             CCS     DEXDEX
 0203   REF 741  LAST 1264    23,3724  52 155 1             DXCH    MPAC            NBSM CASE
 0204                         23,3725  1 3730 1             TCF     +3
 0205                         23,3726  0 0006 1             EXTEND                  SMNB CASE
 0206   REF 742  LAST 1264    23,3727  4 0155 1             DCS     MPAC
 0207   REF   1               23,3730  52 160 1             DXCH    TERM1TMP

 0208   REF  23  LAST 1261    23,3731  3 6242 0             CA      SIX             SINCDU AND COSCDU (EACH 6 WORDS) MUST
 0209   REF  82  LAST 1264    23,3732  26 116 0             ADS     ADDRWD            BE CONSECUTIVE AND IN THAT ORDER

 0210                         23,3733  0 0006 1             EXTEND
 0211   REF 162  LAST 1263    23,3734  5 0130 0             INDEX   BUF
 0212   REF   4  LAST 1264    23,3735  5 0143 1             INDEX   DEX1
 0213   REF  69  LAST 1263    23,3736  3 0123 1             DCA     VBUF
 0214   REF 743  LAST 1264    23,3737  52 155 1             DXCH    MPAC
 0215   REF  22  LAST 1264    23,3740  0 7107 0             TC      DMPSUB          MULTIPLY BY COS(CDUANGLE)
 0216   REF 744  LAST 1264    23,3741  52 155 1             DXCH    MPAC
 0217   REF   2  LAST 1264    23,3742  20 160 1             DAS     TERM1TMP
 0218   REF   3  LAST 1264    23,3743  52 160 1             DXCH    TERM1TMP
 0219                         23,3744  20 001 1             DDOUBL
 0220   REF 163  LAST 1264    23,3745  50 130 0             INDEX   BUF
 0221   REF   5  LAST 1264    23,3746  50 143 1             INDEX   DEX1
 0222   REF  70  LAST 1264    23,3747  52 123 0             DXCH    VBUF
 0223   REF 164  LAST 1264    23,3750  52 131 0             DXCH    BUF             LOADING INDEX, STORING VECTOR COMPONENT

 0224   REF 379  LAST 1263    23,3751  10 000 0             CCS     A               'CAUSE THAT'S WHERE THE INDEX NOW IS
 0225   REF   1               23,3752  1 3715 0             TCF     LOOP2

 0226                         23,3753  0 0006 1             EXTEND
 0227   REF   6  LAST 1264    23,3754  26 142 1             DIM     DEXDEX          DECREMENT MAGNITUDE PRESERVING SIGN

 0228   REF   7  LAST 1264    23,3755  10 142 1  TSTPOINT   CCS     DEXDEX          ONLY THE BRANCHING FUNCTION IS USED
 0229   REF   1               23,3756  1 3700 1             TCF     R*TL**P
 0230   REF   2  LAST 1263    23,3757  0 0145 1             TC      RTNSAVER
 0231   REF   2  LAST 1264    23,3760  1 3700 1             TCF     R*TL**P
 0232   REF   3  LAST 1264    23,3761  0 0145 1             TC      RTNSAVER


 0233   REF   6  LAST 1261    23,3762   00736 0  SINESLOC   ADRES   SINCDU          FOR USE IN SETTING ADDRWD


 0234                         23,3763   00004 0  INDEXI     DEC     4               **********     DON'T     **********
 0235                         23,3764   00002 0             DEC     2               **********     TOUCH     **********
 0236                         23,3765   00000 1             DEC     0               **********     THESE     **********
 0237                          23,3766   00004 0            DEC     4                 *********  CONSTANTS  *********

R0238    ******************************************************************************************************************

 0240                          10,2030                      BANK    10
 0241    REF   1               10,2000                      SETLOC FLESHLOC
 0242                          10,2030                      BANK
 0243    REF   1                                            COUNT* $$/POWFL

R0244         ROUTINE FLESHPOT COMPUTES THE BODY-STABLE MEMBER TRANSFORMATION MATRIX (COMMONLY CALLED XNB) AND STORES
R0246    IT IN THE LOCATIONS SPECIFIED BY THE ECADR ENTERING IN A.

 0247                          10,2030   77776 1  CALCSMSC EXIT
 0248    REF 310  LAST  977    10,2031  0 4616 1           TC      BANKCALL
 02481   REF   2  LAST  861    10,2032   20036 0           CADR    FLESHPOT -1
 02482   REF 241  LAST 1262    10,2033  0 6037 0           TC      INTPRET
 02483                         10,2034   77616 0           RVQ

 0249    REF  11  LAST 1253    10,2035   02604 1  XNBECADR ECADR   XNB

 0250    REF   1               10,2036  3 2035 0     -1    CAF     XNBECADR

 0251    REF  28  LAST 1260    10,2037  54 142 1  FLESHPOT TS      TEM2
 0252    REF  62  LAST 1089    10,2040  56 003 1           XCH     EBANK
 0253    REF  29  LAST 1265    10,2041  56 142 0           XCH     TEM2
 0254    REF  15  LAST 1089    10,2042  7 4357 0           MASK    LOW8
 0255    REF   8  LAST 1089    10,2043  6 5007 0           AD      OCT1400
 0256    REF  22  LAST 1070    10,2044  54 141 1           TS      TEM1

 0257                          10,2045  0 0006 1           EXTEND
 0258    REF   3  LAST  478    10,2046  3 0745 1           DCA     COSCDUY
 0259    REF 745  LAST 1264    10,2047  52 155 1           DXCH    MPAC
 0260    REF  17  LAST  796    10,2050  0 7103 1           TC      DMP
 0261    REF   7  LAST  917    10,2051   00746 1           ADRES   COSCDUZ
 0262    REF 746  LAST 1265    10,2052  52 155 1           DXCH    MPAC
 0263                          10,2053  20 001 1           DDOUBL
 0264    REF  23  LAST 1265    10,2054  50 141 0           INDEX   TEM1
 0265                          10,2055  52 001 1           DXCH    0                     = COSY COSZ

 0266                          10,2056  0 0006 1           EXTEND
 0267    REF   6  LAST  917    10,2057  3 0741 0           DCA     SINCDUZ
 0268    REF  24  LAST 1265    10,2060  50 141 0           INDEX   TEM1
 0269                          10,2061  52 003 0           DXCH    2                     = SINZ

 0270                          10,2062  0 0006 1           EXTEND
 0271    REF   3  LAST  478    10,2063  4 0737 0           DCS     SINCDUY
 0272    REF 747  LAST 1265    10,2064  52 155 1           DXCH    MPAC
 0273    REF  23  LAST 1264    10,2065  0 7107 0           TC      DMPSUB                ADDRWD SET TO COSCDUZ
 0274   REF 748  LAST 1265   10,2066  52 155 1         DXCH    MPAC
 0275                        10,2067  20 001 1         DDOUBL
 0276   REF  25  LAST 1265   10,2070  50 141 0         INDEX   TEM1
 0277                        10,2071  52 005 0         DXCH    4                  = - SINY COSZ

 0278                        10,2072  0 0006 1         EXTEND
 0279   REF   5  LAST  917   10,2073  4 0743 0         DCS     SINCDUX
 0280   REF 749  LAST 1266   10,2074  52 155 1         DXCH    MPAC
 0281   REF  24  LAST 1265   10,2075  0 7107 0         TC      DMPSUB             ADDRWD SET TO COSCDUZ STILL
 0282   REF 750  LAST 1266   10,2076  52 155 1         DXCH    MPAC
 0283                        10,2077  20 001 1         DDOUBL
 0284   REF 751  LAST 1266   10,2100  52 160 1         DXCH    MPAC     +3

 0285                        10,2101  0 0006 1         EXTEND
 0286   REF   6  LAST 1266   10,2102  4 0743 0         DCS     SINCDUX
 0287   REF 752  LAST 1266   10,2103  52 155 1         DXCH    MPAC
 0288   REF  18  LAST 1265   10,2104  0 7103 1         TC      DMP
 0289   REF   7  LAST 1265   10,2105   00740 1         ADRES   SINCDUZ
 0290                        10,2106  0 0006 1         EXTEND
 0291   REF 753  LAST 1266   10,2107  4 0155 1         DCS     MPAC
 0292   REF 754  LAST 1266   10,2110  52 162 0         DXCH    MPAC     +5
 0293   REF  19  LAST 1266   10,2111  0 7103 1         TC      DMP
 0294   REF   4  LAST 1265   10,2112   00736 0         ADRES   SINCDUY
 0295   REF 755  LAST 1266   10,2113  52 155 1         DXCH    MPAC
 0296                        10,2114  20 001 1         DDOUBL
 0297                        10,2115  20 001 1         DDOUBL
 0298   REF 756  LAST 1266   10,2116  52 162 0         DXCH    MPAC     +5

 0299   REF 757  LAST 1266   10,2117  52 155 1         DXCH    MPAC
 0300   REF  20  LAST 1266   10,2120  0 7103 1         TC      DMP
 0301   REF   4  LAST 1265   10,2121   00744 0         ADRES   COSCDUY
 0302   REF 758  LAST 1266   10,2122  52 155 1         DXCH    MPAC
 0303                        10,2123  20 001 1         DDOUBL
 0304                        10,2124  20 001 1         DDOUBL
 0305   REF 165  LAST 1264   10,2125  52 131 0         DXCH    BUF

 0306                        10,2126  0 0006 1         EXTEND
 0307   REF   5  LAST 1265   10,2127  3 0745 1         DCA     COSCDUY
 0308   REF 759  LAST 1266   10,2130  52 155 1         DXCH    MPAC
 0309   REF  21  LAST 1266   10,2131  0 7103 1         TC      DMP
 0310   REF   6  LAST  917   10,2132   00750 0         ADRES   COSCDUX
 0311   REF 760  LAST 1266   10,2133  52 155 1         DXCH    MPAC
 0312                        10,2134  20 001 1         DDOUBL
 0313   REF 761  LAST 1266   10,2135  20 162 0         DAS     MPAC     +5

 0314                        10,2136  0 0006 1         EXTEND
 0315   REF   5  LAST 1266   10,2137  3 0737 1         DCA     SINCDUY
 0316   REF 762  LAST 1266   10,2140  52 155 1         DXCH    MPAC
 0317   REF  25  LAST 1266   10,2141  0 7107 0         TC      DMPSUB             ADDRWD SET TO COSCDUX
 0318   REF 763  LAST 1266   10,2142  52 155 1         DXCH    MPAC
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0319                            10,2143  20 001 1          DDOUBL
0320   REF 166   LAST 1266      10,2144  20 131 0          DAS      BUF

0321   REF 167   LAST 1267      10,2145  52 131 0          DXCH     BUF
0322   REF 764   LAST 1266      10,2146  52 155 1          DXCH     MPAC

0323                            10,2147  0 0006 1          EXTEND
0324   REF 765   LAST 1267      10,2150  3 0155 0          DCA      MPAC
0325   REF  26   LAST 1266      10,2151  50 141 0          INDEX    TEM1
0326                            10,2152  52 015 1          DXCH     14                 = SINY COSX + SINX SINZ COSY

0327                            10,2153  0 0006 1          EXTEND
0328   REF 766   LAST 1267      10,2154  3 0160 0          DCA      MPAC       +3
0329   REF  27   LAST 1267      10,2155  50 141 0          INDEX    TEM1
0330                            10,2156  52 017 0          DXCH     16                 = - SINX COSZ

0331                            10,2157  0 0006 1          EXTEND
0332   REF 767   LAST 1267      10,2160  3 0162 1          DCA      MPAC       +5
0333   REF  28   LAST 1267      10,2161  50 141 0          INDEX    TEM1
0334                            10,2162  52 021 0          DXCH     20                 = COSX COSY - SINX SINY SINZ

0335   REF  29   LAST 1267      10,2163  3 0141 0          CA       TEM1
0336   REF  83   LAST 1264      10,2164  54 116 0          TS       ADDRWD
0337                            10,2165  0 0006 1          EXTEND
0338   REF  22   LAST  863      10,2166  3 0006 1          DCA      Z
0339   REF  25   LAST 1261      10,2167  6 4751 0          AD       FOUR
0340   REF  43   LAST 1116      10,2170  52 165 1          DXCH     LOC
0341   REF  36   LAST 1122      10,2171  3 7744 1          CAF      BIT8
0342   REF  11   LAST 1003      10,2172  54 023 1          TS       EDOP
0343   REF   2   LAST 1011      10,2173  1 7460 0          TCF      VXV
0344   REF 768   LAST 1267      10,2174  52 155 1          DXCH     MPAC
0345                            10,2175  20 001 1          DDOUBL
0346   REF  30   LAST 1267      10,2176  50 141 0          INDEX    TEM1
0347                            10,2177  52 007 1          DXCH     6

0348   REF 769   LAST 1267      10,2200  52 160 1          DXCH     MPAC       +3
0349                            10,2201  20 001 1          DDOUBL
0350   REF  31   LAST 1267      10,2202  50 141 0          INDEX    TEM1
0351                            10,2203  52 011 0          DXCH     10

0352   REF 770   LAST 1267      10,2204  52 162 0          DXCH     MPAC       +5
0353                            10,2205  20 001 1          DDOUBL
0354   REF  32   LAST 1267      10,2206  50 141 0          INDEX    TEM1
0355                            10,2207  52 013 1          DXCH     12

0356   REF  30   LAST 1265      10,2210  3 0142 0          CA       TEM2
0357   REF  63   LAST 1265      10,2211  54 003 0          TS       EBANK
0358   REF   6   LAST  983      10,2212  1 4631 0          TCF      SWRETURN
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R0001           THE TFF SUBROUTINES MAY BE USED IN EITHER EARTH OR MOON CENTERED COORDINATES. THE TFF ROUTINES NEVER
R0003   KNOW WHICH ORIGIN APPLIES. IT IS THE USER WHO KNOWS, AND WHO SUPPLIES  RONE, VONE AND 1/SQRT(MU)  AT THE
R0005   APPROPRIATE SCALE LEVEL FOR THE PROPER PRIMARY BODY.

R0006           EARTH ORIGIN            POSITION       -29        METERS
R0007                                   VELOCITY       -7         METERS/CENTISECOND
R0009                                   1/SQRT(MU)     +17        SQRT(CS SQ/METERS CUBED)

R0011           MOON ORIGIN             POSITION       -27        METERS
R0012                                   VELOCITY       -5         METERS/CENTISECONDS
R0014                                   1/SQRT(MU)     +14        SQRT(CS SQ/METERS CUBED)

R0016   ALL DATA PROVIDED TO AND RECEIVED FROM ANY TFF SUBROUTINE WILL BE AT ONE OF THE LEVELS ABOVE. IN ALL CASES,
R0018   THE FREE FALL TIME IS RETURNED IN CENTISECONDS AT (-28). PROGRAM  TFF/CONIC  WILL GENERATE VONE/RTMU  AND
R0020   LEAVE IT IN  VONE' AT (+10) IF EARTH ORIGIN AND (+9) IF MOON ORIGIN.
R0021           THE USER MUST STORE THE STATE VECTOR IN  RONE, VONE  AND MU IN  THE FORM 1/SQRT(MU) IN  TFF/RTMU
R0023   AT THE PROPER SCALE BEFORE CALLING  TFF/CONIC. SINCE  RONE, VONE  ARE IN THE EXTENDED VERB STORAGE AREA,
R0025   THE USER MUST ALSO LOCK OUT THE EXTENDED VERBS, AND RELEASE THEM WHEN FINISHED.
R0027           PROGRAMS     CALC/TFF   AND  CALC/TPER  ASSUME THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT
R0029   RADIUS. THIS RESTRICTION CAN BE REMOVED BY A  15 W CODING CHANGE, BUT AT PRESENT IT IS NOT DEEMED NECESSARY.
R0031
R0032           THE FOLLOWING ERASABLE QUANTITIES ARE USED BY THE TFF ROUTINES, AND ARE LOCATED IN THE PUSH LIST.
R0034

A0035                                                                BELOW      E:   IS USED FOR EARTH ORIGIN SCALE
A0036                                                                           M:   IS USED FOR MOON  ORIGIN SCALE

A0037                                        TFFSW      =      119D  BIT1       0 = CALCTFF          1 = CALCTPER
 0038                       0012             TFFDELQ    =      10D              Q2-Q1                E: (-16)  M: (-15)
 0039                       0014             RMAG1      =      12D              ABVAL(RN)   M        E: (-29)  M: (-27)
A0040                                        RPER       =      14D              PERIGEE RADIUS M     E: (-29)  M: (-27)
 0041                       0016             TFFQ1      =      14D              R.V / SQRT(MUE)      E: (-16)  M: (-15)
A0042                                        SDELF/2                            SIN(THETA) /2
 0043                       0016             CDELF/2    =      14D              COS(THETA) /2
A0044                                        RAPO       =      16D              APOGEE RADIUS  M     E: (-29)  M: (-27)
 0045                       0020             NRTERM     =      16D              TERMINAL RADIUS M    E: (-29+NR)
A0046                                                                                                M: (-27+NR)
 0047                       0022             RTERM      =      18D              TERMINAL RADIUS M    E: (-29)  M: (-27)
 0048                       0024             TFFVSQ     =      20D              -(V SQUARED/MU)  1/M  E: (20)  M: (18)
 0049                       0026             TFF1/ALF   =      22D              SEMI MAJ AXIS  M   E: (-22-2 NA)
A0050                                                                                              M: (-20-2 NA)
 0051                       0030             TFFRTALF   =      24D              SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0052                       0032             TFFALFA    =      26D              ALFA  1/M   E: (26-NR)  M: (24-NR)
 0053                       0034             TFFNP      =      28D              SEMI LATUS RECTUM  M  E: (-38+2 NR)
A0054                                                                                                 M: (-36+2 NR)
 0055                       0036             TFF/RTMU   =      30D              1/SQRT(MU)           E: (17)   M: (14)
 0056                       0040             NRMAG      =      32D              PRESENT RADIUS  M    E: (-29+NR)
A0057                                                                                                M: (-27+NR)
 0058                       0042             TFFX       =      34D
 0059                       0044             TFFTEM     =      36D              TEMPORARY
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A0060                                     REGISTERS S1, S2 ARE UNTOUCHED BY ANY TFF SUBROUTINE
A0061                                     INDEX REGISTERS X1, X2 ARE USED BY ALL TFF SUBROUTINES. THEY ARE ESTAB-
A0062                                     LISHED IN TFF/CONIC AND MUST BE PRESERVED BETWEEN CALLS TO SUBSEQUENT
A0063                                     SUBROUTINES.
A0064                                     -NI                        C(X1) = NORM COUNT OF RMAG
A0065                                     -NA                        C(X2)= NORM COUNT OF SQRT(ABS(ALFA))
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P0066

R0067   SUBROUTINE NAME:     TFFCONIC                                            DATE:    01.29.67
R0069   MOD NO:  0                                                               LOG SECTION:    TIME OF FREE FALL
R0071   MOD BY:  RR BAIRNSFATHER
R0072   MOD NO:  1           MOD BY:  RR BAIRNSFATHER      DATE:  11 APR 67
R0073   MOD NO:  2           MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67      ADD MOON MU.
R0075   MOD NO:  3           MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68      ACCEPT DIFFERENT EARTH/MOON SCALES
R0077   FUNCTIONAL DESCRIPTION:      THIS SUBROUTINE IS CALLED TO COMPUTE THOSE CONIC PARAMETERS REQUIRED BY THE TFF
R0079            SUBROUTINES AND TO ESTABLISH THEM IN THE PUSH LIST AREA. THE PARAMETERS ARE LISTED UNDER OUTPUT.
R0081            THE EQUATIONS ARE
R0082                   -   -  -
R0083                   H = RN*VN                                                ANGULAR MOMENTUM
R0085                         - -
R0086                   LCP = H.H / MU                                           SEMI LATUS RECTUM
R0088                                 -  -
R0089                   ALFA = 2/RN - VN.VN / MU                                 RECIPROCAL SEMI MAJ AXIS, SIGNED

R0091            AND ALFA IS POS FOR ELLIPTIC  ORBITS
R0092                         0  FOR PARABOLIC ORBITS
R0093                        NEG FOR HYPERBOLIC ORBITS.
R0094            SUBROUTINE ALSO COMPUTES AND SAVES  RMAG.
R0095   CALLING SEQUENCE:
R0096            TFFCONIC  EXPECTS CALLER TO ENTER WITH CORRECT GRAVITATIONAL CONSTANT IN MPAC, IN THE FORM
R0098            1/SQRT(MU). PROGRAM WILL SAVE IN  TFF/RTMU  . THE SCALE IS DETERMINED BY WHETHER EARTH OR MOON
R0100            ORIGIN IS USED.  THE CALLER MUST LOCK OUT THE EXTENDED VERBS BEFORE PROVIDING STATE VECTOR IN RONE,
R0102            VONE  AT PROPER SCALE. THE EXTENDED VERBS MUST BE RESTORED WHEN THE CALLER IS FINISHED USING THE
R0104            TFF ROUTINES.
R0105            ENTRY POINT  TFFCONMU  EXPECTS THAT  TFF/RTMU  IS ALREADY LOADED.
R0107            TO SPECIFY MU:      DLOAD  CALL                 IF MU ALREADY STORED:    CALL
R0109                                       YOURMU       1/RTMU    E: (17)  M: (14)              TFFCONMU
R0111                                       TFFCONIC
R0112            PUSHLOC = PDL+0, ARBITRARY IF LEQ 18D

R0113   SUBROUTINES CALLED:  NONE
R0114   NORMAL EXIT MODES:   RVQ
R0115   ALARMS:  NONE
R0116   OUTPUT:  THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0117            RMAG1    E:(-29) M:(-27) M  RN, PRESENT RADIUS LENGTH.
R0118            NRMAG    E: (-29+NR)   M  RMAG, NORMALIZED
R0119                   M: (-27+NR)
R0120            X1                     -NR, NORM COUNT
R0121            TFFNP  E: (-38+2NR)    M  LCP, SEMI LATUS RECTUM, WEIGHTED BY NR.        FOR VGAMCALC
R0123                   M: (-36+2NR)
R0124            TFF/RTMU  E:(17)  M:(14)       1/SQRT(MU)
R0125            TFFVSQ E:(20)  M:(18)  1/M    -(V SQ/MU): PRESENT VELOCITY,NORMLIZED.     FOR VGAMCALC
R0127            TFFALFA  E: (26-NR)    1/M   ALFA, WEIGHTED BY NR
R0128                     M: (24-NR)
R0129            TFFRTALF  E: (10+NA)   SQRT(ALFA), NORMALIZED
R0130                      M: (9+NA)
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R0131               X2                          -NA, NORM COUNT
R0132               TFF1/ALF  E: (-22-2NA) SIGNED SEMI MAJ AXIS, WEIGHTED BY MA
R0133                         M: (-20-2NA)
R0134               PUSHLOC AT PDL+0
R0135               THE FOLLOWING  IS STORED IN GENERAL ERASABLE
R0136               VONE'  E:(10)  M:(9)   V/RT(MU), NORMALIZED VELOCITY
R0137      ERASABLE INITIALIZATION REQUIRED:
R0138               RONE    E:(-29)  M:(-27)  M        STATE VECTOR                  LEFT BY CALLER
R0140               VONE    E:(-7)   M:(-5)   M/CS     STATE VECTOR                  LEFT BY CALLER
R0142               TFF/RTMU  E:(17)  M:(14)       1/RT(CS SQ/M CUBE)                IF ENTER VIA  TFFCONMU.
R0144      DEBRIS:  QPRET,      PDL+0 ... PDL+3
R0145


 0146                          33,3777                           BANK    33
 0147      REF    1            27,2000                           SETLOC  TOF-FF
 0148                          27,3360                           BANK

 0149      REF    2 LAST   46 TO   46:     2      2*             COUNT*  $$/TFF

 0150      REF    4  LAST  717  27,3360    00037 0  TFFCONIC  STORE   TFF/RTMU           1/SQRT(MU)          E: (17)   M: (14)

 0151                           27,3361    53575 0  TFFCONMU  VLOAD   UNIT               COME HERE WITH TFFRTMU LOADED.
 0152      REF    1   LAST  720  27,3362   02207 0                    RONE               SAVED RN.   M       E: (-29)   M: (-27)
 0153                           27,3363    77725 1            PDDL                       UR/2 TO PDL+0, +5
 0154                           27,3364    00045 0                    36D                MAGNITUDE
 0155      REF    1             27,3365    00015 0            STORE   RMAG1              M     E: (-29)    M: (-27)

 0156                           27,3366    77701 1            NORM
 0157      REF   69   LAST 1235  27,3367   00047 1                    X1                 -NR
 0158      REF    1             27,3370    24041 1            STOVL   NRMAG              RMAG   M    E: (-29+NR)   M: (-27+NR)
 0159      REF    9   LAST  720  27,3371   02215 0                    VONE               SAVED VN.  M/CS    E: (-7)    M: (-5)
 0160                           27,3372    77761 1            VXSC
 0161      REF    5   LAST 1271  27,3373   00037 0                    TFF/RTMU           E: (17)    M: (14)
 0162      REF    1             27,3374    02170 0            STORE   VONE'              VN/SQRT(MU)    E: (10)    M: (9)

 0163                           27,3375    47361 0            VXSC    VXV
 0164      REF    2   LAST 1271  27,3376   00041 1                    NRMAG              E: (-29+NR)  M: (-27+NR)
A0165                                                                                    UR/2 FROM PDL
 0166                           27,3377    47572 1            VSL1    VSQ                BEFORE:  E:(-19+NR)  M:(-18+NR)
 0167      REF    1             27,3400    14035 1            STODL   TFFNP              LC P   M    E:(-38+2NR)  M:(-36+2NR)
A0168                                                                                    SAVE ALSO FOR VGAMCALC
 0169      REF    1             27,3401    06512 1                    TFF1/4
 0170                           27,3402    63271 0            DDV     PDVL               (2/RMAG)  1/M    E:(26-NR)    M:(24-NR)
 0171      REF    3   LAST 1271  27,3403   00041 1                    NRMAG              RMAG  M    E:(-29+NR)  M:(-27+NR)
 0172      REF    2   LAST 1271  27,3404   02170 0                    VONE'              SAVED VN.   E: (10)    M: (9)
 0173                           27,3405    57436 1            VSQ     DCOMP              KEEP MPAC+2 HONEST FOR SQRT.
 0174      REF    1             27,3406    00025 0            STORE   TFFVSQ             -(V SQ/MU)    E:(20)    M:(18)
A0175                                                                                    SAVE FOR VGAMCALC
 0176                           27,3407    43257 0            SF*     DAD
 0177                              27,3410   20573 1                      0 -6,1        GET -VSQ/MU    E:(26-NR)    M:(24-NR)
 0178                              27,3411   77626 0             STADR
A0179                                                                                   2/RMAG    FROM PDL+2
 0180   REF    1                   27,3412   77744 0             STORE    TFFALFA       ALFA  1/M     E:(26-NR)    M:(24-NR)
 0181                              27,3413   41457 1             SL*      PUSH          TEMP SAVE ALFA     E:(20)    M:(18)
 0182                              27,3414   20173 0                      0 -6,1
 0183                              27,3415   75446 0             ABS      SQRT          E:(10)    M:(9)
 0184                              27,3416   77701 1             NORM
 0185   REF   29   LAST 1236       27,3417   00050 1                      X2            X2 = -NA
 0186   REF    1                   27,3420   00031 0             STORE    TFFRTALF      SQRT( ABS(ALFA) )  E:(10+NA)    M:(9+NA)
 0187                              27,3421   75316 1             DSQ      SIGN          NOT SO ACCURATE, BUT OK
A0188                                                                                   ALFA FROM PDL+2    E:(20)    M:(18)
 0189                              27,3422   55254 1             BZE      BDDV          SET 1/ALFA =0, TO SHOW SMALL ALFA
 0190                              27,3423   57425 0                      +2
 0191   REF    2   LAST 1271       27,3424   06512 1                      TFF1/4
 0192   REF    1                   27,3425   00027 1  +2         STORE    TFF1/ALF      1/ALFA   E:(-22-2 NA)   M:(-20-2 NA)
 0193                              27,3426   77616 0  DUMPCNIC   RVQ

A0194                                                                                                     39 W
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R0195   SUBROUTINE NAME:     TFFRP/RA                                           DATE:  01.17.67
R0197   MOD NO:  0                                                              LOG SECTION:    TIME OF FREE FALL
R0199   MOD BY:  RR BAIRNSFATHER
R0200   MOD NO:  1          MOD BY:  RR BAIRNSFATHER      DATE:  11 APR 67
R0201   MOD NO:  2          MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68     ACCEPT DIFFERENT EARTH/MOON SCALES
R0203                                                                           ALSO IMPROVE ACCURACY OF RAPO.
R0205   FUNCTIONAL DESCRIPTION:         USED BY CALCTPER AND TFF DISPLAYS TO CALCULATE PERIGEE RADIUS AND ALSO
R0207            APOGEE RADIUS FOR A GENERAL CONIC.
R0208            PROGRAM GIVES PERIGEE RADIUS AS               APOGEE RADIUS IS GIVEN BY
R0210                   RP = P /(1+E)                                 RA = (1+E) / ALFA
R0212            WHERE   2
R0213                   E  = 1 - P ALFA
R0214            IF RA IS NEGATIVE OR SHOWS DIVIDE OVERFLOW, THEN RA = POSMAX BECAUSE
R0216                   1. APOGEE RADIUS IS NOT MEANINGFUL FOR HYPERBOLA
R0217                   2. APOGEE RADIUS IS NOT DEFINED FOR PARABOLA
R0218                   3. APOGEE RADIUS EXCEEDS THE SCALING FOR ELLIPSE.
R0219            THIS SUBROUTINE REQUIRES THE SIGNED  RECIPROCAL SEMI MAJ AXIS,  ALFA,  AND SEMI LATUS RECTUM AS DATA.
R0221   CALLING SEQUENCE:  CALL
R0222                             TFFRP/RA
R0223            PUSHLOC = PDL+0, ARBITRARY IF LEQ 10D
R0224            C(MPAC) UNSPECIFIED

R0225   SUBROUTINES CALLED:  NONE
R0226   NORMAL EXIT MODE:     RVQ
R0227            IF ELLIPSE, WITHIN NORMAL SCALING, RAPO IS CORRECT.
R0228            OTHERWISE, RAPO = POSMAX.
R0229   ALARMS:  NONE
R0230   OUTPUT:  STORED IN PUSH LIST AREA. SCALE OF OUTPUT AGREES WITH DATA SUPPLIED TO  TFF/CONIC.
R0232            RPER   E:(-29)  M:(-27)  M     PERIGEE RADIUS                  DESTROYED BY CALCTFF/CALCTPER, TFFTRIG.
R0234            RAPO   E:(-29)  M:(-27)  M     APOGEE  RADIUS                  WILL BE DESTROYED BY CALCTFF/CALCTPER
R0236            PUSHLOC AT PDL+0
R0237   ERASABLE INITIALIZATION REQUIRED:
R0238            TFFALFA E:(26-NR)      M   1/SEMI MAJ AXIS                     LEFT BY TFFCONIC
R0240                    M:(24-NR)
R0241            TFFNP  E: (-38+2NR)    M  LC P, SEMI LATUS RECTUM              LEFT BY TFFCONIC
R0243                    M: (-36+2NR)
R0244            X1                     -NR, NORM COUNT OF RMAG                 LEFT BY TFFCONIC
R0246            X2                     -NA, NORM COUNT OF ALFA                 LEFT BY TFFCONIC
R0248   DEBRIS:  QPRET,    PDL+0 ... PDL+1
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L       TIME OF FREE FALL                                                                   USER'S PAGE NO.   7       E0 S3

P0249
 0250                             0020           RAPO       =       16D           APOGEE RADIUS  M   E:(-29)  M:(-27)
 0251                             0016           RPER       =       14D           PERIGEE RADIUS  M  E:(-29)  M:(-27)
A0252
 0253                          27,3427  41345 0  TFFRP/RA DLOAD     DMP
 0254  REF   2  LAST 1272      27,3430  00033 1                     TFFALFA       ALFA  1/M  E:(26-NR)   M:(24-NR)
 0255  REF   2  LAST 1271      27,3431  00035 1                     TFFNP         LC P   M   E:(-38+2NR)   M:(-36+2NR)
 0256                          27,3432  57457 0             SR*     DCOMP         ALFA P (-12+NR)
 0257                          27,3433  20571 0                     0 -8D,1       ALFA P  (-4)
 0258                          27,3434  51415 0             DAD     ABS           (DCOMP GIVES VALID TP RESULT FOR SQRT)
A0259                                                                             (ABS PROTECTS SQRT IF E IS VERY NEAR 0)
 0260  REF   1                 27,3435  17765 0                     DP2(-4)
 0261                          27,3436  43366 0             SQRT    DAD           E SQ = (1- P ALFA)   (-4)
 0262  REF   3  LAST 1272      27,3437  06512 1                     TFF1/4
 0263                          27,3440  55206 0             PUSH    BDDV          (1+E)  (-2)  TO PDL+0
 0264  REF   3  LAST 1274      27,3441  00035 1                     TFFNP         LCP  M E:(-38+2NR)   M:(-36+2NR)
 0265                          27,3442  53657 0             SR*     SR*           (DOES SR THEN SL TO AVOID OVFL)
 0266                          27,3443  20601 1                     0,1           X1=-NP
 0267                          27,3444  20572 0                     0 -7,1        (EFFECTIVE SL)
 0268  REF   3  LAST  721      27,3445  14017 1             STODL   RPER          PERIGEE RADIUS  M   E:(-29)   M:(-27)
A0269                                                                             (1+E)  (-2)   FROM PDL+0
 0270                          27,3446  41005 1             DMP     BOVB
 0271  REF   2  LAST 1272      27,3447  00027 1                     TFF1/ALF      E:(-22-2NA)  M:(-20-2NA)
 0272  REF   4  LAST 1228      27,3450  57753 1                     TCDANZIG      CLEAR OVFIND, IF ON.
 0273                          27,3451  53654 0             BZE     SL*
 0274  REF   1                 27,3452  57461 0                     MAXRA         SET POSMAX, IF ALFA=0
 0275                          27,3453  57603 0                     0 -5,2        -5+NA
 0276                          27,3454  40057 1             SL*     BOV
 0277                          27,3455  57576 1                     0,2
 0278  REF   2  LAST 1274      27,3456  57461 0                     MAXRA         SET POSMAX IF OVFL.
 0279                          27,3457  77644 1             BPL                   CONTINUE WITH VALID RAPO.
 0280                          27,3460  57463 1                     +3
 0281                          27,3461  77745 1  MAXRA      DLOAD                 RAPO CALC IS NOT VALID. SET RAPO =
 0282  REF   3  LAST  856      27,3462  17771 0                     NEARONE       POSMAX AS A TAG.
 0283  REF   1                 27,3463  00021 1  +3         STORE   RAPO          APOGEE RADIUS  M   E:(-29)   M:(-27)
 0284                          27,3464  77616 0  DUMPRPRA   RVQ

A0285                                                                                            30 W
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R0286   SUBROUTINE NAME:     CALCTPER   /   CALCTFF                                   DATE:     01.29.67
R0288   MOD NO:  0                                                                    LOG SECTION:    TIME OF FREE FALL
R0290   MOD BY:  RR BAIRNSFATHER
R0291   MOD NO:  1               MOD BY:  RR BAIRNSFATHER       DATE:  21 MAR 67
R0292   MOD NO:  2               MOD BY:  RR BAIRNSFATHER       DATE:  14 APR 67
R0293   MOD NO:  3               MOD BY:  RR BAIRNSFATHER       DATE:  8JUL 67        NEAR EARTH MUE AND NEG TFF (GONEPAST)
R0295   MOD NO:  4               MOD BY:  RR BAIRNSFATHER       DATE:  21 NOV 67      ADD VARIABLE MU.
R0297   MOD NO:  5               MOD BY:  RR BAIRNSFATHER       DATE:  21 MAR 68      ACCEPT DIFFERENT EARTH/MOON SCALES
R0299   FUNCTIONAL DESCRIPTION:       PROGRAM CALCULATES THE FREE-FALL TIME OF FLIGHT FROM PRESENT POSITION  RN  AND
R0301           VELOCITY  VN   TO A RADIUS LENGTH SPECIFIED BY  RTERM  , SUPPLIED BY THE USER. THE POSITION VECTOR
R0303           RN  MAY BE ON EITHER SIDE OF THE CONIC, BUT  RTERM  IS CONSIDERED ON THE INBOUND SIDE.
R0305           THE EQUATIONS ARE

R0306                  Q2 = -SQRT(RTERM (2-RTERM ALFA) - LCP)    (INBOUND SIDE))        LEQ +- LCE/SQRT(ALFA)
R0308                        -  -
R0309                  Q1 = RN.VN / SQRT(MU)                                             LEQ +- LCE/SQRT(ALFA)

R0311                  Z = NUM / DEN                                                     LEQ +- 1/SQRT(ALFA)

R0313           WHERE, IF INBOUND
R0314                  NUM = RTERM - RN                                                  LEQ +- 2 LCE/ALFA
R0316                  DEN = Q2+Q1                                                       LEQ +- 2 LCE/SQRT(ALFA)

R0318           AND, IF OUTBOUND
R0319                  NUM = Q2-Q1                                                       LEQ +- 2 LCE/SQRT(ALFA)
R0321                  DEN = 2 - ALFA (RTERM + RN) .                                     LEQ +- 2 LCE

R0323           IF     ALFA ZZ  <  1.0               (FOR ALL CONICS EXCEPT ELLIPSES HAVING ABS(DEL ECC ANOM) G 90 DEG)

R0325           THEN   X = ALFA Z Z
R0326           AND    TFF = (RTERM +RN -2 ZZ T(X) ) Z/SQRT(MU)

R0327                  EXCEPT IF ALFA PNZ, AND IF TFF NEG,
R0328                  THEN   TFF = 2 PI /(ALFA SQRT(ALFA)) + TFF

R0329           OR IF  ALFA ZZ  GEQ  1.0             (FOR ELLIPSES HAVING ABS(DEL ECC ANOM) GEQ 90 DEG)

R0331           THEN   X = 1/ALFA Z Z
R0332           AND    TFF = (PI/SQRT(ALFA) -Q2 +Q1 +2(X T(X) -1) /ALFA Z) /ALFA SQRT(MU)

R0334           WHERE  T(X) IS A POLYNOMIAL APPROXIMATION TO THE SERIES
R0335                             2     3                              2
R0336                  1/3 -X/5 +X /7 -X /9 ...                       (X   <  1.0)

R0337   CALLING SEQUENCE:  TIME TO RTERM                              TIME TO PERIGEE
R0339                      CALL                                       CALL
R0340                           CALCTFF                                    CALCTPER
R0342                      C(MPAC) = TERMNL RAD  M                    C(MPAC) = PERIGEE RAD  M
R0344           FOR EITHER,    E: (-29)    M: (-27)
R0345           FOR EITHER, PUSHLOC = PDL+0 , ARBITRARY IF LEQ 8D.
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R0346   SUBROUTINES CALLED:  T(X),  VIA RTB
R0347   NORMAL EXIT MODE:  RVQ
R0348            HOWEVER, PROGRAM EXITS WITH ONE OF THE FOLLOWING VALUES FOR TFF (-28) CS  IN MPAC. USER MUST STORE.
R0350                   A.  TFF= FLIGHT TIME. NORMAL CASE FOR POSITIVE FLIGHT TIME LESS THAN ONE ORBITAL PERIOD.
R0352                   B.  (THIS OPTION IS NO LONGER USED.)
R0353                   C.  TFF = POSMAX.  THIS INDICATES THAT THE CONIC FROM THE PRESENT POSITION WILL NOT RETURN TO
R0355                       THE SPECIFIED ALTITUDE.  ALSO INDICATES OUTBOUND PARABOLA OR HYPERBOLA.
R0357   OUTPUT:  C(MPAC)  (-28)  CS     TIME OF FLIGHT, OR TIME TO PERIGEE
R0358            TFFX     (0)           X,                                      LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0360            NRTERM   E: (-29+NR)   M  RTERM, WEIGHTED BY NR                LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0362                     M: (-27+NR)
R0363            TFFTEM   E: (-59+2NR)  LCP / Z SGN(SDELF)                      LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0365                     M: (-55+2NR)  LCP /ALFA SGN(SDELF)                    LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0367            NOTE:  TFFTEM = PDL 36D AND WILL BE DESTROYED BY .:UNIT:.
R0368            RMAG1  E:(-29)  M:(-27)  PDL 12 NOT TOUCHED.
R0369            TFFQ1  E:(-16)  M:(-15)  PDL 14D
R0370            TFFDELQ E:(-16) M:(-15)  PDL 10D
R0371            PUSHLOC AT PDL+0
R0372   ERASABLE INITIALIZATION REQUIRED:
R0373            RONE   E:(-29)  M:(-27)  M   STATE VECTOR                      LEFT BY USER
R0375            VONE'  E:(+10)  M:(+8)   VN/SQRT(MU)                           LEFT BY TFF/CONIC
R0377            RMAG1  E:(-29)  M:(-27)  PRESENT RADIUS, M                     LEFT BY TFFCONIC
R0379            C(MPAC)E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH, M      LEFT BY USER

R0381            THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0382            TFF/RTMU  E:(17)  M:(14)  1/SQRT(MU)                           LEFT BY TFFCONIC.
R0384            NRMAG  E: (-29+NR)  M  RMAG, NORMALIZED                        LEFT BY TFFCONIC
R0386                   M: (-27+NR)
R0387            X1                     -NR, NORM COUNT                         LEFT BY TFFCONIC
R0389            TFFNP  E: (-38+2NR)  M   LCP, SEMI LATUS RECTUM, WEIGHT  NR    LEFT BY TFFCONIC
R0391                   M: (-36+2NR)
R0392            TFFALFA  E: (26-NR)    1/M  ALFA, WEIGHT  NR                   LEFT BY TFFCONIC
R0394                     M: (24-NR)
R0395            TFFRTALF  E:(10+NA)    SQRT(ALFA), NORMALIZED                  LEFT BY TFFCONIC
R0397                      M:(9+NA)
R0398            X2                     -NA, NORM COUNT                         LEFT BY TFFCONIC
R0400            TFF1/ALF  E: (-22-2NA)  SIGNED SEMIMAJ AXIS, WEIGHTED BY NA    LEFT BY TFFCONIC
R0402                      M: (-20-2NA)
R0403   DEBRIS:  QPRET,   PDL+0 ... PDL+3
R0404            RTERM  E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH
R0405            RAPO   E:(-29)  M:(-27)  PDL 16D  (=NRTERM)
R0406            RPER   E:(-29)  M:(-27)  PDL 14D   (=TFFQ1)
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P0407
 0408                        27,3465   77614 1  CALCTPER  SETGO                           ENTER WITH RPER  IN MPAC
 0409   REF   1              27,3466   03436 0                    TFFSW
 0410                        27,3467   57472 1                    +3
 0411                        27,3470   77614 1  CALCTFF   CLEAR                           ENTER WITH RTERM IN MPAC
 0412   REF   2  LAST 1277   27,3471   03676 0                    TFFSW
 0413   REF   1              27,3472   00023 0  +3        STORE   RTERM                   E: (-29)  M: (-27)
 0414                        27,3473   77657 0            SL*
 0415                        27,3474   20201 0                    0,1                     X1=-NR
 0416   REF   1              27,3475   00021 1            STORE   NRTERM                  RTERM  E: (-29+NR)  M: (-27+NR)
 0417                        27,3476   44205 0            DMP     BDSU
 0418   REF   3  LAST 1274   27,3477   00033 1                    TFFALFA                 ALFA  E: (26-NR)  M: (24-NR)
 0419   REF   4  LAST 1274   27,3500   06512 1                    TFF1/4
 0420                        27,3501   41206 0            PUSH    DMP                     (2-ALFA RTERM)  (-3)  TO PDL+0
 0421   REF   2  LAST 1277   27,3502   00021 1                    NRTERM                  E: (-29+NR)  M: (-27+NR)
 0422                        27,3503   53725 1            PDDL    SR*                     RTERM(2-ALFA RTERM) TO PDL+2
A0423                                                                                     E: (-32+NR)   M: (-30+NR)
 0424   REF   4  LAST 1274   27,3504   00035 1                    TFFNP                   LC P  E:(-38+2NR)  M:(-36+2NR)
 0425                        27,3505   20573 1                    0 -6,1                  X1 = -NR
 0426                        27,3506   43276 0            DCOMP   DAD                     DUE TO SHIFTS, KEEP PRECISION FOR SQRT
A0427                                                                                     RTERM(2-ALFA RTERM) FROM PDL+2
A0428                                                                                     E: (-32+NR)  M: (-30+NR)
 0429                        27,3507   77657 0            SR*                             LEAVE  E: (-32)  M: (-30)
 0430                        27,3510   20601 1                    0,1                     X1 = -NR
 0431                        27,3511   71214 0            BOFF    DLOAD                   CHECK TFF / TPER SWITCH
 0432   REF   3  LAST 1277   27,3512   03756 0                    TFFSW
 0433                        27,3513   57515 1                    +2                      IF TFF, CONTINUE
 0434   REF   1              27,3514   06522 1                    TFFZEROS                IF TPER, SET Q2 = 0
 0435                        27,3515   75440 0  +2        BMN     SQRT                    E: (-16)  M: (-15)

 0436   REF   1              27,3516   57650 0                    MAXTFF1                 NO FREE FALL CONIC TO RTERM FROM HERE
A0437                                                                                     RESET PDL, SET TFF=POSMAX, AND EXIT.

 0438                        27,3517   41076 0            DCOMP   BOVB                    RT IS ON INBOUND SIDE.  ASSURE OVFIND=0
 0439   REF   5  LAST 1274   27,3520   57753 1                    TCDANZIG                ANY PORT IN A STORM.
 0440   REF   1              27,3521   24045 0            STOVL   TFFTEM                  Q2    E: (-16)  M: (-15)
 0441   REF   3  LAST 1271   27,3522   02170 0                    VONE'                   VN/SQRT(MU) E: (10)  M: (9)
 0442                        27,3523   52441 1            DOT     SL3
 0443   REF  16  LAST 1271   27,3524   02207 0                    RONE                    SAVED RN.  E: (-29)  M: (-27)
 0444   REF   1              27,3525   00017 1            STORE   TFFQ1                   Q1, SAVE FOR GONEPAST TEST.
A0445                                                                                     E: (-16)  M: (-15)
 0446                        27,3526   44240 1            BMN     BDSU
 0447   REF   1              27,3527   57550 0                    INBOUND                 USE ALTERNATE Z
 0448   REF   2  LAST 1277   27,3530   00045 0                    TFFTEM                  Q2  E: (-16)  M: (-15)

A0449                                           OUTBOUND  Z CALC CONTINUES HERE

 0450   REF   1              27,3531   14043 0            STODL   TFFX                    NUM=Q2-Q1  E: (-16)  M: (-15)
 0451   REF   4  LAST 1277   27,3532   00033 1                    TFFALFA                 ALFA  E: (26-NR)  M: (24-NR)
 0452                        27,3533   44205 0            DMP     BDSU
 0453   REF    4  LAST 1271   27,3534   00041 1                   NRMAG             RMAG  E: (-29+NR)  M: (-27+NR)
A0454                                                                               (2-RTERM ALFA)  (-3) FROM PDL+0
 0455                         27,3535   51406 1  SAVEDEN  PUSH    ABS               DEN TO PDL+0   E: (-3) OR (-16)
A0456                                                                                            M: (-3) OR (-15)
 0457                         27,3536   40015 1           DAD     BOV               INDETERMINANCY TEST
 0458   REF    1              27,3537   17757 1                   LIM(-22)          =1.0-B(-22)
 0459   REF    1              27,3540   57561 1                   TFFXTEST          GO IF DEN >/= B(-22)
 0460                         27,3541   65345 0           DLOAD   PDDL              SET DEN=0  OTHERWISE
 0461   REF    2  LAST 1277   27,3542   06522 1                   TFFZEROS
A0462                                                                               XCH ZERO WITH PDL+0
 0463                         27,3543   57545 1           DLOAD   DCOMP
 0464   REF    5  LAST 1277   27,3544   00033 1                   TFFALFA           ALFA  E: (26-NR)  M: (24-NR)
 0465                         27,3545   71240 1           BMN     DLOAD             FOR TPER: Z INDET AT DELE/2=0 AND 90.
 0466   REF    1              27,3546   57655 0                   TFFEL1            ASSUME 90, AND LEAVE 0 IN PDL: 1/Z=D/N

A0467                                                                               Z INDET. AT PERIGEE FOR PARAB OR HYPERB.
 0468                         27,3547   77616 0  DUMPTFF1 RVQ                       RETURN  TFF =0

A0469                                            INBOUND  Z  CALC CONTINUES HERE
 0470                         27,3550   77745 1  INBOUND  DLOAD                     RESET PDL+0
 0471                         27,3551   45345 1           DLOAD   DSU               ALTERNATE Z CALC
 0472   REF    2  LAST 1277   27,3552   00023 0                   RTERM             E: (-29)  M: (-27)
 0473   REF    2  LAST 1271   27,3553   00015 0                   RMAG1             E: (-29)  M: (-27)
 0474   REF    2  LAST 1277   27,3554   14043 0           STODL   TFFX              NUM=RTERM-RN  E: (-29)  M: (-27)
 0475   REF    3  LAST 1277   27,3555   00045 0                   TFFTEM            Q2  E: (-16)  M: (-15)
 0476                         27,3556   52015 1           DAD     GOTO
 0477   REF    2  LAST 1277   27,3557   00017 1                   TFFQ1             Q1  E: (-16)  M: (-15)
 0478   REF    1              27,3560   57535 0                   SAVEDEN           DEN = Q2+Q1   E: (-16)  M: (-15)

 0479                         27,3561   65215 1  TFFXTEST DAD     PDDL               (ABS(DEN) TO PDL+2))  E: (-3) OR (-16)
A0480                                                                                                      M: (-3) OR (-15)
 0481   REF    1              27,3562   17761 1                   DP(-22)           RESTORE ABS(DEN) TO MPAC
 0482   REF    3  LAST 1278   27,3563   00043 0                   TFFX              NUM E:(-16) OR (-29)  M:(-15) OR (-27)
 0483                         27,3564   53605 1           DMP     SR*
 0484   REF    2  LAST 1272   27,3565   00031 0                   TFFRTALF          SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0485                         27,3566   57201 0                   0 -3,2            X2=-NA
 0486                         27,3567   77671 1           DDV                       C(MPAC) =NUM SQRT(ALFA)  E:(-3) OR (-16)
A0487                                                                                                        M:(-3) OR (-15)
A0488                                                                               ABS(DEN) FROM PDL+2  E:(-3) OR (-16)
A0489                                                                                                  M:(-3) OR (-15)
 0490                         27,3570   40145 0           DLOAD   BOV               (THE DLOAD IS SHARED WITH TFFELL)
 0491   REF    4  LAST 1278   27,3571   00043 0                   TFFX              NUM  E: (-16) OR (-29)  M:(-15) OR (-27)
 0492   REF    1              27,3572   57653 0                   TFFELL            USE EQN FOR DELE GEQ 90, LEQ -90

A0493                                            OTHERWISE, CONTINUE FOR GENERAL CONIC FOR TFF EQN

 0494                         27,3573   45471 1           DDV     STADR
A0495                                                                               DEN FROM PDL+0    E: (-3) OR (-16)
A0496                                                                                                 M: (-3) OR (-15)
 0497   REF    4  LAST 1278   27,3574   77732 1           STORE   TFFTEM            Z  SAVE FOR SIGN OF SDELF.
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A0498                                                                   E: (-13)   M: (-12)
 0499                          27,3575   63406 0          PUSH    DSQ     Z TO PDL+0
 0500                          27,3576   41206 0          PUSH    DMP     Z SQ TO PDL+2  E: (-26)  M: (-24)
 0501   REF   5  LAST 1277     27,3577   00035 1                  TFFNP   LC P  E: (-38+2NR)  M: (-36+2NR)
 0502                          27,3600   75261 0          SL      SIGN
 0503                          27,3601   20206 1                  5
 0504   REF   5  LAST 1278     27,3602   00045 0                  TFFTEM  AFFIX SIGN FOR SDELF (ENTRY DISPLAY)
 0505   REF   6  LAST 1279     27,3603   14045 0          STODL   TFFTEM  P ZSQ  E: (-59+2NR)  M: (-55+2NR)
A0506                                                                   (ARG IS USED IN TFF/TRIG)
A0507                                                                   ZSQ FROM PDL+2   E: (-26)  M: (-24)
 0508                          27,3604   41206 0          PUSH    DMP     RESTORE PUSH LOC
 0509   REF   6  LAST 1278     27,3605   00033 1                  TFFALFA ALFA  E: (26-NR)  M: (24-NR)
 0510                          27,3606   77657 0          SL*
 0511                          27,3607   20201 0                  0,1     X1=-NR
 0512   REF   5  LAST 1278     27,3610   00043 0          STORE   TFFX    X
 0513                          27,3611   41234 1          RTB     DMP
 0514   REF   1                27,3612   57735 1                  T(X)     POLY
A0515                                                                   ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0516                          27,3613   44302 0          SR2     BDSU    2 ZSQ T(X)  E: (-29)  M: (-27)
 0517   REF   3  LAST 1278     27,3614   00023 0                  RTERM   RTERM  E: (-29)  M: (-27)
 0518                          27,3615   41215 1          DAD     DMP
 0519   REF   3  LAST 1278     27,3616   00015 0                  RMAG1   E: (-29)  M: (-27)
A0520                                                                   Z FROM PDL+0  E: (-13)  M: (-12)
 0521                          27,3617   51042 0          SR3     BPL     TFF SQRT(MU)   E: (-45)  M: (-42)
 0522   REF   1                27,3620   57641 0                  ENDTFF  (NO PUSH UP)
 0523                          27,3621   75206 1          PUSH    SIGN    TFF SQRT(MU)  TO PDL+0
 0524   REF   3  LAST 1278     27,3622   00017 1                  TFFQ1   Q1 FOR GONEPAST TEST
 0525                          27,3623   71244 0          BPL     DLOAD   GONE PAST ?
 0526   REF   1                27,3624   57645 1                  NEGTFF  YES. TFF < 0 .
 0527   REF   3  LAST 1274     27,3625   00027 1                  TFF1/ALF 1/ALFA  E: (-22-2NA)  M: (-20-2NA)
 0528                          27,3626   51076 1          DCOMP   BPL     ALFA > 0 ?
 0529   REF   2  LAST 1279     27,3627   57645 1                  NEGTFF  NO. TFF IS NEGATIVE.

A0530                                            CORRECT FOR ORBITAL PERIOD.

 0531                          27,3630   77676 0          DCOMP           YES. CORRECT FOR ORB PERIOD.
 0532                          27,3631   56205 0          DMP     DDV
 0533   REF   1                27,3632   17755 0                  PI/16   2 PI (-5)
 0534   REF   3  LAST 1278     27,3633   00031 0                  TFFRTALF SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0535                          27,3634   53657 0          SL*     SL*
 0536                          27,3635   57602 1                  0 -4,2  X2=-NA
 0537                          27,3636   57602 1                  0 -4,2
 0538                          27,3637   43257 0          SL*     DAD
 0539                          27,3640   57576 1                  0,2
A0540                                                                   TFF SQRT(MU) FROM PDL+0  E:(-45) M:(-42)
 0541                          27,3641   40005 0  ENDTFF  DMP     BOV     TFF SQRT(MU) IN MPAC     E:(-45) M:(-42)
 0542   REF   6  LAST 1271     27,3642   00037 0                  TFF/RTMU E: (17)  M: (14)
 0543   REF   1                27,3643   57651 1                  MAXTFF  SET POSMAX IF OVFL.

 0544                          27,3644   77616 0  DUMPTFF2 RVQ            RETURN  TFF  (-28) CS IN MPAC.
 0545                        27,3645   77745 1  NEGTFF   DLOAD
A0546                                                                        TFF SQRT(MU)  FROM PDL+0, NEGATIVE.
 0547                        27,3646   77650 1           GOTO
 0548   REF   2  LAST 1279   27,3647   57641 0                   ENDTFF

 0549                        27,3650   77745 1  MAXTFF1  DLOAD               RESET PDL
 0550                        27,3651   43545 1  MAXTFF   DLOAD   RVQ
 0551   REF   4  LAST 1279   27,3652   17771 0                   NEARONE

R0552   TIME OF FLIGHT ELLIPSE WHEN DEL (ECCENTRIC ANOM) GEQ 90 AND LEQ -90.

A0553                                                                        NUM FROM TFFX.  E: (-16) OR (-29)
A0554                                                                                        M: (-15) OR (-27)
 0555                        27,3653   77712 0  TFFELL   SL2                 NUM  E:(-14) OR (-27)  M:(-13) OR (-25)
 0556                        27,3654   41465 0           BDDV    PUSH        TEMP SAVE D/N IN PDL+0
A0557                                                                        DEN FROM PDL+0 E:(-3)/( 16) M:(-3)/(-15)
A0558                                                                        N/D TO PDL+0  E: (11)  M: (10)
 0559                        27,3655   45345 1  TFFEL1   DLOAD   DSU         (ENTER WITH D/N=0 IN PDL+0)
 0560   REF   7  LAST 1279   27,3656   00045 0                   TFFTEM      Q2  E: (-16)  M: (-15)
 0561   REF   4  LAST 1279   27,3657   00017 1                   TFFQ1       Q1  E: (-16)  M: (-15)
 0562   REF   1              27,3660   14013 0           STODL   TFFDELQ     Q2-Q1  E: (-16)  M: (-15)
A0563                                                                        D/N FROM PDL+0
 0564                        27,3661   77626 0           STADR
 0565   REF   8  LAST 1280   27,3662   77732 1           STORE   TFFTEM      D/N  E: (11)  M: (10)
 0566                        27,3663   53605 1           DMP     SL*
 0567   REF   4  LAST 1279   27,3664   00027 1                   TFF1/ALF    1/ALFA E: (-22-2NA)  M: (-20-2NA)
 0568                        27,3665   57576 1                   0,2         1/ALFA Z  E: (-11-NA)  M: (-10-NA)
 0569                        27,3666   41206 0           PUSH    DMP         TO PDL+0
 0570   REF   9  LAST 1280   27,3667   00045 0                   TFFTEM      1/Z  E: (11)  M: (10)
 0571                        27,3670   41057 0           SL*     BOVB
 0572                        27,3671   57576 1                   0,2         X2= -NA
 0573   REF  14  LAST 1219   27,3672   21712 0                   SIGNMPAC    IN CASE X= 1.0, CONTINUE
 0574   REF   6  LAST 1279   27,3673   00043 0           STORE   TFFX        X=1/ALFA ZSQ
 0575                        27,3674   41234 1           F TB    DMP
 0576   REF   2  LAST 1279   27,3675   57735 1                   T(X)        POLY
 0577   REF   7  LAST 1280   27,3676   00043 0                   TFFX
 0578                        27,3677   45242 1           SR3     DSU
 0579   REF   1              27,3700   17763 0                   DP2(-3)
 0580                        27,3701   41405 0           DMP     PUSH        2(X T(X)-1) /Z ALFA  E: (-15-NA)
A0581                                                                                             M: (-14-NA)
A0582                                                                        1/ALFA Z FROM PDL+0  E: (-11-NA)
A0583                                                                                             M: (-10-NA)
 0584                        27,3702   41345 0           DLOAD   DMP         GET SIGN FOR SDELF
 0585   REF  10  LAST 1280   27,3703   00045 0                   TFFTEM      1/Z  E: (11)  M: (10)
 0586   REF   4  LAST 1279   27,3704   00015 0                   RMAG1       E: (-29)  M: (-27)
 0587                        27,3705   43312 0           SL2     DAD
 0588   REF   5  LAST 1280   27,3706   00017 1                   TFFQ1       Q1  E: (-16)  M: (-15)
 0589   REF  11  LAST 1280   27,3707   14045 0           STODL   TFFTEM      (Q1+R 1/Z)  =SGN OF SDELF E:(-16) M:(-15
 0590   REF   6  LAST 1279   27,3710   00035 1                   TFFNP       LC P E: (-38+2NR) M: (-36+2NR)
 0591                        27,3711   53605 1           DMP     SL*         CALC FOR ARG FOR TFF/TRIG.
 0592   REF   5  LAST 1280   27,3712   00027 1             TFF1/ALF      1/ALFA    E:(-22-2NA)  M:(-20-2NA)
 0593                        27,3713   57575 1             1,2           X2=-NA
 0594                        27,3714   53765 0    SIGN     SL*
 0595   REF  12  LAST 1280   27,3715   00045 0             TFFTEM        AFFIX SIGN FOR SDELF
 0596                        27,3716   57576 1             0,2
 0597   REF  13  LAST 1231   27,3717   14045 0    STODL    TFFTEM        P/ALFA  E:(-59+2NR)  M:(-55+2NR)
A0598                                                                    (ARG FOR USE IN TFF/TRIG)
 0599   REF   6  LAST 1281   27,3720   00027 1             TFF1/ALF      1/ALFA E:(-22-2NA)  M:(-20-2NA)
 0600                        27,3721   41366 1    SQRT     DMP
 0601   REF   2  LAST 1279   27,3722   17755 0             PI/16         PI (-4)
 0602                        27,3723   77615 0    DAD
A0603                                                                    2(XT(X)-1)/Z ALFA FROM PDL E:(-15-NA)
A0604                                                                                                M:(-14-NA)
 0605                        27,3724   45257 0    SL*      DSU
 0606                        27,3725   57577 0             0 -1,2
 0607   REF   2  LAST 1280   27,3726   00013 0             TFFDELQ       Q2-Q1  E: (-16)  M: (-15)
 0608                        27,3727   53605 1    DMP      SL*
 0609   REF   7  LAST 1281   27,3730   00027 1             TFF1/ALF      1/ALFA  E:(-22-2NA)  M:(-20-2NA)
 0610                        27,3731   57601 1             0 -3,2
 0611                        27,3732   52057 1    SL*      GOTO
 0612                        27,3733   57602 1             0 -4,2
 0613   REF   3  LAST 1280   27,3734   57641 0             ENDTFF        TFF SQRT(MU) IN MPAC E:(-45) M:(-42)
```

```
R0614    PROGRAM NAME:        T(X)                                                                     DATE:      01.17.67
R0616    MOD NO:  0                                                                                    LOG SECTION:     TIME OF FREE FALL
R0618    MOD BY:   RR BAIRNSFATHER
R0619    FUNCTIONAL DESCRIPTION:        THE POLYNOMIAL T(X) IS USED BY TIME OF FLIGHT SUBROUTINES  CALCTFF AND
R0621               CALCTPER TO APPROXIMATE THE SERIES
R0622                                      2      3
R0623                        1/3 -X/5 +X /7 -X /9 ...

R0624               WHERE   X = ALFA Z Z          IF ALFA Z Z  LEQ 1
R0625                       X = 1/(ALFA Z Z )  IF ALFA Z Z    G  1

R0626               ALSO    X IS NEG FOR HYPERBOLIC ORBITS
R0627                       X = 0 FOR PARABOLIC ORBITS
R0628                       X IS POSITIVE FOR ELLIPTIC ORBITS
R0629               FOR FLIGHT 278, THE POLYNOMIAL  T(X) IS FITTED OVER THE RANGE  (0,+1)  AND HAS A MAXIMUM
R0631               DEVIATION FROM THE SERIES OF  2 E-5        (T(X) IS A CHEBYCHEV  TYPE FIT AND WAS OBTAINED USING
R0633               MAC PROGRAM AUTCURFIT294R[illegible]B  AND IS VALID TO THE SAME TOLERANCE OVER THE RANGE  (-.08,+1). )
R0635    CALLING SEQUENCE:  RTB
R0636                                   T(X)
R0637               C(MPAC) = X

R0638    SUBROUTINES CALLED:  NONE
R0639    NORMAL EXIT MODE:   TC    DANZIG
R0640    ALARMS:   NONE
R0641    OUTPUT:  C(MPAC) = T(X)
R0642    ERASABLE INITIALIZATION REQUIRED:
R0643               C(MPAC)   =   X
R0644    DEBRIS:  NONE

 0645    REF    7  LAST 11[illegible]9   27,3735  0 7222 1  T(X)      TC      POLY
 0646                            27,3736   00004 0            DEC     4                        N-1
 0647                            27,3737   12525 0            2DEC    3.333333333 E-1
 0647                            27,3740   12525 0
 0648                            27,3741   71463 0            2DEC*   -1.999819135 E-1 *
 0648                            27,3742   57703 1
 0649                            27,3743   04423 0            2DEC*   1.418143467  E-1 *
 0649                            27,3744   17645 0
 0650                            27,3745   74604 0            2DEC*   -1.01310997  E-1 *
 0650                            27,3746   43667 1
 0651                            27,3747   01626 1            2DEC*   5.609004986  E-2 *
 0651                            27,3750   37256 1
 0652                            27,3751   77404 1            2DEC*   -1.536156925 E-2 *
 0652                            27,3752   52071 0
 0653    REF   60  LAST 1212    27,3753  0 6061 0  ENDT(X)  TC      DANZIG

 0654    REF    1               27,3753            TCDANZIG =      ENDT(X)
```

```
P0655    TFF CONSTANTS
 0656                        32,3773                     BANK    32

 0657    REF    2  LAST   46  27,2000                    SETLOC  TOF-FF1
 0658                        27,3754                     BANK

A0659                                                                NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0660                                            MUE         =       3.990 815 471 E10   M CUBE/CS SQ
A0661                                            RTMUE       =       1.997702549 E5 B-18*       MODIFIED EARTH MU

A0663                                                                NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0664                                            MUM         =       4.902 778  E8       M CUBE /CS SQ

A0665                                            RTMUM       2DEC*   2.21422176 E4 B-18*
 0666                        27,3754   06220 1   PI/16       2DEC    3.141592653 B-4
 0666                        27,3755   37553 0
 0667                        27,3756   37777 1   LIM(-22)    2OCT    37777 37700       1.0 -B(-22)
 0667                        27,3757   37700 1
 0668                        27,3760   00000 1   DP(-22)     2OCT    00000 00100       B(-22)
 0668                        27,3761   00100 0
 0669                        27,3762   04000 0   DP2(-3)     2DEC    1  B-3
 0669                        27,3763   00000 1
 0670                        27,3764   02000 0   DP2(-4)     2DEC    1 B-4             1/16
 0670                        27,3765   00000 1
R0671    RPAD1    2DEC   6373338 B-29    M   (-29)   =20 909 901.57 FT

 0672    REF    4  LAST  717  23,2314            RPAD1       =       RPAD
 0673                        27,3766   00305 1   300K        2DEC    6464778 B-29       (-29)  M
 0673                        27,3767   11205 0
 0674                        27,3770   37777 1   NEARONE     2DEC    .999999999
 0674                        27,3771   37777 1
 0675    REF   16  LAST 1249  23,2521            TFFZEROS EQUALS HI6ZEROS
 0676    REF    1            23,2511             TFF1/4      EQUALS HIDP1/4
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L        AGC BLOCK TWO SELF-CHECK                                                        USER'S PAGE NO.    1       EO S3

R0001    PROGRAM DESCRIPTION                                                            DATE   20 DECEMBER 1967
R0003    PROGRAM NAME -  SELF-CHECK                                                     LOG SECTION AGC BLOCK TWO SELF-CHECK
R0005    MOD NO -  1                                                                    ASSEMBLY SUBROUTINE UTILITYM REV 25
R0007    MOD BY - GAUNTT

R0008    FUNCTIONAL DESCRIPTION

R0009          PROGRAM HAS TWO MAIN PARTS. THE FIRST IS SELF-CHECK WHICH RUNS AS A ZERO PRIORITY JOB WITH NO CORE SET, AS
R0011    PART OF THE BACK-UP IDLE LOOP. THE SECOND IS SHOW-BANKSUM WHICH RUNS AS A REGULAR EXECUTIVE JOB WITH ITS OWN
R0013    STARTING VERB.
R0014          THE PURPOSE OF SELF-CHECK IS TO CHECK OUT VARIOUS PARTS OF THE COMPUTER AS OUTLINED BELOW IN THE OPTIONS.
R0016          THE PURPOSE OF SHOW-BANKSUM IS TO DISPLAY THE SUM OF EACH BANK , ONE AT A TIME.
R0020          IN ALL THERE ARE  7 POSSIBLE OPTIONS IN THIS BLOCK II VERSION OF SELF-CHECK. MORE DETAIL DESCRIPTION MAY BE
R0022    FOUND IN E-2065 BLOCK II AGC SELF-CHECK AND SHOW BANKSUM BY EDWIN D. SMALLY DECEMBER 1966, AND ADDENDA 2 AND 3.
R0024          THE DIFFERENT OPTIONS ARE CONTROLLED BY PUTTING DIFFERENT NUMBERS IN THE SMODE REGISTER (NOUN 27). BELOW IS
R0026    A DESCRIPTION OF WHAT PARTS OF THE COMPUTER THAT ARE CHECKED BY THE OPTIONS, AND THE CORRESPONDING NUMBER, IN
R0028    OCTAL, TO LOAD INTO SMODE.
R0032    +-4    ERASABLE MEMORY
R0033    +-5    FIXED MEMORY
R0034    +-1,2,3,6,7,10    EVERYTHING IN OPTIONS 4 AND 5.
R0036    -0     SAME AS +-10 UNTIL AN ERROR IS DETECTED.
R0037    +0     NO CHECK, PUTS COMPUTER INTO THE BACKUP IDLE LOOP.

R0038    WARNINGS

R0039          USE OF E MEMORY RESERVED FOR SELF-CHECK (EVEN IN IDLE LOOP) AS TEMP STORAGE BY OTHER PROGRAMS IS DANGEROUS.
R0041          SMODE SET GREATER THAN OCT 10 PUTS COMPUTER INTO BACKUP IDLE LOOP.

R0042    CALLING SEQUENCE

R0043          TO CALL SELF-CHECK KEY IN
R0044                V 21 N 27 E  OPTION NUMBER E
R0047          TO CALL SHOW-BANKSUM KEY IN
R0048                V 91 E           DISPLAYS FIRST BANK
R0049                V 33 E           PROCEED, DISPLAYS NEXT BANK

R0050    EXIT MODES, NORMAL AND ALARM

R0051          SELF-CHECK NORMALLY CONTINUES INDEFINITELY UNLESS THERE IS AN ERROR DETECTED. IF SO + OPTION NUMBERS PUT
R0053    COMPUTER INTO BACKUP IDLE LOOP, - OPTION NUMBERS RESTART THE OPTION.
R0054          THE -0 OPTION PROCEEDS FROM THE LINE FOLLOWING THE LINE WHERE THE ERROR WAS DETECTED.
R0057          SHOW-BANKSUM PROCEEDS UNTIL A TERMINATE IS KEYED IN (V 34 E). THE COMPUTER IS PUT INTO THE BACKUP IDLE LOOP
R0059

R0060    OUTPUT
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R0061        SELF-CHECK UPON DETECTING AN ERROR LOADS THE SELF-CHECK ALARM CONSTANT (01102) INTO THE FAILREG SET AND
R0063   TURNS ON THE ALARM LIGHT. THE OPERATOR MAY THEN DISPLAY THE THREE FAILREGS BY KEYING IN V 05 N 09 E. FOR FURTHER
R0065   INFORMATION HE MAY KEY IN V 05 N 08 E, THE DSKY DISPLAY IN R1 WILL BE ADDRESS+1 OF WHERE THE ERROR WAS DETECTED,
R0067   IN R2 THE BBCON OF SELF-CHECK, AND IN R3 THE TOTAL NUMBER OF ERRORS DETECTED BY SELF-CHECK SINCE THE LAST MAN
R0069   INITIATED FRESH START (SLAP1).
R0073        SHOW-BANKSUM STARTING WITH BANK 0 DISPLAYS IN R1 THE BANK SUM (A +-NUMBER EQUAL TO THE BANK NUMBER), IN R2
R0075   THE BANK NUMBER, AND IN R3 THE BUGGER WORD.


R0076   ERASABLE INITIALIZATION REQUIRED

R0077        ACCOMPLISHED BY FRESH START
R0078              SMODE SET TO +0


R0079   DEBRIS

R0080        ALL EXITS FROM THE CHECK OF ERASABLE (ERASCHK) RESTORE ORIGINAL CONTENTS TO REGISTERS UNDER CHECK.
R0082   EXCEPTION IS A RESTART. RESTART THAT OCCURS DURING ERASCHK RESTORES ERASABLE, UNLESS THERE IS EVIDENCE TO DOUBT
R0084   E MEMORY, IN WHICH CASE PROGRAM THEN DOES A FRESH START (DOFSTART).


  0085                          25,3770                     BANK    25
  0086    REF    1              43,2000                     SETLOC  SELFCHEC
  0087                          43,3232                     BANK

  0088    REF    1                                          COUNT*  $$/SELF
  0089    REF   51  LAST 1099      4753         SBIT1       EQUALS  BIT1
  0090    REF   48  LAST 1099      4752         SBIT2       EQUALS  BIT2
  0091    REF   34  LAST 1099      4751         SBIT3       EQUALS  BIT3
  0092    REF   41  LAST 1099      4750         SBIT4       EQUALS  BIT4
  0093    REF   37  LAST 1014      4747         SBIT5       EQUALS  BIT5
  0094    REF   45  LAST 1099      4746         SBIT6       EQUALS  BIT6
  0095    REF   41  LAST 1096      4745         SBIT7       EQUALS  BIT7
  0096    REF   37  LAST 1267      4744         SBIT8       EQUALS  BIT8
  0097    REF   26  LAST  983      4743         SBIT9       EQUALS  BIT9
  0098    REF   37  LAST 1099      4742         SBIT10      EQUALS  BIT10
  0099    REF   27  LAST 1099      4741         SBIT11      EQUALS  BIT11
  0100    REF   32  LAST 1099      4740         SBIT12      EQUALS  BIT12
  0101    REF   41  LAST 1099      4737         SBIT13      EQUALS  BIT13
  0102    REF   70  LAST 1261      4736         SBIT14      EQUALS  BIT14
  0103    REF   40  LAST 1099      4735         SBIT15      EQUALS  BIT15

  0104    REF  228  LAST 1153      4755         S+ZERO      EQUALS  ZERO
  0105    REF   52  LAST 1285      4753         S+1         EQUALS  BIT1
  0106    REF   49  LAST 1285      4752         S+2         EQUALS  BIT2
  0107    REF   35  LAST 1263      6245         S+3         EQUALS  THREE
  0108    REF   26  LAST 1267      4751         S+4         EQUALS  FOUR
  0109    REF   21  LAST 1034      4756         S+5         EQUALS  FIVE
  0110    REF   24  LAST 1264      6242         S+6         EQUALS  SIX
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0111  REF  17  LAST 1099      4757             S+7       EQUALS  SEVEN
0112  REF  16  LAST 1265      4357             S8BITS    EQUALS  LOW8        00377
0113  REF   2  LAST  304      4771             CNTRCON   =       OCT50       USED IN CNTRCHK
0114                       43,3232    00061 0  ERASCON1  OCTAL   00061       USED IN ERASCHK
0115                       43,3233    01373 1  ERASCON2  OCTAL   01373       USED IN ERASCHK
0116  REF   9  LAST 1265      5007             ERASCON6  =       OCT1400     USED IN ERASCHK
0117                       43,3234    01461 0  ERASCON3  OCTAL   01461       USED IN ERASCHK
0118                       43,3235    01773 0  ERASCON4  OCTAL   01773       USED IN ERASCHK
0119  REF  20  LAST 1024      5012             S10BITS   EQUALS  LOW10       01777, USED IN ERASCHK
0120  REF   3  LAST  907      5020             SBNK03    EQUALS  PRIO6       06000, USED IN ROPECHK
0121  REF   7  LAST 1099      4350             -MAXADRS  =       HI5         FOR ROPECHK
0122                       43,3236    00060 1  SIXTY     OCTAL   00060
0123                       43,3237    60017 1  SUPRCON   OCTAL   60017       USED IN ROPECHK
0124                       43,3240    17777 0  S13BITS   OCTAL   17777
0125                       43,3241    25252 0  CONC+S1   OCTAL   25252       USED IN CYCLSHFT
0126                       43,3242    52400 1  CONC+S2   OCTAL   52400       USED IN CYCLSHFT
0127                       43,3243    76777 1  ERASCON5  OCTAL   76777
0128  REF   2  LAST  232      5660             S-7       =       OCT77770
0129  REF   2  LAST 1008      6112             S-4       EQUALS  NEG4
0130  REF   3  LAST  890      7745             S-3       EQUALS  NEG3
0131  REF   6  LAST 1103      7746             S-2       EQUALS  NEG2
0132  REF  12  LAST 1099      7747             S-1       EQUALS  NEGONE
0133  REF  27  LAST  996      4754             S-ZERO    EQUALS  NEG0

0134  REF  46  LAST 1132   E3,1400                       EBANK=  LST1
0135  REF   3  LAST  291   43,3244    01371 0  ADRS1     ADRES   SKEEP1
0136  REF   4  LAST 1116   43,3245    03336 1  SELFADRS  ADRES   SELFCHK     SELFCHK RETURN ADDRESS. SHOULD BE PUT
A0137                                                                        IN SELFRET WHEN GOING FROM SELFCHK TO
A0138                                                                        SHOWSUM AND PUT IN SKEEP1 WHEN GOING
A0139                                                                        FROM SHOWSUM TO SELF-CHECK.

0140  REF   6  LAST  215   43,3246   3 1360 0  PRERRORS  CA      ERESTORE    IS IT NECESSARY TO RESTORE ERASABLE
0141                       43,3247   0 0006 1            EXTEND
0142  REF   1              43,3250   1 3257 0            BZF     ERRORS      NO
0143                       43,3251   0 0006 1            EXTEND
0144  REF   3  LAST  215   43,3252   3 1376 1            DCA     SKEEP5
0145  REF   3  LAST  215   43,3253   51'377 0            INDEX   SKEEP7
0146                       43,3254   52 001 1            DXCH    0000        RESTORE THE TWO ERASABLE REGISTERS
0147  REF   2  LAST  290   43,3255   3 4755 1            CA      S+ZERO
0148  REF   7  LAST 1286   43,3256   55'360 1            TS      ERESTORE
0149                       43,3257   0 0004 0  ERRORS    INHINT
0150  REF 324  LAST 1213   43,3260   3 0002 0            CA      Q
0151  REF   3  LAST  471   43,3261   55'357 0            TS      SFAIL       SAVE Q FOR FAILURE LOCATION
0152  REF   3  LAST  305   43,3262   55'363 1            TS      ALMCADR     FOR DISPLAY WITH BBANK AND ERCOUNT
0153  REF   3  LAST  211   43,3263   25'365 0            INCR    ERCOUNT     KEEP TRACK OF NUMBER OF MALFUNCTIONS.
0154  REF   1              43,3264   0 5571 1  TCALARM2  TC      ALARM2
0155                       43,3265    01102 0            OCT     01102       SELF-CHECK MALFUNCTION INDICATOR
0156  REF   5  LAST  305   43,3266   11'362 0            CCS     SMODE
0157  REF   3  LAST 1286   43,3267   3 4755 1  SIDLOOP   CA      S+ZERO
0158  REF   6  LAST 1286   43,3270   55'362 0            TS      SMODE
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 0159    REF    5  LAST 1286    43,3271   0 3336 1              TC        SELFCHK            GO TO IDLE LOOP
 0160    REF    4  LAST 1286    43,3272   0 1357 1              TC        SFAIL              CONTINUE WITH SELF-CHECK

 0161    REF 380   LAST 1264    43,3273  10 000 0   -1CHK      CCS       A
 0162    REF    1               43,3274   1 3246 0              TCF       PRERRORS
 0163    REF    2  LAST 1287    43,3275   1 3246 0              TCF       PRERRORS
 0164    REF 381   LAST 1287    43,3276  10 000 0               CCS       A
 0165    REF    3  LAST 1287    43,3277   1 3246 0              TCF       PRERRORS
 0166    REF 325   LAST 1286    43,3300   0 0002 0              TC        Q

 0167                           43,3301   0 0006 1  SMODECHK  EXTEND
 0168    REF    4  LAST 1286    43,3302  23'371 0               QXCH      SKEEP1
 0169    REF    1               43,3303   0 3332 0              TC        CHECKNJ            CHECK FOR NEW JOB
 0170    REF    7  LAST 1286    43,3304  11'362 0               CCS       SMODE
 0171    REF    1               43,3305   0 3312 1              TC        SOPTIONS
 0172    REF    1               43,3306   0 3303 1              TC        SMODECHK +2        TO BACKUP IDLE LOOP
 0173    REF    2  LAST 1287    43,3307   0 3312 1              TC        SOPTIONS
 0174    REF    2  LAST  108    43,3310  25'366 0               INCR      SCOUNT
 0175    REF    5  LAST 1287    43,3311   0 1371 0              TC        SKEEP1             CONTINUE WITH SELF-CHECK

 0176    REF    1               43,3312   6 5660 1  SOPTIONS  AD        S-7
 0177                           43,3313   0 0006 1            EXTEND
 0178                           43,3314   6 3316 0            BZMF      +2                 FOR OPTIONS BELOW NINE.
 0179    REF    1               43,3315   0 3267 1  BNKOPTN   TC        SIDLOOP            ILLEGAL OPTION.  GO TO IDLE LOOP.
 0180    REF    3  LAST 1287    43,3316  25'366 0             INCR      SCOUNT             FOR OPTIONS BELOW NINE.
 0181    REF    1               43,3317   6 4757 0            AD        S+7

 0182    REF 382   LAST 1287    43,3320  50 000 1             INDEX     A
 0183    REF    1               43,3321   0 3322 1            TC        SOPTION1
 0184    REF    6  LAST 1287    43,3322   0 1371 0  SOPTION1  TC        SKEEP1             WAS TC+TCF
 0185    REF    7  LAST 1287    43,3323   0 1371 0  SOPTION2  TC        SKEEP1             WAS IN:OUT1
 0186    REF    8  LAST 1287    43,3324   0 1371 0  SOPTION3  TC        SKEEP1             WAS COUNTCHK
 0187    REF    1               43,3325   0 3337 0  SOPTION4  TC        ERASCHK
 0188    REF    1               43,3326   0 3520 0  SOPTION5  TC        ROPECHK
 0189    REF    9  LAST 1287    43,3327   0 1371 0  SOPTION6  TC        SKEEP1
 0190    REF   10  LAST 1287    43,3330   0 1371 0  SOPTION7  TC        SKEEP1
 0191    REF   11  LAST 1287    43,3331   0 1371 0  SOPTON10  TC        SKEEP1             CONTINUE WITH SELF-CHECK

 0192                           43,3332   0 0006 1  CHECKNJ   EXTEND
 0193    REF    7  LAST 1116    43,3333  23'361 1             QXCH      SELFRET            SAVE RETURN ADDRESS WHILE TESTING NEWJOB
 0194    REF   55  LAST 1157    43,3334   0 4635 0            TC        POSTJUMP           TO SEE IF ANY JOBS HAVE BECOME ACTIVE.
 0195    REF    2  LAST 1110    43,3335    03214 0            CADR      ADVAN

 0196    REF    2  LAST 1287    43,3336   0 3301 0  SELFCHK   TC        SMODECHK           ** CHARLEY, COME IN HERE

R0197    SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0198    SKEEP6 HOLDS B(X+1).
R0199    SKEEP5 HOLDS B(X).
R0200    SKEEP4 HOLDS C(EBANK) DURING ERASLOOP AND CHECKNJ.
R0201    SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
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R0202   SKEEP2 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH BANK NUMBERS IN EB.
R0204   ERASCHK TAKES APPROXMATELY 7 SECONDS
 0205   REF   2  LAST  290   43,3337  3 4753 1  ERASCHK   CA      S+1
 0206   REF   3  LAST  290   43,3340  55'372 1            TS      SKEEP2
 0207   REF   4  LAST 1286   43,3341  3 4755 1  OEBANK    CA      S+ZERO
 0208   REF  64  LAST 1267   43,3342  54 003 0            TS      EBANK
 0209   REF   1              43,3343  3 3234 1            CA      ERASCON3         01461
 0210   REF   4  LAST 1286   43,3344  55'377 1            TS      SKEEP7           STARTING ADDRESS
 0211   REF   1              43,3345  3 5012 1            CA      S10BITS          01777
 0212   REF   3  LAST  290   43,3346  55'373 0            TS      SKEEP3           LAST ADDRESS CHECKED
 0213   REF   1              43,3347  0 3367 0            TC      ERASLOOP

 0214   REF   1              43,3350  3 5007 0  E134567B  CA      ERASCON6         01400
 0215   REF   5  LAST 1288   43,3351  55'377 1            TS      SKEEP7           STARTING ADDRESS
 0216   REF   2  LAST 1288   43,3352  3 5012 1            CA      S10BITS          01777
 0217   REF   4  LAST 1288   43,3353  55'373 0            TS      SKEEP3           LAST ADDRESS CHECKED
 0218   REF   2  LAST 1288   43,3354  0 3367 0            TC      ERASLOOP

 0219   REF   2  LAST 1288   43,3355  3 5007 0  2EBANK    CA      ERASCON6         01400
 0220   REF   6  LAST 1288   43,3356  55'377 1            TS      SKEEP7           STARTING ADDRESS
 0221   REF   1              43,3357  3 3235 0            CA      ERASCON4         01773
 0222   REF   5  LAST 1288   43,3360  55'373 0            TS      SKEEP3           LAST ADDRESS CHECKED
 0223   REF   3  LAST 1288   43,3361  0 3367 0            TC      ERASLOOP

 0224   REF   4  LAST 1288   43,3362  55'372 1  NOEBANK   TS      SKEEP2           +0
 0225   REF   1              43,3363  3 3232 1            CA      ERASCON1         00061
 0226   REF   7  LAST 1288   43,3364  55'377 1            TS      SKEEP7           STARTING ADDRESS
 0227   REF   1              43,3365  3 3233 0            CA      ERASCON2         01373
 0228   REF   6  LAST 1288   43,3366  55'373 0            TS      SKEEP3           LAST ADDRESS CHECKED

 0229                        43,3367  0 0004 0  ERASLOOP  INHINT
 0230   REF  65  LAST 1288   43,3370  3 0003 1            CA      EBANK            STORES C(EBANK)
 0231   REF   3  LAST  215   43,3371  55'374 1            TS      SKEEP4
 0232                        43,3372  0 0006 1            EXTEND
 0233   REF   8  LAST 1288   43,3373  5 1377 0            NDX     SKEEP7
 0234                        43,3374  3 0001 0            DCA     0000
 0235   REF   4  LAST 1286   43,3375  53'376 0            DXCH    SKEEP5           STORES C(X) AND C(X+1) IN SKEEP6 AND 5.
 0236   REF   9  LAST 1288   43,3376  3 1377 0            CA      SKEEP7
 0237   REF   8  LAST 1286   43,3377  55'360 1            TS      ERESTORE         IF RESTART, RESTORE C(X) AND C(X+1)
 0238   REF 220  LAST 1128   43,3400  54 001 1            TS      L
 0239   REF 221  LAST 1288   43,3401  24 001 0            INCR    L
 0240   REF 383  LAST 1287   43,3402  50 000 1            NDX     A
 0241                        43,3403  52 001 1            DXCH    0000             PUTS OWN ADDRESS IN X AND X +1
 0242   REF  10  LAST 1288   43,3404  51'377 0            NDX     SKEEP7
 0243                        43,3405  4 0001 1            CS      0001             CS  X+1
 0244   REF  11  LAST 1288   43,3406  51'377 0            NDX     SKEEP7
 0245                        43,3407  6 0000 1            AD      0000             AD X
 0246   REF   1              43,3410  0 3273 1            TC      -1CHK
 0247   REF   9  LAST 1288   43,3411  3 1360 0            CA      ERESTORE         HAS ERASABLE BEEN RESTORED
 0248                        43,3412  0 0006 1            EXTEND
 0249    REF    1                 43,3413   1 3437 0            BZF     ELOOPFIN           YES, EXIT ERASLOOP.
 0250                             43,3414   0 0006 1            EXTEND
 0251    REF   12  LAST 1288      43,3415   5 1377 0            NDX     SKEEP7
 0252                             43,3416   4 0001 1            DCS     0000               COMPLEMENT OF ADDRESS OF X AND X+1
 0253    REF   13  LAST 1289      43,3417   51'377 0            NDX     SKEEP7
 0254                             43,3420   52 001 1            DXCH    0000               PUT COMPLEMENT OF ADDRESS OF X AND X+1
 0255    REF   14  LAST 1289      43,3421   51'377 0            NDX     SKEEP7
 0256                             43,3422   4 0000 0            CS      0000               CS  X
 0257    REF   15  LAST 1289      43,3423   51'377 0            NDX     SKEEP7
 0258                             43,3424   6 0001 0            AD      0001               AD X+1
 0259    REF    2  LAST 1288      43,3425   0 3273 1            TC      -1CHK
 0260    REF   10  LAST 1288      43,3426   3 1360 0            CA      ERESTORE           HAS ERASABLE BEEN RESTORED
 0261                             43,3427   0 0006 1            EXTEND
 0262    REF    2  LAST 1289      43,3430   1 3437 0            BZF     ELOOPFIN           YES, EXIT ERASLOOP.
 0263                             43,3431   0 0006 1            EXTEND
 0264    REF    5  LAST 1288      43,3432   3 1376 1            DCA     SKEEP5
 0265    REF   16  LAST 1289      43,3433   51'377 0            NDX     SKEEP7
 0266                             43,3434   52 001 1            DXCH    0000               PUT B(X) AND B(X+1) BACK INTO X AND X+1
 0267    REF    5  LAST 1288      43,3435   3 4755 1            CA      S+ZERO
 0268    REF   11  LAST 1289      43,3436   55'360 1            TS      ERESTORE           IF RESTART, DO NOT RESTORE C(X), C(X+1)
 0269                             43,3437   0 0003 1  ELOOPFIN  RELINT
 0270    REF    2  LAST 1287      43,3440   0 3332 0            TC      CHECKNJ            CHECK FOR NEW JOB
 0271    REF    4  LAST 1288      43,3441   3 1374 0            CA      SKEEP4             REPLACES B(EBANK)
 0272    REF   66  LAST 1288      43,3442   54 003 0            TS      EBANK
 0273    REF   17  LAST 1289      43,3443   25'377 0            INCR    SKEEP7
 0274    REF   18  LAST 1289      43,3444   4 1377 1            CS      SKEEP7
 0275    REF    7  LAST 1288      43,3445   6 1373 1            AD      SKEEP3
 0276                             43,3446   0 0006 1            EXTEND
 0277                             43,3447   1 3451 0            BZF     +2
 0278    REF    4  LAST 1288      43,3450   0 3367 0            TC      ERASLOOP           GO TO NEXT ADDRESS IN SAME BANK
 0279    REF    5  LAST 1288      43,3451   11'372 1            CCS     SKEEP2
 0280    REF    1                 43,3452   0 3362 0            TC      NOEBANK
 0281    REF    6  LAST 1289      43,3453   25'372 0            INCR    SKEEP2             PUT +1 IN SKEEP2.
 0282    REF   67  LAST 1289      43,3454   3 0003 1            CA      EBANK
 0283    REF    1                 43,3455   6 4743 0            AD      SBIT9
 0284    REF   68  LAST 1289      43,3456   54 003 0            TS      EBANK
 0285    REF    1                 43,3457   6 3243 1            AD      ERASCON5           76777, CHECK FOR BANK E2
 0286                             43,3460   0 0006 1            EXTEND
 0287    REF    1                 43,3461   1 3355 0            BZF     2EBANK
 0288    REF   69  LAST 1289      43,3462   10 003 0            CCS     EBANK
 0289    REF    1                 43,3463   0 3350 1            TC      E134567B           GO TO EBANKS 1,3,4,5,6, AND 7
 0290    REF    3  LAST 1288      43,3464   3 5007 0            CA      ERASCON6           END OF ERASCHK
 0291    REF   70  LAST 12        43,3465   54 003 0            TS      EBANK
R0292    CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 60 THROUGH OCT. 10.
R0293    INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
 0294    REF    1                 43,3466   3 4771 1  CNTRCHK   CA      CNTRCON            00050
 0295    REF    7  LAST 1289      43,3467   55'372 1  CNTRLOOP  TS      SKEEP2
 0296    REF    1                 43,3470   6 4750 1            AD      SBIT4              +10 OCTAL
 0297    REF  384  LAST 1288      43,3471   50 000 1            INDEX   A
 0298                             43,3472   4 0000 0            CS      0000
 0299   REF   8  LAST 1289   43,3473  11'372 1             CCS     SKEEP2
 0300   REF   1              43,3474  0 3467 1             TC      CNTRLOOP

R0301   CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
 0302   REF   1              43,3475  3 3241 0  CYCLSHFT   CA      CONC+S1          25252
 0303   REF  42  LAST 1091   43,3476  54 020 1             TS      CYR              C(CYR) = 12525
 0304   REF  22  LAST 1081   43,3477  54 022 0             TS      CYL              C(CYL) = 52524
 0305   REF  20  LAST 1081   43,3500  54 021 0             TS      SR               C(SR) = 12525
 0306   REF  12  LAST 1267   43,3501  54 023 1             TS      EDOP             C(EDOP) = 00125
 0307   REF  43  LAST 1290   43,3502  6 0020 0             AD      CYR              37777          C(CYR) = 45252
 0308   REF  23  LAST 1290   43,3503  6 0022 1             AD      CYL              00-12524       C(CYL) = 25251
 0309   REF  21  LAST 1290   43,3504  6 0021 1             AD      SR               00-25251       C(SR) = 05252
 0310   REF  13  LAST 1290   43,3505  6 0023 0             AD      EDOP             00-25376       C(EDOP) = +0
 0311   REF   1              43,3506  6 3242 0             AD      CONC+S2          C(CONC+S2) = 52400
 0312   REF   3  LAST 1289   43,3507  0 3273 1             TC      -1CHK
 0313   REF  44  LAST 1290   43,3510  6 0020 0             AD      CYR              45252
 0314   REF  24  LAST 1290   43,3511  6 0022 1             AD      CYL              72523
 0315   REF  22  LAST 1290   43,3512  6 0021 1             AD      SR               77775
 0316   REF  14  LAST 1290   43,3513  6 0023 0             AD      EDOP             77775
 0317   REF   3  LAST 1288   43,3514  6 4753 1             AD      S+1              77776
 0318   REF   4  LAST 1290   43,3515  0 3273 1             TC      -1CHK

 0319   REF   4  LAST 1287   43,3516  25'367 1             INCR    SCOUNT +1
 0320   REF   3  LAST 1287   43,3517  0 3301 0             TC      SMODECHK
R0321   SKEEP1 HOLDS SUM
R0322   SKEEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0323   SKEEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0324   SKEEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0325                                 (04000 TO 07777 IN FXFX BANKS)
R0326   SKEEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0327   SKEEP4 HOLDS BANK NUMBER AND SUPER BANK NUMBER
R0328   SKEEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0329   SKEEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0330   SKEEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

 0331   REF   1              43,3520  3 4754 0  ROPECHK    CA      S-ZERO           *
 03311  REF   4  LAST  291   43,3521  55'376 0             TS      SKEEP6           * -0 FOR ROPECHK.
 03312  REF   6  LAST 1289   43,3522  3 4755 1  STSHOSUM   CA      S+ZERO           * SHOULD BE ROPECHK

 0332   REF   5  LAST 1289   43,3523  55'374 1             TS      SKEEP4           BANK NUMBER
 0333   REF   4  LAST 1290   43,3524  3 4753 1             CA      S+1
 0334   REF  19  LAST 1289   43,3525  55'377 1  COMMFX     TS      SKEEP7
 0335   REF   7  LAST 1290   43,3526  3 4755 1             CA      S+ZERO
 0336   REF  12  LAST 1287   43,3527  55'371 1             TS      SKEEP1
 0337   REF   8  LAST 1289   43,3530  55'373 0             TS      SKEEP3
 0338   REF   5  LAST 1290   43,3531  3 4753 1             CA      S+1
 0339   REF   6  LAST 1289   43,3532  55'375 0             TS      SKEEP5           COUNTS DOWN 2 TC SELF WORDS
 0340   REF   6  LAST 1290   43,3533  3 1374 0  COMADRS    CA      SKEEP4
 0341   REF 222  LAST 1288   43,3534  54 001 1             TS      L                TO SET SUPER BANK
 0342   REF   8  LAST 1286   43,3535  7 4350 1             MASK    HI5
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0343    REF   9  LAST 1290    43,3536   6 1373 1              AD       SKEEP3
0344    REF   2  LAST  440    43,3537   0 4651 1              TC       SUPDACAL          SUPER DATA CALL
0345    REF   1               43,3540   0 3563 1              TC       ADSUM
0346    REF   1               43,3541   6 4741 1              AD       SBIT11            02000
0347    REF   1               43,3542   0 3574 1              TC       ADRSCHK

0348    REF 385  LAST 1289    43,3543   4 0000 0   FXFX       CS       A
0349    REF  20  LAST 1290    43,3544   55'377 1              TS       SKEEP7
0350                          43,3545   0 0006 1              EXTEND
0351                          43,3546   1 3551 1              BZF      +3
0352    REF   1               43,3547   3 4740 0              CA       SBIT12            04000, STARTING ADDRESS OF BANK 02
0353                          43,3550   0 3552 0              TC       +2
0354    REF   1               43,3551   3 5020 0              CA       SBNK03            06000, STARTING ADDRESS OF BANK 03
0355    REF  10  LAST 1291    43,3552   55'373 0              TS       SKEEP3
0356    REF   3  LAST 1290    43,3553   3 4755 1              CA       S+ZERO
0357    REF  13  LAST 1290    43,3554   55'371 1              TS       SKEEP1
0358    REF   6  LAST 1290    43,3555   3 4753 1              CA       S+1
0359    REF   7  LAST 1290    43,3556   55'375 0              TS       SKEEP5            COUNTS DOWN 2 TC SELF WORDS
0360    REF  11  LAST 1291    43,3557   51'373 1   FXADRS     INDEX    SKEEP3
0361                          43,3560   3 0000 1              CA       0000
0362    REF   2  LAST 1291    43,3561   0 3563 1              TC       ADSUM
0363    REF   2  LAST 1291    43,3562   0 3574 1              TC       ADRSCHK

0364    REF   9  LAST 1290    43,3563   55'372 1   ADSUM      TS       SKEEP2
0365    REF  14  LAST 1291    43,3564   6 1371 0              AD       SKEEP1
0366    REF  15  LAST 1291    43,3565   55'371 1              TS       SKEEP1
0367    REF   9  LAST 1291    43,3566   3 4755 1              CAF      S+ZERO
0368    REF  16  LAST 1291    43,3567   6 1371 0              AD       SKEEP1
0369    REF  17  LAST 1291    43,3570   55'371 1              TS       SKEEP1
0370    REF  10  LAST 1291    43,3571   4 1372 1              CS       SKEEP2
0371    REF  12  LAST 1291    43,3572   6 1373 1              AD       SKEEP3
0372    REF 326  LAST 1287    43,3573   0 0002 0              TC       Q

0373    REF 386  LAST 1291    43,3574   22 000 1   ADRSCHK    LXCH     A
0374    REF  13  LAST 1291    43,3575   3 1373 1              CA       SKEEP3
0375    REF  21  LAST 1286    43,3576   7 5012 0              MASK     LOW10             RELATIVE ADDRESS
0376    REF   1               43,3577   6 4350 0              AD       -MAXADRS          SUBTRACT MAX RELATIVE ADDRESS = 1777.
0377                          43,3600   0 0006 1              EXTEND
0378    REF   1               43,3601   1 3670 1              BZF      SOPTION           CHECKSUM FINISHED IF LAST ADDRESS.
0379    REF   8  LAST 1291    43,3602   11'375 0              CCS      SKEEP5            IS CHECKSUM FINISHED
0380                          43,3603   0 3606 1              TC       +3                NO
0381                          43,3604   0 3606 1              TC       +2                NO
0382    REF   2  LAST 1291    43,3605   0 3670 0              TC       SOPTION           GO TO ROPECHK SHOWSUM OPTION
0383    REF 223  LAST 1290    43,3606   10 001 1              CCS      L                 -0 MEANS A TC SELF WORD.
0384    REF   1               43,3607   0 3616 0              TC       CONTINU
0385    REF   2  LAST 1291    43,3610   0 3616 0              TC       CONTINU
0386    REF   3  LAST 1291    43,3611   0 3616 0              TC       CONTINU
0387    REF   9  LAST 1291    43,3612   11'375 0              CCS      SKEEP5
0388    REF   4  LAST 1291    43,3613   0 3617 1              TC       CONTINU +1
0389    REF   1               43,3614   3 7747 1              CA       S-1
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 0390    REF   5  LAST 1291   43,3615  0 3617 1            TC       CONTINU +1      AD IN THE BUGGER WORD
 0391    REF   7  LAST 1291   43,3616  3 4753 1  CONTINU   CA       S+1             MAKE SURE TWO CONSECUTIVE TC SELF WORDS
 0392    REF  10  LAST 1291   43,3617  55'375 0            TS       SKEEP5
 03921   REF   5  LAST 1290   43,3620  11'376 0            CCS      SKEEP6          *
 03922   REF  21  LAST 1116   43,3621  10 067 1            CCS      NEWJOB          * +1, SHOWSUM
 03923   REF   4  LAST  717   43,3622  0 5122 0            TC       CHANG1          *
 03924                        43,3623  0 3625 0            TC       +2              *
 0393    REF   3  LAST 1289   43,3624  0 3332 0            TC       CHECKNJ         -0 IN SKEEP6 FOR ROPECHK

 0394    REF  14  LAST 1291   43,3625  25'373 1  ADRS+1    INCR     SKEEP3
 0395    REF  21  LAST 1291   43,3626  11'377 1            CCS      SKEEP7
 0396    REF   1              43,3627  0 3533 1            TC       CCMADRS
 0397    REF   2  LAST 1292   43,3630  0 3533 1            TC       CCMADRS
 0398    REF   1              43,3631  0 3557 0            TC       FXADRS
 0399    REF   2  LAST 1292   43,3632  0 3557 0            TC       FXADRS

 0400    REF   7  LAST 1290   43,3633  4 1374 1  NXTBNK    CS       SKEEP4
 0401    REF   1              43,3634  6 3723 1            AD       LSTBNKCH        LAST BANK TO BE CHECKED
 0402                         43,3635  0 0006 1            EXTEND
 0403    REF   1              43,3636  1 3131 0            BZF      ENDSUMS         END OF SUMMING OF BANKS.
 0404    REF   8  LAST 1292   43,3637  3 1374 0            CA       SKEEP4
 0405    REF   2  LAST 1291   43,3640  6 4741 1            AD       SBIT11
 0406    REF   9  LAST 1292   43,3641  55'374 1            TS       SKEEP4          37 TO 40 INCRMTS SKEEP4 BY END RND CARRY
 0407    REF   1              43,3642  0 3646 0            TC       CHKSUPR
 0408    REF   1              43,3643  3 4735 1  17TO20    CA       SBIT15
 0409    REF  10  LAST 1292   43,3644  27'374 1            ADS      SKEEP4          SET FOR BANK 20
 0410    REF   1              43,3645  0 3662 0            TC       GONXTBNK
 0411    REF   9  LAST 1290   43,3646  7 4350 1  CHKSUPR   MASK     HI5
 0412                         43,3647  0 0006 1            EXTEND
 0413    REF   1              43,3650  1 3660 0            BZF      NXTSUPR         INCREMENT SUPER BANK
 0414    REF   1              43,3651  6 3240 1  27TO30    AD       S13BITS
 0415                         43,3652  0 0006 1            EXTEND
 0416                         43,3653  1 3655 0            BZF      +2              BANK SET FOR 30
 0417    REF   2  LAST 1292   43,3654  0 3662 0            TC       GONXTBNK
 0418    REF   1              43,3655  3 3236 0            CA       SIXTY           FIRST SUPER BANK
 0419    REF  11  LAST 1292   43,3656  27'374 1            ADS      SKEEP4
 0420    REF   3  LAST 1292   43,3657  0 3662 0            TC       GONXTBNK
 0421    REF   1              43,3660  6 3237 1  NXTSUPR   AD       SUPRCON         SET BNK 30 + INCR SUPR BNK AND CANCEL
 0422    REF  12  LAST 1292   43,3661  27'374 1            ADS      SKEEP4          ERC BIT OF THE 37 TO 40 ADVANCE.
 0423    REF  22  LAST 1292   43,3662  11'377 1  GONXTBNK  CCS      SKEEP7
 0424    REF   1              43,3663  0 3525 0            TC       COMMFX
 0425    REF   8  LAST 1292   43,3664  3 4753 1            CA       S+1
 0426    REF   1              43,3665  0 3543 0            TC       FXFX
 0427    REF   1              43,3666  3 4745 0            CA       SBIT7           HAS TO BE LARGER THAN NO OF FXSW BANKS.
 0428    REF   2  LAST 1292   43,3667  0 3525 0            TC       COMMFX

 0429    REF  13  LAST 1292   43,3670  3 1374 0  SOPTION   CA       SKEEP4
 0430    REF  10  LAST 1292   43,3671  7 4350 1            MASK     HI5             = BANK BITS
 0431    REF   5  LAST  437   43,3672  0 4331 1            TC       LEFT5
 0432    REF 224  LAST 1291   43,3673  54 001 1            TS       L               BANK NUMBER BEFORE SUPER BANK
 0433    REF  14  LAST 1292    43,3674  3 1374 0              CA       SKEEP4
 0434    REF   1               43,3675  7 4357 0              MASK     S8BITS          = SUPER BANK BITS
 0435                          43,3676  0 0006 1              EXTEND
 0436    REF   1               43,3677  1 3705 1              BZF      SOPT            BEFORE SUPER BANK
 0437    REF  23  LAST 1290    43,3700  54 021 0              TS       SR              SUPER BANK NECESSARY
 0438    REF 225  LAST 1292    43,3701  3 0001 0              CA       L
 0439    REF  18  LAST 1286    43,3702  7 4757 1              MASK     SEVEN
 0440    REF  24  LAST 1293    43,3703  6 0021 1              AD       SR
 0441    REF 226  LAST 1293    43,3704  54 001 1              TS       L               BANK NUMBER WITH SUPER BANK
 0442    REF   6  LAST 1292    43,3705  3 1376 1  SOPT        CA       SKEEP6          *
 0443                          43,3706  0 0006 1              EXTEND                   *
 0444                          43,3707  1 3711 1              BZF      +2              * ON -0 CONTINUE WITH ROPE CHECK.
 0445    REF   1               43,3710  0 3113 1              TC       SDISPLAY        * ON +1 GO TO DISPLAY OF SUM.
 0446    REF  18  LAST 1291    43,3711  11'371 1              CCS      SKEEP1          FORCE SUM TO ABSOLUTE VALUE.
 04461                         43,3712  0 3714 0              TC       +2
 04462                         43,3713  0 3715 1              TC       +2
 04463   REF   9  LAST 1292    43,3714  6 4753 1              AD       S+1
 04464   REF  19  LAST 1293    43,3715  55'371 1              TS       SKEEP1
 0447    REF 227  LAST 1293    43,3716  4 0001 1  BNKCHK      CS       L               = - BANK NUMBER
 0448    REF  20  LAST 1293    43,3717  6 1371 0              AD       SKEEP1
 0449    REF   2  LAST 1291    43,3720  6 7747 1              AD       S-1
 0450    REF   5  LAST 12[illegible]    43,3721  0 3273 1              TC       -1CHK           CHECK SUM
 0451    REF   2  LAST  290    43,3722  0 3633 1              TC       NXTBNK

 0454    REF  22  LAST 1292       0067                        EBANK=   NEWJOB
 0455                          43,3723   66100 0  LSTBNKCH    BBCON*                   * CONSTANT, LAST BANK.
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P0001             SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

 0002   REF   1                                                 COUNT* $$/PHASE
 0003                              5311                         BLOCK  02
 0004   REF   1                    4000                         SETLOC FFTAG1
 0005                              5311                         BANK

 0006   REF 327  LAST 1291         5311  50 002 0  NEWMODEX INDEX  0                UPDATE MODREG. ENTRY FOR MODE IN FIXED.
 0007                              5312  3 0000 1           CAF    0
 0008   REF 328  LAST 1294         5313  24 002 0           INCR   Q

 0009   REF  21  LAST 1231         5314  55 011 1  NEWMODEA TS     MODREG           ENTRY FOR MODE IN A.
 0014                              5315  3 5320 0  MMDSPLAY CAF    +3               DISPLAY MAJOR MODE.
 0015   REF  40  LAST 1213         5316  22 006 1  PREBJUMP LXCH   BBANK            PUTS BBANK IN L
 0016   REF  17  LAST 1224         5317  1 4640 0           TCF    BANKJUMP         PUTS Q INTO A
 0017   REF   1                    5320   20213 0           CADR   SETUPDSP

R0018             RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

 0020   REF 329  LAST 1294         5321  50 002 0  CHECKMM  INDEX  0
 0021                              5322  4 0000 0           CS     0
 0022   REF  22  LAST 1294         5323  6 1011 0           AD     MODREG
 0023                              5324  0 0006 1           EXTEND
 0024   REF   3  LAST 1105         5325  1 6741 1           BZF    Q+2
 0025   REF   4  LAST  521         5326  1 6737 0           TCF    Q+1              NO MATCH

 0026   REF   4  LAST 1294         6742            TCQ      =      Q+2 +1

 0027                           14,3774                     BANK   14
 0028   REF   1                 10,2000                     SETLOC PHASETAB
 0029                           10,2213                     BANK

 0030   REF   1                                             COUNT* $$/PHASE
 0031                           10,2213  0 0004 0  SETUPDSP INHINT
 0032   REF  44  LAST  904      10,2214  52 071 0           DXCH   RUPTREG1         SAVE CALLER-S RETURN 2CADR
 0033   REF  11  LAST 1099      10,2215  3 4355 0           CAF    PRIO30             EITHER A TASK OR JOB CAN COME TO
 0034   REF  26  LAST 1121      10,2216  0 5072 1           TC     NOVAC              NEWMODEX
 0035   REF  23  LAST 1294         1011                     EBANK= MODREG
 0036   REF   1                 10,2217   03534 0           2CADR  DSPMMJOB
 0036   REF   1                 10,2220   60102 1
 0037   REF  45  LAST 1294      10,2221  52 071 0           DXCH   RUPTREG1
 0038                           10,2222  0 0003 1           RELINT
 0039   REF  23  LAST 1267      10,2223  52 006 0           DXCH   Z                RETURN

 0040   REF   2  LAST  457      40,3534            DSPMMJOB EQUALS DSPMMJB


 0041                              5327                     BLOCK  02
 0042   REF   2  LAST 1294         4000                     SETLOC FFTAG1
 0043                              5327                     BANK
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R0044   PHASCHNG IS THE MAIN WAY OF MAKING PHASE CHANGES FOR RESTARTS.  THERE ARE THREE FORMS OF PHASCHNG, KNOWN AS TYPE
R0046   A, TYPE B, AND TYPE C. THEY ARE ALL CALLED AS FOLLOWS, WHERE OCT XXXXX   CONTAINS THE PHASE INFORMATION,

A0048                                                         TC      PHASCHNG
A0049                                                         OCT     XXXXX

R0050   TYPE A IS CONCERNED WITH FIXED PHASE CHANGES, THAT IS, PHASE INFORMATIONTHAT IS STORED PERMANENTLY.  THESE
R0052   OPTIONS ARE, WHERE G STANDS FOR A GROUP AND .X FOR THE PHASE,

R0053                   G.0                INACTIVE, WILLNOT PERMIT A GROUP G RESTART
R0055                   G.1                WILL CAUSE THE LAST DISPLAY TO BE REACTIVATED, USED MAINLY IN MANNED FLIGHTS
R0057                   G.EVEN             A DOUBLE TABLE RESTART, CAN CAUSE ANY COMBINATION OF TWO JOBS, TASKS, AND/OR
R0059                                      LONGCALL TO BE RESTARTED.
R0060                   G.ODD NOT .1       A SINGLE TABLE RESTART, CAN CAUSE EITHER A JOB, TASK, OR LONGCALL RESTART

R0062   THIS INFORMATION IS PUT INTO THE OCTAL WORD AFTER TC PHASCHNG AS FOLLOWS

R0063                   TLO 00P PPP PPP GGG

R0065   WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7, THE P:S FOR THE PHASE,
R0067   OCTAL 0 - 127.  0:S MUST BE 0.            IF ONE WISHES TO HAVE THE TBASE OF GROUP G TO BE SET AT THIS TIME,
R0069   T IS SET TO 1, OTHERWISE IT IS SET TO 0.  SIMIARLY IF ONE WISHES TO SET LONGBASE, THEN L IS SET TO 1, OTHERWISE
R0071   IT IS SET TO 0.  SOME EXAMPLES,

A0072                                                         TC      PHASCHNG        THIS WILL CAUSE GROUP 3 TOBE SET TO 0,
A0073                                                         OCT     00003           MAKING GROUP 3 INACTIVE

A0074                                                         TC      PHASCHNG        IF A RESTART OCCURS THIS WOULD CAUSE
A0075                                                         OCT     00012           GROUP 2 TO RESTART THE LAST DISPLAY

A0076                                                         TC      PHASCHNG        THIS SETS THE TBASE OF GROUP 4 AND IN
A0077                                                         OCT     40064           CASE OF A RESTART WOULD START UP THE TWO
A0078                                                                                 THINGS LOCATED IN THE DOUBLE 4.6 RESTART
A0079                                                                                 LOCATION
A0080                                                         TC      PHASCHNG        THIS SETS LONGBASE AND UPON A RESTART
A0081                                                         OCT     20135           CAUSES 5.13 TO BE RESTARTED  (SINCE
A0082                                                                                 LONGBASE WAS SET THIS SINGLE ENTRY
A0083                                                                                 SHOULD BE A LONGCALL)
A0084                                                         TC      PHASCHNG        SINCE BOTH TBASE4 AND LONGBASE ARE SET,
A0085                                                         OCT     60124           4.12 SHOULD CONTAIN BOTH A TASK AND A
A0086                                                                                 LONGCALL TO BE RESTARTED

R0087   TYPE C PHASCHNG CONTAINS THE VARIABLE TYPE OF PHASCHNG INFORMATION. INSTEAD OF THE INFORMATION BEING IN A
R0089   PERMANENT FORM, ONE STORES THE DESIRED RESTART INFORMATION IN A VARIABKE LOCATION. THE BITS ARE AS FOLLOWS,

R0091                   TLO 1AD XXX CJW GGG

R0092   WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7.  IF THE RESTART IS TO
R0094   BE BY WAITLIST, W IS SET TO 1, IF IT IS A JOB, J IS SET TO 1, IF IT IS A LONGCALL, C IS SET TO 1. ONLY ONE OF
R0096   THESE THREE BITS MAY BE SET.  X:S ARE IGNORED  1 MUST BE 1, AND 0 MUST  BE 0.  AGAIN T STANDS FOR THE TBASE,
R0098    AND L FOR LONGBASE.  THE BITS A AND D ARE CONCERNED WITH THE VARIABLE INFORMATION. IF D IS SET TO 1, A PRIORITY
R0100    OR DELTA TIME WILL BE READ FROM THE NEXT LOCATION AFTER THE OCTAL INFORMATION, IF THIS IS TO BE INDIRECT, THAT
R0102    IS, THE NAME OF A LOCATION CONTAINING THE INFORMATION (DELTA TIME ONLY), THEN THIS IS GIVEN AS THE -GENADR OF
R0104    THAT LOCATION WHICH CONTAINS THE DELTA TIME.  IF THE OLD PRIORITY OR DELTA TIME IS TO BE USED, THAT WHICH IS
R0106    ALREADY IN THE VARIABLE STORAGE, THEN D IS SET TO 0. NEXT THE A BIT IS USED.  IF IT IS SET TO 0, THE ADDRESS
R0108    THAT WOULD BE RESTARTED DURING A RESTART IS THE NEXT LOCATION AFTER THE  PHASE INFORMATION, THAT IS, EITHER
R0110    (TC PHASCHNG) +2 OR +3, DEPENDING ON WHETHER D HAD BEEN SET OR NOT.  IF A IS SET TO 1, THEN THE ADDRESS THAT
R0112    WOULD BE RESTARTED IS THE 2CADR THAT IS READ FROM THE NEXT TWO LOCATIONS.  EXAMPLES,

A0114                                      AD       TC       PHASCHNG        THIS WOULD CAUSE LOCATION AD +3 TO BE
A0115                                      AD+1     OCT      05023           RESTARTED BY GROUP THREE WITHA PRIORITY
A0116                                      AD+2     OCT      23000           OF 23.  NOTE UPON RETURNING IT WOULD
A0117                                      AD+3                              ALSO GO TO AD+3

A0118                                      AD       TC       PHASCHNG        GROUP  1 WOULD CAUSE CAUSE CALLCALL TO
A0119                                      AD+1     OCT      27441           BE STARTED AS A LONGCALL FROM THE TIME
A0120                                      AD+2     -GENADR  DELTIME         STORED IN LONGBASE (LONGBASE WAS SET) BY
A0121                                      AD+3     2CADR    CALLCALL        A DELTATIME STORED IN DELTIME.  THE
A0122                                      AD+4                              BBCON OF THE 2CADR SHOULD CONTAIN THE E
A0123                                      AD+5                              BANK OF DELTIME. PHASCHNG RETURNS TO
A0124                                                                        LOCATION AD+5

R0125    NOTE THAT IF A VARIABLE PRIORITY IS GIVEN FOR A JOB, THE JOB WILL BE RESTARTED AS A NOVAC IF THE PRIORITY IS
R0127    NEGATIVE, AS A FINDVAC IF THE PRIORITY IS POSITIVE.


R0128    TYPE B PHASCHNG IS A COMBINATION OF VARIABLE AND FIXED PHASE CHANGES. IT WILL START UP A JOB AS INDICATED
R0130    BELOW AND ALSO START UP ONE FIXED RESTART, THAT IS EITHER AN G.1 OR  A G.ODD OR THE FIRST ENTRY OF G.EVEN
R0132    DOUBLE ENTRY.  THE BIT INFORMATION IS AS FOLLOWS,

R0133                     TL1 DAP PPP PPP GGG

R0134    WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. THE P:S FOR THE FIXED
R0136    PHASE INFORMATION, OCTAL 0 - 127. 1 MUST BE 1.  AND AGAIN T STANDS FOR THE TBASE AND L FOR LONGBASE. D THIS
R0138    TIME STANDS ONLY FOR PRIORITY SINCE THIS WILL BE CONSIDERED A JOB, AND IT MUST BE GIVEN DIRECTLY IF GIVEN.
R0140    AGAIN A STANDS FOR THE ADDRESS OF THE LOCATION TO BE RESTARTED, 1 IF THE 2CADR IS GIVEN , OR 0 IF IT IS TO BE
R0142    THE NEXT LOCATION.(THE RETURN LOCATION OF PHASCHNG) EXAMPLES,

A0143                                      AD       TC       PHASCHNG        TBASE IS SET AND ARESTART CAUSE GROUP 3
A0144                                      AD+1     OCT      56043           TO START THE JOB AJOBAJOB WITH PRIORITY
A0145                                      AD+2     OCT      31000           31 AND THE FIRST ENTRY OF 3.4SPOT(WE CAN
A0146                                      AD+3     2CADR    AJOBAJOB        ASSUME IT IS A TASK SINCE WE SET TBASE3)
A0147                                      AD+4                              UPON RETURN FROM PHASCHNG CONTROL WOULD
A0148                                      AD+5                              GO TO AD+5

A0149                                      AD       TC       PHASCHNG        UPON A RESTART THE LAST DISPLAY WOULD BE
A0150                                      AD+1     OCT      10015           RESTARTED AND A JOB WITH THE PREVIOUSLY
A0151                                      AD+2                              STORED PRIORITY WOULD BE BEGUN AT AD+2
A0152                                                                        BY MEANS OF GROUP 5
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R0153   THE NOVAC-FINDVAC CHOICE FOR JOBS HOLDS HERE ALSO - NEGATIVE PRIORITY CAUSES A NOVAC CALL, POSITIVE A FINDVAC.

R0155   SUMMARY OF BITS
R0156   TYPE A             TL0 00P PPP PPP GGG
R0157   TYPE B             TL1 CAP PPP PPP GGG
R0158   TYPE C             TL0 1AD XXX CJW GGG
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P0159   2PHSCHNG IS USED WHEN ONE WISHES TO START UP A GROUP OR CHANGE A GROUP WHILE UNDER THE CONTROL OF A DIFFERENT
R0161   GROUP. FOR EXAMPLE, CHANGE THE PHASE OF GROUP 3 WHILE THE PORTION OF THE PROGRAM IS UNDER GROUP 5. ALL 2PHSCHNG
R0163   CALLS ARE MADE IN THE FOLLOWING MANNER,

A0164                                                              TC       2PHSCHNG
A0165                                                              OCT      XXXXX
A0166                                                              OCT      YYYYY

R0167   WHERE OCT XXXXX MUST BE OF TYPE A AND OCT YYYYY MAY BE OF EITHER TYPE A OR TYPE B OR TYPEC.  THERE IS ONE
R0169   DIFFERENCE --- NOTE- IF LONGBASE IS TO BE SET THIS INFORMATION IS GIVEN IN THE OCT YYYYY INFORMATION, IT WILL
R0171   BE DISREGARDED IF GIVEN WITH THE OCT XXXXX INFORMATION. A COUPLE OF EXAMPLES MAY HELP,

A0173                                                     AD       TC       2PHSCHNG          SET TBASE3 AND IF A RESTART OCCURS START
A0174                                                     AD+1     OCT      40083             THE TWO ENTRIES IN 3.8 TABLE LOCATION
A0175                                                     AD+2     OCT      05025             THIS IS OF TYPE C, SET THE JOB TO BE
A0176                                                     AD+3     OCT      18000             TO BE LOCATION AD+4, WITH A PRIORITY 18,
A0177                                                     AD+4                                FOR GROUP 5 PHASE INFORMATION

 0178    REF   1                                                   COUNT*  $$/PHASE
 0179                                   5327  0 0004 0  2PHSCHNG INHINT                         THE ENTRY FOR A DOUBLE PHASE CHANGE
 0180    REF 330  LAST 1298             5330  50 0002 0           NDX      Q
 0181                                   5331  3 0000 1             CA       0
 0182    REF 331  LAST 1298             5332  24 002 0             INCR     Q
 0183    REF   1                        5333  54 072 0             TS       TEMPP2

 0184    REF   1                        5334  7 4757 1             MASK     OCT7
 0185                                   5335  6 0000 1             DOUBLE
 0186    REF   1                        5336  54 071 0             TS       TEMPG2

 0187    REF   2  LAST 1298             5337  3 0072 1             CA       TEMPP2
 0188    REF   1                        5340  7 5030 0             MASK     OCT17770          NEED ONLY 1770, BUT WHY GET A NEW CONST.
 0189                                   5341  0 0006 1             EXTEND
 0190    REF  33  LAST 1285             5342  7 4740 1             MP       BIT12
 0191    REF   3  LAST 1298             5343  56 072 1             XCH      TEMPP2

 0192    REF  41  LAST 1295             5344  7 4735 0             MASK     BIT15
 0193    REF   1                        5345  54 066 0             TS       TEMPSW2           INDICATES WHETHER TO SET TBASE OR NOT

 01932   REF 332  LAST 1298             5346  50 002 0             INDEX    Q
 01934                                  5347  3 0000 1             CA       0
 01936   REF 333  LAST 1298             5350  24 002 0             INCR     Q
 01938   REF   1                        5351  54 065 0             TS       TEMPSW

 0194    REF   1                        5352  1 5363 0             TCF      PHASJUMP

 0195                                   5353  0 0004 0  PHASCHNG INHINT                         NORMAL PHASCHNG ENTRY POINT.
 0196    REF 334  LAST 1298             5354  50 002 0             INDEX    Q
 0197                                   5355  3 0000 1             CA       0
 0198    REF 335  LAST 1298             5356  24 002 0             INCR     Q
 0199                                   5357  0 0004 0  PHSCHNGA INHINT                         FIRST OCTAL PARAMETER IN A.
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0200   REF   2  LAST 1298          5360  54 065 0                     TS      TEMPSW
0201   REF 128  LAST 1263          5361   3 4753 1                    CA      ONE
02015  REF   2  LAST 1298          5362  54 066 0                     TS      TEMPSW2
0202                               5363   0 0006 1        PHASJUMP    EXTEND
0203   REF   1                     5364   3 5367 0                    DCA     ADRPCHN2          OFF TO SWITCHED BANK
0204                               5365  52 006 0                     DTCB

0205   REF  47  LAST 1286  E3,1400                                    EBANK=  LST1
0206   REF   1                     5366     02224 1       ADRPCHN2    2CADR   PHSCHNG2
0206   REF   1                     5367     20103 1


0207   REF   1                     5370  22 073 0         ONEORTWO    LXCH    TEMPBBCN
0208   REF  41  LAST 1294          5371  22 006 1                     LXCH    BBANK
0209   REF   2  LAST 1299          5372  22 073 0                     LXCH    TEMPBBCN

0210   REF   1                     5373   7 5024 0                    MASK    OCT14000          SEE WHAT KIND OF PHASE CHANGE IT IS
0211   REF 387  LAST 1291          5374  10 000 0                     CCS     A
0212   REF   1                     5375   1 7750 0                    TCF     CHECKB             IT IS OF TYPE :B:

0213   REF   1                     5376   3 0062 0                    CA      TEMPP
0214   REF  42  LAST 1285          5377   7 4745 1                    MASK    BIT7
0215   REF 388  LAST 1299          5400  10 000 0                     CCS     A                  SHALL WE USE THE OLD PRIORITY
0216   REF   1                     5401   1 5423 0                    TCF     GETPRIO            NO GET A NEW PRIORITY (OR DELTA T)

0217   REF   1                     5402  50 061 0         OLDPRIO     NDX     TEMPG              USE THE OLD PRIORITY (OR DELTA T)
0218   REF   1                     5403   3 1052 1                    CA      PHSPRDT1 -2
0219   REF   1                     5404  54 070 1                     TS      TEMPPR

0220   REF   2  LAST 1299          5405   3 0062 0        CON1        CA      TEMPP             SEE IF A 2CADR IS GIVEN
0221   REF  38  LAST 1285          5406   7 4744 0                    MASK    BIT8
0222   REF 389  LAST 1299          5407  10 000 0                     CCS     A
0223   REF   1                     5410   1 5427 1                    TCF     GETNEWNM

0224   REF 336  LAST 1298          5411   3 0002 0                    CA      Q
0225   REF   1                     5412  54 063 0                     TS      TEMPNM
0226   REF   1                     5413   3 0006 1                    CA      BB
0227                               5414   0 0006 1                    EXTEND                    PICK UP USERS SUPERBANK
0228   REF  24  LAST 1129          5415  04 007 1                     ROR     SUPERBNK
0229   REF   1                     5416  54 064 1                     TS      TEMPBB

0230   REF   1                     5417   3 5422 0        TOCON2      CA      CON2ADR           BACK TO SWITCHED BANK
0231   REF   3  LAST 1299          5420  22 073 0                     LXCH    TEMPBBCN
0232                               5421  52 006 0                     DTCB

0233   REF   1                     5422     02312 0       CON2ADR     GENADR  CON2

0234   REF 337  LAST 1299          5423  50 002 0         GETPRIO     NDX     Q                 DON:T CARE IF DIRECT OR INDIRECT
0235                               5424   3 0000 1                    CA      0                 LEAVE THAT DECISION TO RESTARTS
0236   REF 338  LAST 1299          5425  24 002 0                     INCR    Q                 OBTAIN RETURN ADDRESS
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 0237   REF    1                   5426  1 5404 0            TCF      CON1 -1

 0238                              5427  0 0006 1  GETNEWNM  EXTEND
 0239   REF 339  LAST 1299         5430  5 0002 0            INDEX    Q
 0240                              5431  3 0001 0            DCA      0
 0241   REF   2  LAST 1299         5432  52 064 1            DXCH     TEMPNM
 0242   REF  78  LAST 1131         5433  3 4752 0            CA       TWO
 0243   REF 340  LAST 1300         5434  26 002 1            ADS      Q                            OBTAIN RETURN ADDRESS

 0244   REF   1                    5435  1 5417 1            TCF      TOCON2

 0245   REF   2  LAST  503         5024               OCT14000 EQUALS PRIO14
 0246   REF  40  LAST 1261         0061               TEMPG    EQUALS ITEMP1
 0247   REF  20  LAST 1261         0062               TEMPP    EQUALS ITEMP2
 0248   REF  26  LAST  903         0063               TEMPNM   EQUALS ITEMP3
 0249   REF  12  LAST  903         0064               TEMPBB   EQUALS ITEMP4
 0250   REF  50  LAST  907         0065               TEMPSW   EQUALS ITEMP5
 0251   REF   7  LAST  905         0066               TEMPSW2  EQUALS ITEMP6
 0252   REF  46  LAST 1294         0070               TEMPPP   EQUALS RUPTREG1
 0253   REF   9  LAST  817         0071               TEMPG2   EQUALS RUPTREG2
 0254   REF  12  LAST 1000         0072               TEMPP2   EQUALS RUPTREG3

 0255   REF   5  LAST 1000         0073               TEMPBBCN EQUALS RUPTREG4
 0256   REF  42  LAST 1299         0006               BB       EQUALS BBANK


 0257                         14,3774                            BANK     14
 0258   REF   2  LAST 1294    10,2000                            SETLOC   PHASETAB
 0259                         10,2224                            BANK

 0260   REF   1               E3,1436                            EBANK=   PHSNAME1
 0261   REF   2 LAST 1294 TO 1298:     9      9*                 COUNT*   $$/PHASE
 0262   REF   4  LAST 1299    10,2224  22 073 0   PHSCHNG2       LXCH     TEMPBBCN
 0263   REF   3  LAST 1299    10,2225  3 0065 1                  CA       TEMPSW
 0264   REF   2  LAST 1298    10,2226  7 4757 1                  MASK     OCT7
 0265                         10,2227  6 0000 1                  DOUBLE
 0266   REF   2  LAST 1299    10,2230  54 061 1                  TS       TEMPG

 0267   REF   4  LAST 1300    10,2231  3 0065 1                  CA       TEMPSW
 0268   REF   2  LAST 1298    10,2232  7 5030 0                  MASK     OCT17770
 0269                         10,2233  0 0006 1                  EXTEND
 0270   REF  34  LAST 1298    10,2234  7 4740 1                  MP       BIT12
 0271   REF   3  LAST 1299    10,2235  54 062 1                  TS       TEMPP

 0272   REF   5  LAST 1300    10,2236  3 0065 1                  CA       TEMPSW
 0273   REF   1               10,2237  7 6101 1                  MASK     OCT60000
 0274   REF   6  LAST 1300    10,2240  56 065 1                  XCH      TEMPSW
 0275   REF   2  LAST 1299    10,2241  7 5024 0                  MASK     OCT14000
 0276   REF 390  LAST 1299    10,2242  10 000 0                  CCS      A
 0277   REF    1             10,2243   1 5370 1              TCF      ONEORTWO

 0278   REF    4  LAST 1300  10,2244   3 0062 0              CA       TEMPP              START STORING THE PHASE INFORMATION
 0279   REF    3  LAST 1300  10,2245  50 061  0              NDX      TEMPG
 0280   REF    2  LAST  217  10,2246  54 751  0              TS       PHASE1 -2

 0281   REF    3  LAST 1299  10,2247  10 066  0   BELOW1     CCS      TEMPSW2            IS IT A PHASCHNG OR A 2PHSCHNG
 0282   REF    1             10,2250   1 2264 1              TCF      BELOW2             IT:S A PHASCHNG

 0283                        10,2251   1 2252 1              TCF      +1                 IT:S A 2PHSCHNG
 0284   REF    4  LAST 1298  10,2252   4 0072 0              CS       TEMPP2
 0285   REF    5  LAST 1301  10,2253  22 072  1              LXCH     TEMPP2
 0286   REF    2  LAST 1298  10,2254  50 071  1              NDX      TEMPG2
 0287   REF    6  LAST  865  10,2255  52 751  0              DXCH     -PHASE1 -2

 0288   REF    4  LAST 1301  10,2256  10 066  0              CCS      TEMPSW2
 0289                        10,2257  12 260  0              NOOP                        CAN:T GET HERE
 0290   REF    2  LAST 1301  10,2260   1 2264 1              TCF      BELOW2

 0291   REF   17  LAST  996  10,2261   4 0025 1              CS       TIME1
 0292   REF    3  LAST 1301  10,2262  50 071  1              NDX      TEMPG2
 0293   REF    2  LAST  736  10,2263  55'051  0              TS       TBASE1 -2

 0294   REF    7  LAST 1300  10,2264  10 065  0   BELOW2     CCS      TEMPSW             SEE IF WE SHOULD SET TBASE OR LONGBASE
 0295   REF    1             10,2265   1 2300 1              TCF      BELOW3             SET LONGBASE ONLY
 0296   REF    1             10,2266   1 2303 1              TCF      BELOW4             SET NEITHER

 0297   REF   18  LAST 1301  10,2267   4 0025 1              CS       TIME1              SET TBASE TO BEGIN WITH
 0298   REF    4  LAST 1301  10,2270  50 061  0              NDX      TEMPG
 0299   REF    3  LAST 1301  10,2271  55'051  0              TS       TBASE1 -2

 0300   REF    8  LAST 1301  10,2272   3 0065 1              CA       TEMPSW              SHALL WE NOW SET LONGBASE
 0301   REF    1             10,2273   6 2276 0              AD       BIT14COM
 0302   REF  391  LAST 1300  10,2274  10 000  0              CCS      A
 0303                        10,2275  12 276  1              NOOP                        ***** CANT GET HERE *****
 0304                        10,2276    17777 0   BIT14COM   OCT      17777              ***** CANT GET HERE *****
 0305   REF    2  LAST 1301  10,2277   1 2303 1              TCF      BELOW4             NO WE NEED ONLY SET TBASE

 0306                        10,2300   0 0006 1   BELOW3     EXTEND                      SET LONGBASE
 0307   REF   31  LAST 1224  10,2301   3 0025 0              DCA      TIME2
 0308   REF    1             10,2302  53'152  1              DXCH     LONGBASE

 0309   REF    5  LAST 1301  10,2303   4 0062 1   BELOW4     CS       TEMPP              AND STORE THE FINAL PART OF THE PHASE
 0310   REF    5  LAST 1301  10,2304  50 061  0              NDX      TEMPG
 0311   REF    7  LAST 1301  10,2305  54 750  1              TS       -PHASE1 -2

 0312   REF  341  LAST 1300  10,2306   3 0002 0              CA       Q
 0313   REF    5  LAST 1300  10,2307  22 073  0              LXCH     TEMPBBCN
 0314                        10,2310   0 0003 1              RELINT
 0315                        10,2311  52 006  0              DTCB
 0316    REF     6  LAST 1301   10,2312  22 073 0  CON2      LXCH    TEMPRBCN

 0317    REF     6  LAST 1301   10,2313   3 0062 0           CA      TEMPP
 0318    REF     6  LAST 1301   10,2314  50 061 0            NDX     TEMPG
 0319    REF     3  LAST 1301   10,2315  54 751 0            TS      PHASE1 -2

 0320    REF     2  LAST 1299   10,2316   3 0070 0           CA      TEMPPR
 0321    REF     7  LAST 1302   10,2317  50 061 0            NDX     TEMPG
 0322    REF     2  LAST 1299   10,2320  55'052 0            TS      PHSPRDT1 -2

 0323                           10,2321   0 0006 1           EXTEND
 0324    REF     3  LAST 1300   10,2322   3 0064 0           DCA     TEMPNM
 0325    REF     8  LAST 1302   10,2323  50 061 0            NDX     TEMPG
 0326    REF     2  LAST 1300   10,2324  53'435 0            DXCH    PHSNAME1 -2

 0327    REF     1              10,2325   1 2247 0           TCF     BELOW1

 0328                              7750                      BLOCK   03
 0329    REF     3  LAST  750      6000                      SETLOC  FFTAG6
 0330                              7750                      BANK

 0331    REF     1                                           COUNT*  $$/PHASE
 0332    REF    35  LAST 1300      7750   7 4740 1  CHECKB   MASK    BIT12          SINCE THIS IS OF TYPE B, THIS BIT SHOULD
 0333    REF   392  LAST 1301      7751  10 000 0            CCS     A               BE HERE IF WE ARE TO GET A NEW PRIORITY
 0334    REF     2  LAST 1299      7752   1 5423 0           TCF     GETPRIO        IT IS, SO GET NEW PRIORITY

 0335    REF     1                 7753   1 5402 0           TCF     OLDPRIO        IT ISN:T, USE THE OLD PRIORITY
 0001                          01,3526                        BANK     01
 0002   REF    2  LAST  239    01,2000                        SETLOC   RESTART
 0003                          01,3526                        BANK

 0004   REF    3  LAST 1302    E3,1436                        EBANK=   PHSNAME1       GOPROG MUST SWITCH TO THIS EBANK

 0005   REF    1                                              COUNT*   $$/RSROU
 0006   REF  771  LAST 1267    01,3526   3 0161 1  RESTARTS   CA       MPAC +5        GET GROUP NUMBER -1
 0007                          01,3527   6 0000 1             DOUBLE                  SAVE FOR INDEXING
 0008   REF    1               01,3530  54 155 1              TS       TEMP2G

 0009   REF    1               01,3531   3 3770 1             CA       PHS2CADR       SET UP EXIT IN CASE IT IS AN EVEN
 0010   REF    1               01,3532  54 157 0              TS       TEMPSWCH       TABLE PHASE

 0011   REF    1               01,3533   3 3565 1             CA       RTRNCADR       TO SAVE TIME ASSUME IT WILL GET NEXT
 0012   REF    1               01,3534  54 707 0              TS       GOLOC +2       GROUP AFTER THIS

 0013   REF    1               01,3535   3 0154 1             CA       TEMPPHS
 0014   REF   10  LAST 1286    01,3536   7 5007 1             MASK     OCT1400
 0015   REF  393  LAST 1302    01,3537  10 000 0              CCS      A              IS IT A VARIABLE OR TABLE RESTART
 0016   REF    1               01,3540   1 3551 1             TCF      ITSAVAR        IT:S A VARIABLE RESTART

 0017   REF    2  LAST 1303    01,3541  10 154 0   GETPART2   CCS      TEMPPHS        IS IT AN X.1 RESTART
 0018   REF  394  LAST 1303    01,3542  10 000 0              CCS      A
 0019   REF    1               01,3543   1 3651 1             TCF      ITSATBL        NO, ITS A TABLE RESTART

 0020   REF    3  LAST 1300    01,3544   3 5024 1             CA       PRIO14         IT IS AN X.1 RESTART, THEREFORE START
 0021   REF   42  LAST 1209    01,3545   0 5105 0             TC       FINDVAC        THE DISPLAY RESTART JOB
 0022   REF   48  LAST 1299    E3,1400                        EBANK=   LST1
 0023   REF    1               01,3546    03037 0             2CADR    INITDSP
 0023   REF    1               01,3547    20103 1

 0024   REF    2  LAST 1303    01,3550   0 3565 1             TC       RTRNCADR       FINISHED WITH THIS GROUP, GET NEXT ONE

 0025   REF   11  LAST 1303    01,3551   7 5007 1  ITSAVAR    MASK     OCT1400        IS IT TYPE B ?
 0026   REF  395  LAST 1303    01,3552  10 000 0              CCS      A
 0027   REF    1               01,3553   1 3622 0             TCF      ITSLIKEB       YES,IT IS TYPE B

 0028                          01,3554   0 0006 1             EXTEND                  STORE THE JOB (OR TASK) 2CADR FOR EXIT
 0029   REF    2  LAST 1303    01,3555   5 0155 0             NDX      TEMP2G
 0030   REF    4  LAST 1303    01,3556   3 1437 0             DCA      PHSNAME1
 0031   REF    2  LAST 1303    01,3557  52 706 1              DXCH     GOLOC

 0032   REF    3  LAST 1303    01,3560   3 0154 1             CA       TEMPPHS        SEE IF THIS IS A JOB, TASK, OR A LONGCAL
 0033   REF    3  LAST 1300    01,3561   7 4757 1             MASK     OCT7
 0034   REF    3  LAST 1155    01,3562   6 7746 0             AD       MINUS2
 0035   REF  396  LAST 1303    01,3563  10 000 0              CCS      A
 0036   REF    1               01,3564   1 3734 0             TCF      ITSLNGCL       ITS A LONGCALL

 0037   REF    7  LAST 1267    01,3565   0 4631 1  RTRNCADR   TC       SVRETURN       CANT GET HERE
 0038    REF   1               01,3566  1 3570 1           TCF     ITSAWAIT

 0039    REF   1               01,3567  1 3635 0           TCF     ITSAJOB      ITS A JOB

 0040    REF   1               01,3570  3 3774 0  ITSAWAIT CA      WTLTCADR     SET UP WAITLIST CALL
 0041    REF   3  LAST 1303    01,3571  54 704 0           TS      GOLOC -1

 0042    REF   3  LAST 1303    01,3572  50 155 0           NDX     TEMP2G       DIRECTLY STORED
 0043    REF   3  LAST 1302    01,3573  3 1054 1           CA      PHSPRDT1
 0044    REF 397  LAST 1303    01,3574  10 000 0  TIMETEST CCS     A            IS IT AN IMMEDIATE RESTART
 0045    REF 398  LAST 1304    01,3575  24 000 1           INCR    A            NO,
 0046    REF   1               01,3576  1 3601 1           TCF     FINDTIME     FIND OUT WHEN IT SHOULD BEGIN

 0047    REF   1               01,3577  1 5436 1           TCF     ITSINDIR     STORED INDIRECTLY

 0048    REF   1               01,3600  1 3620 1           TCF     IMEDIATE     IT WANTS AN IMMEDIATE RESTART

R0049    ***** THIS MUST BE IN FIXED FIXED *****

 0050                             5436                     BLOCK   02
 0051    REF   1                  4000                     SETLOC  FFTAG2
 0052                             5436                     BANK

 0053    REF   1                                           COUNT*  $$/FSRPU
 0054    REF   4  LAST 1304       5436  22 706 0  ITSINDIR LXCH    GOLOC +1     GET THE CORRECT F BANK IN CASE THIS IS
 0055    REF   2  LAST 1299       5437  22 006 1           LXCH    BB           SWITCHED ERRASIBLE

 0056    REF 399  LAST 1304       5440  50 000 1           NDX     A            GET THE TIME INDIRECTLY
 0057                             5441  3 0001 0           CA      1

 0058    REF   3  LAST 1304       5442  22 006 1           LXCH    BB           RESTORE THE BB AND GOLOC
 0059    REF   5  LAST 1304       5443  22 706 0           LXCH    GOLOC +1

 0060    REF   2  LAST 1304       5444  1 3601 1           TCF     FINDTIME     FIND OUT WHEN IT SHOULD BEGIN

R0061    ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

 0062                          01,3601                     BANK    01
 0063    REF   3  LAST 1303    01,2000                     SETLOC  RESTART
 0064                          01,3601                     BANK

 0065    REF   2 LAST 1303 TO 1304:     43 ***43*          COUNT*  $$/FSROU
 0066                          01,3601  4 0000 0  FINDTIME COM                  MAKE NEGITIVE SINCE IT WILL BE SUBTRACTD
 0067    REF 228  LAST 1293    01,3602  54 001 1           TS      L            AND SAVE
 0068    REF   4  LAST 1304    01,3603  50 155 0           NDX     TEMP2G
 0069    REF   4  LAST 1301    01,3604  4 1053 1           CS      TBASE1
 0070                          01,3605  0 0006 1           EXTEND
 0071    REF  19  LAST 1301    01,3606  60 025 0           SU      TIME1
 0072    REF 400  LAST 1304    01,3607  10 000 0           CCS     A
 0073                          01,3610  4 0000 0           COM
 0074   REF   2  LAST  159   01,3611  6 7731 0            AD      OCT37776
 0075   REF 129  LAST 1299   01,3612  6 4753 1            AD      ONE
 0076   REF 229  LAST 1304   01,3613  6 0001 0            AD      L
 0077   REF 401  LAST 1304   01,3614  10 000 0            CCS     A
 0078   REF 229  LAST 1285   01,3615  3 4755 1            CA      ZERO
 0079                        01,3616  1 3620 1            TCF     +2
 0080                        01,3617  1 3620 1            TCF     +1
 0081   REF 130  LAST 1305   01,3620  6 4753 1  IMEDIATE  AD      ONE
 0082   REF   6  LAST 1304   01,3621  0 0704 1            TC      GOLOC -1
 0083   REF   3  LAST 1303   01,3622  3 3565 1  ITSLIKEB  CA      RTRNCADR       TYPE B,            SO STORE RETURN IN
 0084   REF   2  LAST 1303   01,3623  54 157 0            TS      TEMPSWCH       TEMPSWCH IN CASE OF AN EVEN PHASE

 0085   REF   1              01,3624  3 3771 0            CA      PRT2CADR       SET UP EXIT TO GET TABLE PART OF THIS
 0086   REF   7  LAST 1305   01,3625  54 707 0            TS      GOLOC +2       VARIABLE TYPE OF PHASE

 0087   REF   4  LAST 1303   01,3626  3 0154 1            CA      TEMPPHS        MAKE THE PHASE LOOK RIGHT FOR THE TABLE
 0088   REF   1              01,3627  7 6074 0            MASK    OCT177         PART OF THIS VARIABLE PHASE
 0089   REF   5  LAST 1305   01,3630  54 154 0            TS      TEMPPHS

 0090                        01,3631  0 0006 1            EXTEND
 0091   REF   5  LAST 1304   01,3632  5 0155 0            NDX     TEMP2G         OBTAIN THE JOB:S 2CADR
 0092   REF   5  LAST 1303   01,3633  3 1437 0            DCA     PHSNAME1
 0093   REF   8  LAST 1305   01,3634  52 706 1            DXCH    GOLOC

 0094   REF   6  LAST 1305   01,3635  50 155 0  ITSAJOB   NDX     TEMP2G         NOW ADD THE PRIORITY AND LET:S GO
 0095   REF   4  LAST 1304   01,3636  3 1054 1            CA      PHSPRDT1
 0096   REF   9  LAST 1305   01,3637  54 704 0  CHKNOVAC  TS      GOLOC -1       SAVE PRIO UNTIL WE SEE IF ITS
 0097                        01,3640  0 0006 1            EXTEND                 A FINDVAC OR A NOVAC
 0098   REF   1              01,3641  6 3645 0            BZMF    ITSNOVAC

 0099   REF   1              01,3642  3 3773 1            CAF     FVACCADR       POSITIVE, SET UP FINDVAC CALL.
 0100   REF  10  LAST 1305   01,3643  56 704 1            XCH     GOLOC -1       PICK UP PRIO,
 0101   REF  11  LAST 1305     1,     0 0704 1            TC      GOLOC -1       AND GO

 0102   REF   1              01,3645  3 3775 1  ITSNOVAC  CAF     NOVACADR       NEGATIVE,
 0103   REF  12  LAST 1305   01,3646  56 704 1            XCH     GOLOC -1       SET UP NOVAC CALL,
 0104                        01,3647  4 0000 0            COM                    CORRECT PRIO,
 0105   REF  13  LAST 1305   01,3650  0 0704 1            TC      GOLOC -1       AND GO

 0106   REF  45  LAST 1290   01,3651  54 020 1  ITSATBL   TS      CYR            FIND OUT IF THE PHASE IS ODD OR EVEN
 0107   REF  46  LAST 1305   01,3652  10 020 1            CCS     CYR
 0108                        01,3653  1 3654 1            TCF     +1             IT:S EVEN
 0109   REF   1              01,3654  1 3752 0            TCF     ITSEVEN

 0110   REF   4  LAST 1305   01,3655  3 3565 1            CA      RTRNCADR       IN CASE THIS IS THE SECOND PART OF A
 0111   REF  14  LAST 1305   01,3656  54 707 0            TS      GOLOC +2       TYPE B RESTART, WE NEED PROPER EXIT

 0112   REF   6  LAST 1305   01,3657  3 0154 1            CA      TEMPPHS        SET UP POINTER FOR FINDING OUR PLACE IN
 0113   REF  25  LAST 1293   01,3660  54 021 0            TS      SR             THE RESTART TABLES
 0114   REF  26  LAST 1305   01,3661  6 0021 1            AD      SR
 0115   REF    7  LAST 1305   01,3662  50 155 0              NDX      TEMP2G
 0116   REF    1              01,3663  6 2003 0              AD       SIZFTAB +1
 0117   REF    1              01,3664  54 156 1              TS       POINTER

 0118                         01,3665  0 0006 1  CONTRBL2    EXTEND                     FIND OUT WHAT:S IN THE TABLE
 0119   REF    2  LAST 1306   01,3666  5 0156 0              NDX      POINTER
 0120   REF    1              01,3667  3 2002 1              DCA      CADRTAB           GET THE 2CADR

 0121   REF   15  LAST 1305   01,3670  22 706 0              LXCH     GOLOC +1          STORE THE BB INFORMATION

 0122   REF  402  LAST 1305   01,3671  10 000 0              CCS      A                 IS IT A JOB OR IS IT  TIMED
 0123   REF  403  LAST 1306   01,3672  24 000 1              INCR     A                 POSITIVE, MUST BE A JOB
 0124   REF    1              01,3673  1 3746 0              TCF      ITSAJOB2

 0125   REF  404  LAST 1306   01,3674  24 000 1              INCR     A                 MUST BE EITHER A WAITLIST OR LONGCALL
 0126   REF   16  LAST 1306   01,3675  54 705 1              TS       GOLOC             LET-S STORE THE CORRECT CADR

 0127   REF    2  LAST 1304   01,3676  3 3774 0              CA       WTLTCADR          SET UP OUR EXIT TO WAITLIST
 0128   REF   17  LAST 1306   01,3677  54 704 0              TS       GOLOC -1

 0129   REF   18  LAST 1306   01,3700  3 0706 0              CA       GOLOC +1          NOW FIND OUT IF IT IS A WAITLIST CALL
 0130   REF   38  LAST 1285   01,3701  7 4742 0              MASK     BIT10             THIS SHOULD BE ONE IF WE HAVE -BB
 0131   REF  405  LAST 1306   01,3702  10 000 0              CCS      A                 FOR THAT MATTER SO SHOULD BE BITS 9,8,7,
A0132                                                                                   6,5, AND LAST BUT NOT LEAST (PERHAPS NOT
A0133                                                                                   IN IMPORTANCE ANYWAY. BIT 4
 0134   REF    1              01,3703  1 3741 1              TCF      ITSWTLST          IT IS A WAITLIST CALL

 0135   REF    3  LAST 1306   01,3704  50 156 0              NDX      POINTER           OBTAIN THE ORIGINAL DELTA T
 0136   REF    1              01,3705  3 2000 0              CA       PRDTTAB           ADDRESS FOR THIS LONGCALL

 0137   REF    1              01,3706  1 5445 0              TCF      ITSLGCL1          NOW GO GET THE DELTA TIME

R0138   ***** THIS MUST BE IN FIXED FIXED *****

 0139                            5445                        BLOCK    02
 0140   REF    2  LAST 1304      4000                        SETLOC   FFTAG2
 0141                            5445                        BANK

 0142   REF    2 LAST 1304 TO 1304:    7      7*             COUNT*   $$/RSROU
 0143   REF   19  LAST 1306      5445  22 706 0  ITSLGCL1    LXCH     GOLOC +1          OBTAIN THE CORRECT E BANK
 0144   REF    4  LAST 1304      5446  22 006 1              LXCH     BB
 0145   REF   20  LAST 1306      5447  22 706 0              LXCH     GOLOC +1          AND PRESERVE OUR E AND F BANKS

 0146                            5450  0 0006 1              EXTEND                     GET THE DELTA TIME
 0147   REF  406  LAST 1306      5451  5 0000 1              NDX      A
 0148                            5452  3 0001 0              DCA      0

 0149   REF   21  LAST 1306      5453  22 706 0              LXCH     GOLOC +1          RESTORE OUR E AND F BANK
 0150   REF    5  LAST 1306      5454  22 006 1              LXCH     BB                RESTORE THE TASKS E AND F BANKS
 0151   REF   22  LAST 1306      5455  22 706 0              LXCH     GOLOC +1          AND PRESERVE OUR L
 0152   REF    1                 5456   1 3707 0            TCF      ITSLGCL2        NOW LET:S PROCESS THIS LONGCALL

R0153   ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

 0154                          01,3707                        BANK     01
 0155   REF    4  LAST 1304    01,2000                        SETLOC   RESTART
 0156                          01,3707                        BANK

 0157   REF    3 LAST 1304 TO  1306:     70    113*           COUNT*   $$/RSROU
 0158   REF    8  LAST 1132    01,3707  53'154 1  ITSLGCL2  DXCH     LONGTIME

 0159                          01,3710   0 0006 1            EXTEND                   CALCULATE TIME LEFT
 0160   REF   32  LAST 1301    01,3711   4 0025 1            DCS      TIME2
 0161   REF    9  LAST 1307    01,3712  21'154 1            DAS      LONGTIME
 0162                          01,3713   0 0006 1            EXTEND
 0163   REF    2  LAST 1301    01,3714   3 1152 0            DCA      LONGBASE
 0164   REF   10  LAST 1307    01,3715  21'154 1            DAS      LONGTIME

 0165   REF   11  LAST 1307    01,3716  11'153 0            CCS      LONGTIME        FIND OUT HOW THIS SHOULD BE RESTARTED
 0166   REF    1               01,3717   1 3727 1            TCF      LONGCLCL
 0167                          01,3720   1 3722 1            TCF      +2
 0168   REF    2  LAST 1304    01,3721   1 3615 1            TCF      IMEDIATE -3
 0169   REF   12  LAST 1307    01,3722  11'154 1            CCS      LONGTIME +1
 0170   REF    2  LAST 1307    01,3723   1 3727 1            TCF      LONGCLCL
 0171                          01,3724  13 725 0             NOOP                     CAN:T GET HERE     *********
 0172   REF    3  LAST 1307    01,3725   1 3615 1            TCF      IMEDIATE -3
 0173   REF    4  LAST 1307    01,3726   1 3620 1            TCF      IMEDIATE

 0174   REF    1               01,3727   3 3772 0  LONGCLCL CA       LGCLCADR        WE WILL GO TO LONGCALL
 0175   REF   23  LAST 1306    01,3730  54 704 0             TS       GOLOC -1

 0176                          01,3731   0 0006 1            EXTEND                   PREPARE OUR ENTRY TO LONGCALL
 0177   REF   13  LAST 1307    01,3732   3 1154 0            DCA      LONGTIME
 0178   REF   24  LAST 1307    01,3733   0 0704 1            TC       GOLOC -1

 0179   REF    3  LAST 1306    01,3734   3 3774 0  ITSLNGCL CA       WTLTCADR        ASSUME IT WILL GO TO WAITLIST
 0180   REF   25  LAST 1307    01,3735  54 704 0             TS       GOLOC -1

 0181   REF    8  LAST 1306    01,3736  50 155 0             NDX      TEMP2G
 0182   REF    5  LAST 1305    01,3737   4 1054 0            CS       PHSPRDT1        GET THE DELTA T ADDRESS

 0183   REF    2  LAST 1306    01,3740   1 5445 0            TCF      ITSLGCL1        NOW GET THE DELTA TIME

 0184   REF   26  LAST 1307    01,3741   4 0706 1  ITSWTLST CS       GOLOC +1        CORRECT THE BBCON INFORMATION
 0185   REF   27  LAST 1307    01,3742  54 706 1             TS       GOLOC +1

 0186   REF    4  LAST 1306    01,3743  50 156 0             NDX      POINTER         GET THE DT AND FIND OUT IF IT WAS STORED
 0187   REF    2  LAST 1306    01,3744   3 2000 0            CA       PRDTTAB         DIRECTLY OR INDIRECTLY

 0188   REF    1               01,3745   1 3574 0            TCF      TIMETEST        FIND OUT HOW THE TIME IS STORED
 0189   REF  28  LAST 1307   01,3746  56 705 0  ITSAJOB2 XCH    GOLOC          STORE THE CADR

 0190   REF   5  LAST 1307   01,3747  50 156 0           NDX    POINTER        ADD THE PRIORITY AND LET:S GO
 0191   REF   3  LAST 1307   01,3750  3 2000 0           CA     PRDTTAB

 0192   REF   1              01,3751  1 3637 1           TCF    CHKNOVAC

 0193   REF   3  LAST 1305   01,3752  3 0157 1  ITSEVEN  CA     TEMPSWCH       SET UP FOR EITHER THE SECOND PART OF THE
 0194   REF  29  LAST 1308   01,3753  54 707 0           TS     GOLOC +2       TABLE, OR A RETURN FOR THE NEXT GROUP

 0195   REF   9  LAST 1307   01,3754  50 155 0           NDX    TEMP2G         SET UP POINTER FOR OUR LOCATION WITHIN
 0196   REF   2  LAST 1306   01,3755  3 2002 1           CA     SIZETAB        THE TABLE
 0197   REF   7  LAST 1305   01,3756  6 0154 1           AD     TEMPPHS        THIS MAY LOOK BAD BUT LET:S SEE YOU DO
 0198   REF   8  LAST 1308   01,3757  6 0154 1           AD     TEMPPHS        BETTER IN TIME OR NUMBERR OF LOCATIONS
 0199   REF   9  LAST 1308   01,3760  6 0154 1           AD     TEMPPHS
 0200   REF   6  LAST 1308   01,3761  54 156 1           TS     POINTER

 0201   REF   1              01,3762  1 3665 0           TCF    CONTBL2        NOW PROCESS WHAT IS IN THE TABLE

 0202   REF  36  LAST 1285   01,3763  3 6245 1  PHSPART2 CA     THREE          SET THE POINTER FOR THE SECOND HALF OF
 0203   REF   7  LAST 1308   01,3764  26 156 1           ADS    POINTER        THE TABLE

 0204   REF   5  LAST 1305   01,3765  3 3565 1           CA     RTRNCADR       THIS WILL BE OUR LAST TIME THROUGH THE
 0205   REF  30  LAST 1308   01,3766  54 707 0           TS     GOLOC +2       EVEN TABLE , SO AFTER IT  GET THE NEXT
A0206                                                                          GROUP
 0207   REF   2  LAST 1308   01,3767  1 3665 0           TCF    CONTBL2        SO LET:S GET THE SECOND ENTRY IN THE TBL

 0208   REF 772  LAST 1303      0154            TEMPPHS  EQUALS MPAC
 0209   REF 773  LAST 1308      0155            TEMP2G   EQUALS MPAC +1
 0210   REF 774  LAST 1308      0156            POINTER  EQUALS MPAC +2
 0211   REF 775  LAST 1308      0157            TEMPSWCH EQUALS MPAC +3
 0212   REF   1                 0705            GOLOC    EQUALS VAC5 +20D
 0213   REF   7  LAST 1236      7746            MINUS2   EQUALS NEG2
 0214   REF   9  LAST 1110      6074            OCT177   EQUALS LOW7


 0215   REF   1              01,3770   03763 0  PHS2CADR GENADR PHSPART2
 0216   REF   1              01,3771   03541 1  PRT2CADR GENADR GETPART2
 0217   REF   5  LAST 1210   01,3772   05277 0  LGCLCADR GENADR LONGCALL
 0218   REF  43  LAST 1303   01,3773   05105 0  FVACCADR GENADR FINDVAC
 0219   REF  39  LAST 1132   01,3774   05203 0  WTLTCADR GENADR WAITLIST
 0220   REF  27  LAST 1294   01,3775   05072 1  NOVACADR GENADR NOVAC
```

```
L         IMU MODE SWITCHING ROUTINES                                                            USER'S PAGE NO.   1      EO S4

 0001                            5457                         BLOCK   02
 0002   REF    1                 4000                         SETLOC  FFTAG3
 0003                            5457                         BANK

 0004   REF    1              E3,1471                         EBANK=  COMMAND

R0005             FIXED-FIXED ROUTINES.

 0006   REF    1                                              COUNT*  $$/IMODE
 0007   REF  230  LAST 1305      5457   3 4755 1  ZEROICDU    CAF     ZERO              ZERO ICDU COUNTERS.
 0008   REF   18  LAST 1259      5460  54 032 1               TS      CDUX
 0009   REF    9  LAST 1259      5461  54 033 0               TS      CDUY
 0010   REF   12  LAST 1260      5462  54 034 1               TS      CDUZ
 0011   REF  342  LAST 1301      5463   0 0002 0              TC      Q

 0012   REF   27  LAST 1285      4743             SPSCODE     =       BIT9
```

```
P0013               IMU ZEROING ROUTINE.

 0014                             11,3776                                BANK    11
 0015    REF    1                 07,2000                                SETLOC  MODESW
 0016                             07,2714                                BANK

 0017    REF    1                                                        COUNT*  $$/IMODE
 0018                             07,2714  0 0004 0  IMUZERO   INHINT                    ROUTINE TO ZERO ICDUS.
 0019    REF   42  LAST  525      07,2715  4 1036 1            CS      DSPTAB +11D       DONT ZERO CDUS IF IMU IN GIMBAL LOCK AND
 0020    REF    4  LAST  212      07,2716  7 4771 0            MASK    BITS4&6           COARSE ALIGN (GIMBAL RUNAWAY PROTECTION)
 0021    REF  407  LAST 1306      07,2717  10 000 0            CCS     A
 0022    REF    1                 07,2720  1 2724 0            TCF     IMUZEROA

 0023    REF   44  LAST 1254      07,2721  0 5567 0            TC      ALARM   134       IF SO.
 0024                             07,2722   00206 0            OCT     00206

 0025    REF    1                 07,2723  1 3657 1            TCF     CAGETSTJ +4       IMMEDIATE FAILURE.

 0032    REF    2  LAST 1310      07,2724  0 3653 1  IMUZEROA TC      CAGETSTJ
R0033              DELETE
 0034    REF   41  LAST  907      07,2725  4 1303 1            CS      IMODES33          DISABLE DAP AUTO AND HOLD MODES
 0035    REF    2  LAST  857      07,2726  7 4773 1            MASK    SUPER011              BIT5 FOR GROUND
 0036    REF   42  LAST 1310      07,2727  27'303 1            ADS     IMODES33

 0037    REF   47  LAST  983      07,2730  4 1302 0            CS      IMODES30          INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
 0038    REF    1                 07,2731  7 5751 0            MASK    BITS3&4           JUST CAME OUT OF COARSE ALIGN).
 0039    REF   48  LAST 1310      07,2732  27'302 0            ADS     IMODES30

 0040    REF    5  LAST 1310      07,2733  4 4771 0            CS      BITS4&6           SEND ZERO ENCODE WITH COARSE AND ERROR
 0041                             07,2734  0 0006 1            EXTEND                    COUNTER DISABLED.
 0042    REF   54  LAST  907      07,2735  03 012 1            WAND    CHAN12

 0043    REF    3  LAST  166      07,2736  0 3266 0            TC      NOATTOFF          TURN OFF NO ATT LAMP.

 0044    REF   38  LAST 1285      07,2737  3 4747 1            CAF     BIT5
 0045                             07,2740  0 0006 1            EXTEND
 0046    REF   55  LAST 1310      07,2741  05 012 1            WOR     CHAN12

 00461   REF    3  LAST  166      07,2742  0 5457 1            TC      ZEROICDU
 0047    REF   46  LAST 1285      07,2743  3 4746 0            CAF     BIT6              WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
 0048    REF   40  LAST 1308      07,2744  0 5203 0            TC      WAITLIST          RECEIVE ITS PULSE TRAIN.
 0049    REF    3  LAST  170      E3,1474                      EBANK=  CDUIND
 0050    REF    1                 07,2745   02757 0            2CADR   IMUZERO2
 0050    REF    1                 07,2746   16103 1

 0051    REF   49  LAST 1310      07,2747  4 1302 0            CS      IMODES30          SEE IF IMU OPERATING AND ALARM IF NOT.
 0052    REF   28  LAST 1309      07,2750  7 4743 1            MASK    BIT9
 0053    REF  408  LAST 1310      07,2751  10 000 0            CCS     A
 0054    REF    1                 07,2752  1 2755 0            TCF     MODEEXIT
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L        IMU MODE SWITCHING ROUTINES                                                                      USER'S PAGE NO.   3      E3 S4

 0055    REF  45  LAST 1310   07,2753  0 5567 0              TC      ALARM
 0056                         07,2754   00210 1              OCT     210

 0057                         07,2755  0 0003 1     DEEXIT   RELINT                   GENERAL MODE-SWITCHING EXIT.
 0058    REF   8  LAST 1303   07,2756  1 4631 0              TCF     SWRETURN


 0059    REF   1              07,2757  0 3641 1   IMUZERO2   TC      CAGETEST
 0061    REF   4  LAST 1310   07,2760  0 5457 1              TC      ZEROICDU         ZERO CDUX, CDUY, CDUZ

 0062    REF  39  LAST 1310   07,2761  4 4747 0              CS      BIT5             REMOVE ZERO DISCRETE.
 0063                         07,2762  0 0006 1              EXTEND
 0064    REF  56  LAST 1310   07,2763  03 012 1              WAND    CHAN12

 0065    REF  28  LAST 1285   07,2764  3 4741 1              CAF     BIT11            WAIT 10 SECS FOR CTRS TO FIND GIMBALS
 0066    REF  10  LAST  902   07,2765  0 5224 0              TC      VARDELAY

 0067    REF   2  LAST 1311   07,2766  0 3641 1   IMUZERO3   TC      CAGETEST
 0069    REF   2  LAST 1310   07,2767  4 5751 0              CS      BITS3&4          REMOVE IMUFAIL AND ICDUFAIL INHIBIT.
 0070    REF  50  LAST 1310   07,2770  7 1302 0              MASK    IMODES30
 0071    REF  51  LAST 1311   07,2771  55'302 0              TS      IMODES30

 0072    REF   3  LAST 1310   07,2772  4 4773 1              CS      SUPER011         ENABLE DAP AUTO AND HOLD MODES
 0073    REF  43  LAST 1310   07,2773  7 1303 1              MASK    IMODES33             BITS FOR GROUND
 0074    REF  44  LAST 1311   07,2774  55'303 1              TS      IMODES33

 0075    REF  47  LAST  966   07,2775  0 4674 0              TC      IBNKCALL         SET ISS WARNING IF EITHER OF ABOVE ARE
 0076    REF   5  LAST  180   07,2776   14703 0              CADR    SETISSW          PRESENT.

 0077    REF   1              07,2777  1 3631 1              TCF     ENDIMU
```

```
P0078              IMU COARSE ALIGN MODE.

 0079                              07,3000   0 0004 0  IMUCOARS INHINT
 0080   REF   3  LAST 1310         07,3001   0 3653 1           TC      CAGETSTJ
 0081   REF   2  LAST  169         07,3002   0 3144 0           TC      SETCOARS

 0082   REF  25  LAST 1285         07,3003   3 6242 0           CAF     SIX
 0083   REF  41  LAST 1310         07,3004   0 5203 0           TC      WAITLIST
 0084   REF   4  LAST 1310         E3,1474                      EBANK=  CDUIND
 0085   REF   1                    07,3005    03010 0           2CADR   COARS
 0085   REF   1                    07,3006    16103 1

 0086   REF   2  LAST 1310         07,3007   1 2755 0           TCF     MODEEXIT

 0087   REF   3  LAST 1311         07,3010   0 3641 1  COARS    TC      CAGETEST
 0088   REF  47  LAST 1310         07,3011   3 4746 0           CAF     BIT6               ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0089                              07,3012   0 0006 1           EXTEND
 0090   REF  57  LAST 1311         07,3013   05 012 1           WOR     CHAN12

 0091   REF  79  LAST 1300         07,3014   3 4752 0           CAF     TWO                SET CDU INDICATOR
 0092   REF   5  LAST 1312         07,3015   55'474 0  COARS1   TS      CDUIND

 0093   REF   6  LAST 1312         07,3016   51'474 1           INDEX   CDUIND             COMPUTE THETAD - THETAA IN 1:S
 0094   REF  21  LAST 1254         07,3017   3 0321 1           CA      THETAD               COMPLEMENT FORM
 0095                              07,3020   0 0006 1           EXTEND
 0096   REF   7  LAST 1312         07,3021   5 1474 1           INDEX   CDUIND
 0097   REF  19  LAST 1309         07,3022   20 032 1           MSU     CDUX
 0098                              07,3023   0 0006 1           EXTEND
 0099   REF  42  LAST 1285         07,3024   7 4737 1           MP      BIT13              SHIFT RIGHT 2
 0100   REF 230  LAST 1305         07,3025   56 001 0           XCH     L                  ROUND
 0101                              07,3026   6 0000 1           DOUBLE
 0102   REF  41  LAST 1300         07,3027   54 061 1           TS      ITEMP1
 0103                              07,3030   1 3032 1           TCF     +2
 0104   REF 231  LAST 1312         07,3031   26 001 1           ADS     L

 0105   REF   8  LAST 1312         07,3032   51'474 1           INDEX   CDUIND             DIFFERENCE TO BE COMPUTED
 0106   REF   2  LAST 1309         07,3033   23'471 1           LXCH    COMMAND
 0107   REF   9  LAST 1312         07,3034   11'474 0           CCS     CDUIND
 0108   REF   1                    07,3035   0 3015 0           TC      COARS1

 0109   REF  80  LAST 1312         07,3036   3 4752 0           CAF     TWO                MINIMUM OF 4 MS WAIT
 0110   REF  11  LAST 1311         07,3037   0 5224 0           TC      VARDELAY
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0111  REF   4  LAST 1312  07,3040  0 3641 1  COARS2    TC      CAGETEST      DONT CONTINUE IF CAGED.
0112  REF  42  LAST 1312  07,3041  54 061 1            TS      ITEMP1        SETS TO +0.
0113  REF  81  LAST 1312  07,3042  3 4752 0            CAF     TWO           SET CDU INDICATOR
0114  REF  10  LAST 1312  07,3043  55'474 0   +3       TS      CDUIND

0115  REF  11  LAST 1313  07,3044  51'474 1            INDEX   CDUIND
0116  REF   3  LAST 1312  07,3045  11'471 0            CCS     COMMAND       NUMBER OF PULSES REQUIRED
0117  REF   1             07,3046  0 3052 0            TC      COMPOS        GREATER THAN MAX ALLOWED
0118  REF   1             07,3047  0 3061 0            TC      NEXTCDU +1
0119  REF   1             07,3050  0 3117 0            TC      COMNEG
0120  REF   2  LAST 1313  07,3051  0 3061 0            TC      NEXTCDU +1

0121  REF   1             07,3052  6 3745 1  COMPOS    AD      -COMMAX       COMMAX = MAX NUMBER OF PULSES ALLOWED
0122                      07,3053  0 0006 1            EXTEND                  MINUS ONE
0123  REF   1             07,3054  6 3127 0            BZMF    COMZERO
0124  REF  12  LAST 1313  07,3055  51'474 1            INDEX   CDUIND
0125  REF   4  LAST 1313  07,3056  55'471 0            TS      COMMAND       REDUCE COMMAND BY MAX NUMBER OF PULSES
0126  REF   1             07,3057  4 3746 0            CS      -COMMAX-        ALLOWED

0127  REF  43  LAST 1313  07,3060  24 061 0  NEXTCDU   INCR    ITEMP1
0128  REF  28  LAST 1286  07,3061  6 4754 0            AD      NEG0
0129  REF  13  LAST 1313  07,3062  51'474 1            INDEX   CDUIND
0130  REF   3  LAST  282  07,3063  54 050 0            TS      CDUXCMD       SET UP COMMAND REGISTER.

0131  REF  14  LAST 1313  07,3064  11'474 0            CCS     CDUIND
0132  REF   1             07,3065  0 3043 0            TC      COARS2 +3

0133  REF  44  LAST 1313  07,3066  10 061 1            CCS     ITEMP1        SEE IF ANY PULSES TO GO OUT.
0134  REF   1             07,3067  1 3133 1            TCF     SENDPULS

0135  REF  16  LAST 1121  07,3070  0 5221 0            TC      FIXDELAY      WAIT FOR GIMBALS TO SETTLE.
0136                      07,3071   00226 1            DEC     150


0137  REF  82  LAST 1313  07,3072  3 4752 0            CAF     TWO           AT END OF COMMAND, CHECK TO SEE THAT
0138  REF  45  LAST 1313  07,3073  54 061 1  CHKCORS   TS      ITEMP1        GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
0139  REF 409  LAST 1310  07,3074  50 000 1            INDEX   A
0140  REF  20  LAST 1312  07,3075  3 0032 0            CA      CDUX
0141                      07,3076  0 0006 1            EXTEND
0142  REF  46  LAST 1313  07,3077  5 0061 0            INDEX   ITEMP1
0143  REF  22  LAST 1312  07,3100  20 321 0            MSU     THETAD
0144  REF 410  LAST 1313  07,3101  10 000 0            CCS     A
0145  REF   1             07,3102  1 3110 0            TCF     COARSERR
0146  REF   1             07,3103  1 3105 1            TCF     CORSCHK2
0147  REF   2  LAST 1313  07,3104  1 3110 0            TCF     COARSERR
```

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 0148   REF  47  LAST 1313   07,3105  10 061 1  CORSCHK2 CCS      ITEMP1
 0149   REF   1              07,3106  1 3073 1           TCF      CHKCORS
 0150   REF   2  LAST 1311   07,3107  1 3631 1           TCF      ENDIMU              END OF COARSE ALIGNMENT.

 0151   REF   1              07,3110  6 3116 1  COARSERR AD       COARSTOL            2 DEGREES.
 0152                        07,3111  0 0006 1           EXTEND
 0153   REF   2  LAST 1313   07,3112  6 3105 0           BZMF     CORSCHK2

 0154   REF  46  LAST 1311   07,3113  0 5567 0           TC       ALARM   137         COARSE ALIGN ERROR.
 0155                        07,3114   00211 0           OCT      211

 0156   REF   2  LAST  145   07,3115  1 3637 1           TCF      IMUBAD

 0157                        07,3116   77511 1  COARSTOL DEC      -.01111             2 DEGREES SCALED AT HALF-REVOLUTIONS


 0158   REF   2  LAST 1313   07,3117  6 3745 1  COMNEG   AD       -COMMAX
 0159                        07,3120  0 0006 1           EXTEND
 0160   REF   2  LAST 1313   07,3121  6 3127 0           BZMF     COMZERO
 0161                        07,3122  4 0000 0           COM
 0162   REF  15  LAST 1313   07,3123  51'474 1           INDEX    CDUIND
 0163   REF   5  LAST 1313   07,3124  55'471 0           TS       COMMAND
 0164   REF   2  LAST 1313   07,3125  3 3746 1           CA       -COMMAX-
 0165   REF   3  LAST 1313   07,3126  0 3060 1           TC       NEXTCDU

 0166   REF 231  LAST 1309   07,3127  3 4755 1  COMZERO  CAF      ZERO
 0167   REF  16  LAST 1314   07,3130  51'474 1           INDEX    CDUIND
 0168   REF   6  LAST 1314   07,3131  57'471 1           XCH      COMMAND
 0169   REF   4  LAST 1314   07,3132  0 3060 1           TC       NEXTCDU


 0170   REF   3  LAST  532   07,3133  3 7740 0  SENDPULS CAF      13,14,15
 0171                        07,3134  0 0006 1           EXTEND
 0172   REF  16  LAST  907   07,3135  05 014 1           WOR      CHAN14
 0173   REF   1              07,3136  3 3747 0           CAF      600MS
 0174   REF   2  LAST 1313   07,3137  1 3037 1           TCF      COARS2 -1           THEN TO VARDELAY


 0175   REF  48  LAST 1312   07,3140  3 4746 0  CA+ECE   CAF      BIT6                ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0176                        07,3141  0 0006 1           EXTEND
 0177   REF  58  LAST 1312   07,3142  05 012 1           WOR      CHAN12
 0178   REF  73  LAST 1209   07,3143  0 5261 1           TC       TASKOVER
```

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0179   REF  42  LAST 1285   07,3144  3 4750 1  SETCOARS CAF      BIT4              BYPASS IF ALREADY IN COARSE ALIGN
0180                        07,3145  0 0006 1           EXTEND
0181   REF  59  LAST 1314   07,3146  02 012 0           RAND     CHAN12
0182   REF 411  LAST 1313   07,3147  10 000 0           CCS      A
0183   REF 343  LAST 1309   07,3150  0 0002 0           TC       Q

0184   REF  49  LAST 1314   07,3151  4 4746 1           CS       BIT6              CLEAR ISS ERROR COUNTERS
0185                        07,3152  0 0006 1           EXTEND
0186   REF  60  LAST 1315   07,3153  03 012 1           WAND     CHAN12

0187   REF  39  LAST 1310   07,3154  4 4742 0           CS       BIT10             KNOCK DOWN GYRO ACTIVITY
0188                        07,3155  0 0006 1           EXTEND
0189   REF  17  LAST 1314   07,3156  03 014 1           WAND     CHAN14
0190   REF 232  LAST 1314   07,3157  4 4755 0           CS       ZERO
0191   REF   2  LAST  175   07,3160  54 047 0           TS       GYROCMD

0192   REF  43  LAST 1315   07,3161  3 4750 1           CAF      BIT4              PUT ISS IN COARSE ALIGN
0193                        07,3162  0 0006 1           EXTEND
0194   REF  61  LAST 1315   07,3163  05 012 1           WOR      CHAN12

0195   REF  43  LAST 1310   07,3164  4 1036 1           CS       DSPTAB +11D       TURN ON NO ATT LAMP
0196   REF   1              07,3165  7 3207 0           MASK     OCT40010
0197   REF  44  LAST 1315   07,3166  27'036 1           ADS      DSPTAB +11D

0198   REF  45  LAST 1311   07,3167  4 1303 1           CS       IMODES33          DISABLE DAP AUTO AND HOLD MODES
0199   REF  50  LAST 1315   07,3170  7 4746 1           MASK     BIT6
0200   REF  46  LAST 1315   07,3171  27'303 1           ADS      IMODES33

0201   REF  52  LAST 1311   07,3172  4 1302 0           CS       IMODES30          DISABLE IMUFAIL
0202   REF  44  LAST 1315   07,3173  7 4750 0           MASK     BIT4
0203   REF  53  LAST 1315   07,3174  27'302 0           ADS      IMODES30

0204   REF  14  LAST  518   07,3175  4 4747 0  RNDREFDR CS       TRACKBIT          CLEAR TRACK FLAG
0205   REF  32  LAST  907   07,3176  7 0075 1           MASK     FLAGWRD1
0206   REF  33  LAST 1315   07,3177  54 075 1           TS       FLAGWRD1

0207   REF   3  LAST  857   07,3200  4 4735 0           CS       DRFTBIT           CLEAR DRIFT FLAG
0208   REF  29  LAST 1121   07,3201  7 0076 1           MASK     FLAGWRD2
0209   REF  30  LAST 1315   07,3202  54 076 1           TS       FLAGWRD2

0210   REF   6  LAST  976   07,3203  4 4737 1           CS       REFSMBIT          CLEAR REFSMMAT FLAG
0211   REF  18  LAST  976   07,3204  7 0077 0           MASK     FLAGWRD3
0212   REF  19  LAST 1315   07,3205  54 077 0           TS       FLAGWRD3

0213   REF 344  LAST 1315   07,3206  0 0002 0           TC       Q

0214                        07,3207   40010 1  OCT40010 OCT      40010
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P0215              IMU FINE ALIGN MODE SWITCH.

 0216                           07,3210  0 0004 0  IMUFINE  INHINT
 0217   REF   4  LAST 1312      07,3211  0 3653 1           TC       CAGETSTJ          SEE IF IMU BEING CAGED.

 0218   REF   1                 07,3212  4 3744 1           CS       BITS4-5           RESET ZERO AND COARSE
 0219                           07,3213  0 0006 1           EXTEND
 0220   REF  62  LAST 1315      07,3214  03 012 1           WAND     CHAN12

 0221   REF  51  LAST 1315      07,3215  4 4746 1           CS       BIT6              INSURE DAP AUTO AND HOLD MODES ENABLED
 0222   REF  47  LAST 1315      07,3216  7 1303 1           MASK     IMODES33
 0223   REF  48  LAST 1316      07,3217  55'303 1           TS       IMODES33

 0224   REF   4  LAST 1310      07,3220  0 3266 0           TC       NOATTOFF

 0225   REF  40  LAST 1315      07,3221  3 4742 1           CAF      BIT10             IMU FAIL WAS INHIBITED DURING THE
 0226   REF  42  LAST 1312      07,3222  0 5203 0           TC       WAITLIST          PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
 0227   REF  17  LAST 1314      E3,1474                     EBANK=   CDUIND
 0228   REF   1                 07,3223   03234 1           2CADR    IFAILOK           IT ON FOR THE FIRST 5 SECS OF FINE ALIGN
 0228   REF   1                 07,3224   16103 1

 0229   REF   8  LAST  966      07,3225  3 5000 1           CAF      2SECS
 0230   REF  43  LAST 1316      07,3226  0 5203 0           TC       WAITLIST
 0231   REF  18  LAST 1316      E3,1474                     EBANK=   CDUIND
 0232   REF   1                 07,3227   03232 1           2CADR    IMUFINED
 0232   REF   1                 07,3230   16103 1

 0233   REF   3  LAST 1312      07,3231  1 2755 0           TCF      MODEEXIT

 0234   REF   5  LAST 1313      07,3232  0 3641 1  IMUFINED TC       CAGETEST          SEE THAT NO ONE HAS CAGED THE IMU.
 0235   REF   3  LAST 1314      07,3233  1 3631 1           TCF      ENDIMU
 0236   REF   1                07,3234  0 3646 0  IFAILOK  TC      CAGETSTQ           ENABLE IMU FIAL UNLESS IMU BEING CAGED.
 0237   REF  74  LAST 1314     07,3235  1 5261 0           TCF     TASKOVER           IT IS.

 0238   REF  45  LAST 1315     07,3236  3 4750 1           CAF     BIT4               DONT RESET IMU FAIL INHIBIT IF SOMEONE
 0239                          07,3237  0 0006 1           EXTEND                     HAS GONE INTO COARSE ALIGN.
 0240   REF  63  LAST 1316     07,3240  02 012 0           RAND    CHAN12
 0241   REF 412  LAST 1315     07,3241  10 000 0           CCS     A
 0242   REF  75  LAST 1317     07,3242  1 5261 0           TCF     TASKOVER

 0243   REF  54  LAST 1315     07,3243  4 1302 0           CS      IMODES30           RESET IMUFAIL.
 0244   REF  43  LAST 1312     07,3244  7 4737 1           MASK    BIT13
 0245   REF  55  LAST 1317     07,3245  27'302 0           ADS     IMODES30
 0246   REF  46  LAST 1317     07,3246  4 4750 0           CS      BIT4
 0247   REF  56  LAST 1317     07,3247  7 1302 0  PFAILOK2 MASK    IMODES30
 0248   REF  57  LAST 1317     07,3250  55'302 0           TS      IMODES30
 0249   REF  48  LAST 1311     07,3251  0 4674 0           TC      IBNKCALL           THE ISS WARNING LIGHT MAY COME ON NOW
 0250   REF   6  LAST 1311     07,3252   14703 0           CADR    SETISSW            THAT THE INHIBIT HAS BEEN REMOVED.
 0251   REF  76  LAST 1317     07,3253  1 5261 0           TCF     TASKOVER

 0252   REF   2  LAST 1317     07,3254  0 3646 0  PFAILOK  TC      CAGETSTQ           ENABLE PIP FAIL PROG ALARM.
 0253   REF  77  LAST 1317     07,3255  1 5261 0           TCF     TASKOVER

 0254   REF  58  LAST 1317     07,3256  4 1302 0           CS      IMODES30           RESET IMU AND PIPA FAIL BITS.
 0255   REF  41  LAST 1316     07,3257  7 4742 0           MASK    BIT10
 0256   REF  59  LAST 1317     07,3260  27'302 0           ADS     IMODES30

 0257   REF  49  LAST 1316     07,3261  4 1303 1           CS      IMODES33
 0258   REF  44  LAST 1317     07,3262  7 4737 1           MASK    BIT13
 0259   REF  50  LAST 1317     07,3263  27'303 1           ADS     IMODES33

 0260   REF  40  LAST 1311     07,3264  4 4747 0           CS      BIT5
 0261   REF   1                07,3265  1 3247 1           TCF     PFAILOK2

 0262   REF   2  LAST 1315     07,3266  4 3207 0  NOATTOFF CS      OCT40010           SUBROUTINE TO TURN OFF NO ATT LAMP.
 0263   REF  45  LAST 1315     07,3267  7 1036 1           MASK    DSPTAB +11D
 0264   REF  42  LAST 1298     07,3270  6 4735 1           AD      BIT15
 0265   REF  46  LAST 1317     07,3271  55'036 1           TS      DSPTAB +11D
 0266   REF 345  LAST 1315     07,3272  0 0002 0           TC      Q
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P0267               ROUITNES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

 0272   REF 233  LAST 1315   07,3273  4 4755 0  PIPUSE    CS       ZERO
 0273   REF  15  LAST  952   07,3274  54 037 1            TS       PIPAX
 0274   REF   6  LAST  952   07,3275  54 040 1            TS       PIPAY
 0275   REF   9  LAST  952   07,3276  54 041 0            TS       PIPAZ

 02752  REF   3  LAST 1317   07,3277  0 3646 0  PIPUSE1   TC       CAGETSTQ         DO NOT ENABLE PIPA FAIL IF IMU IS CAGED
 02754  REF      LAST 1311   07,3300  1 4631 0            TCF      SWRETURN

 02756                       07,3301  0 0004 0            INHINT
 0276   REF  53  LAST 1285   07,3302  4 4753 0            CS       BIT1             IF PIPA FAILS FROM NOW ON (UNTIL
 0277   REF  60  LAST 1317   07,3303  7 1302 0            MASK     IMODES30         PIPFREE), LIGHT ISS WARNING.
 0278   REF  61  LAST 1318   07,3304  55'302 0            TS       IMODES30

 0279   REF  49  LAST 1317   07,3305  0 4674 0  PIPFREE2  TC       IBNKCALL         ISS WARNING MIGHT COME ON NOW.
 0280   REF   7  LAST 1317   07,3306   14703 0            CADR     SETISSW          (OR GO OFF ON PIPFREE).

 0281   REF   4  LAST 1316   07,3307  1 2755 0            TCF      MODEEXIT

 0282                        07,3310  0 0004 0  PIPFREE   INHINT                    PROGRAM DONE WITH PIPAS. DONT LIGHT
 0283   REF  62  LAST 1318   07,3311  4 1302 0            CS       IMODES30         ISS WARNING.
 0284   REF  54  LAST 1318   07,3312  7 4753 0            MASK     BIT1
 0285   REF  63  LAST 1318   07,3313  27'302 0            ADS      IMODES30

 0286   REF  42  LAST 1317   07,3314  7 4742 0            MASK     BIT10            IF PIP FAIL ON, DO PROG ALSRM AND RESET
 0287   REF 413  LAST 1317   07,3315  10 000 0            CCS      A                ISS WARNING.
 0288   REF   5  LAST 1318   07,3316  1 2755 0            TCF      MODEEXIT

 0289   REF  47  LAST 1314   07,3317  0 5567 0            TC       ALARM
 0290                        07,3320   00212 0            OCT      212   137

 0291                        07,3321  0 0004 0            INHINT

 0292   REF   1              07,3322  1 3305 0            TCF      PIPFREE2
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P0293           THE FOLLOWING ROUTINE TORQUES THE IPIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0295   BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN IS 16 PULSES (.25 CDU COUNTS). THE
R0297   UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

 0299                      E3,1400                           EBANK= 1400           VARIABLE, ACTUALLY.

 0300   REF 776  LAST 1305  07,3323  54 161 0  IMUPULSE TS     MPAC +5       SAVE ARRIVING ECADR.
 0301   REF   5  LAST 1316  07,3324  0 3653 1           TC     CAGETSTJ      DONT PROCEED IF IMU BEING CAGED.

 0302   REF   2  LAST  222  07,3325  11'314 1           CCS    LGYRO         SEE IF GYROS BUSY.
 0303   REF   1             07,3326  0 3367 0           TC     GYROBUSY      SLEEP.

 0304   REF 777  LAST 1319  07,3327  54 156 1           TS     MPAC +2
 0305   REF  52  LAST 1316  07,3330  3 4746 0           CAF    BIT6          ENABLE THE POWER SUPPLY.
 0306                       07,3331  0 0006 1           EXTEND
 0307   REF  18  LAST 1315  07,3332  05 014 1           WOR    CHAN14

 0308   REF  27  LAST 1285  07,3333  3 4751 0           CAF    FOUR
 0310   REF  44  LAST 1316  07,3334  0 5203 0  GWAKE2   TC     WAITLIST      (IF A JOB WAS PUT TO SLEEP, THE POWER
 0311   REF  19  LAST 1316  E3,1474                     EBANK= CDUIND        SUPPLY IS LEFT ON BY THE WAKING JOB).
 0312   REF   1             07,3335   03405 0           2CADR  STRTGYRO
 0312   REF   1             07,3336   16103 1

 0313   REF 778  LAST 1319  07,3337  3 0161 1           CA     MPAC +5       SET UP EBANK, SAVING CALLER'S EBANK FOR
 0314   REF  71  LAST 1289  07,3340  56 003 1           XCH    EBANK         RESTORATION ON RETURN.
 0315   REF 779  LAST 1319  07,3341  56 161 1           XCH    MPAC +5
 0316   REF   3  LAST 1319  07,3342  55'314 1           TS     LGYRO         RESERVES GYROS.
 0317   REF  17  LAST 1286  07,3343  7 4357 0           MASK   LOW8
 0318   REF  48  LAST 1319  07,3344  54 061 1           TS     ITEMP1

 0319   REF  83  LAST 1313  07,3345  3 4752 0           CAF    TWO           FORCE SIGN AGREEMENT ON INPUTS.
 0320   REF 780  LAST 1319  07,3346  54 157 0  GYROAGRE TS     MPAC +3
 0321                       07,3347  6 0000 1           DOUBLE
 0322   REF  49  LAST 1319  07,3350  6 0061 0           AD     ITEMP1
 0323   REF 781  LAST 1319  07,3351  54 160 1           TS     MPAC +4
 0324                       07,3352  0 0006 1           EXTEND
 0325   REF 414  LAST 1318  07,3353  5 0000 1           INDEX  A
 0326                       07,3354  3 1401 0           DCA    1400
 0327   REF 782  LAST 1319  07,3355  52 155 1           DXCH   MPAC
 0328   REF  15  LAST 1224  07,3356  0 7257 0           TC     TPAGREE
 0329   REF 783  LAST 1319  07,3357  52 155 1           DXCH   MPAC
 0330   REF 784  LAST 1319  07,3360  50 160 0           INDEX  MPAC +4
 0331                       07,3361  53'401 1           DXCH   1400

 0332   REF 785  LAST 1319  07,3362  10 157 0           CCS    MPAC +3
 0333   REF   1             07,3363  1 3346 1           TCF    GYROAGRE

 0334   REF 786  LAST 1319  07,3364  3 0161 1           CA     MPAC +5       RESTORE CALLER'S EBANK.
 0335   REF  72  LAST 1319  07,3365  54 003 0           TS     EBANK
 0336   REF   6  LAST 1318  07,3366  1 2755 0           TCF    MODEEXIT
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P0337             ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

 0338                              07,3367  0 0006 1  GYROBUSY EXTEND                   SAVE RETURN 2FCADR.
 0339   REF  23  LAST 1055         07,3370  3 0134 1           DCA     BUF2
 0340   REF 787  LAST 1319         07,3371  52 155 1           DXCH    MPAC
 0341   REF   1                    07,3372  3 3404 1  REGSLEEP CAF     LGWAKE
 0342   REF   5  LAST 1220         07,3373  1 5133 1           TCF     JOBSLEEP

 0343   REF   4  LAST 1319         07,3374  11'314 1  GWAKE    CCS     LGYRO            WHEN AWAKENED, SEE IF GYROS STILL BUSY.
 0344   REF   1                    07,3375  1 3372 0           TCF     REGSLEEP         IF SO, SLEEP SOME MORE.

 0345   REF 789  LAST 1320         07,3376  54 156 1           TS      MPAC +2
 0346                              07,3377  0 0006 1           EXTEND
 0347   REF 789  LAST 1320         07,3400  3 0155 0           DCA     MPAC
 0348   REF  24  LAST 1320         07,3401  52 134 0           DXCH    BUF2             RESTORE SWRETURN INFO.
 0349   REF 131  LAST 1305         07,3402  3 4753 1           CAF     ONE
 0350   REF   1                    07,3403  1 3334 1           TCF     GWAKE2

 0351   REF   1                    07,3404   17374 1  LGWAKE   CADR    GWAKE
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P0352               GYRO-TORQUING WAITLIST TASKS.

 0353   REF    1                 07,3405  4 3626 1  STRTGYRO CS      GDESELCT          DE-SELECT LAST GYRO.
 0354                            07,3406  0 0006 1           EXTEND
 0355   REF   19   LAST 1319     07,3407  03 014 1           WAND    CHAN14

 0356   REF    6   LAST 1316     07,3410  0 3641 1           TC      CAGETEST

 0357   REF    -   LAST 1320     07,3411  3 1314 0  STRTGYR2 CA      LGYRO             JUMP ON PHASE COUNTER IN BITS 13-14.
 0358                            07,3412  0 0006 1           EXTEND
 0359   REF   47   LAST 1317     07,3413  7 4750 0           MP      BIT4
 0360   REF  415   LAST 1319     07,3414  50 000 1           INDEX   A
 0361                            07,3415  1 3416 0           TCF     +1
 0362   REF    1                 07,3416  0 3433 0           TC      GSELECT           =0. DO Y GYRO.
 0363                            07,3417   00202 1           OCT     00202

 0364   REF    2   LAST 1321     07,3420  0 3433 0           TC      GSELECT           =1. DO Z GYRO.
 0365                            07,3421   00302 0           OCT     00302

 0366   REF    3   LAST 1321     07,3422  0 3431 1           TC      GSELECT -2        =2. DO X GYRO.
 0367                            07,3423   00100 0           OCT     00100

 0368   REF  234   LAST 1318     07,3424  3 4755 1           CAF     ZERO              =3. DONE
 0369   REF    6   LAST 1321     07,3425  55*314 1           TS      LGYRO
 0370   REF    2   LAST 1320     07,3426  3 3404 1           CAF     LGWAKE            WAKE A POSSIBLE SLEEPING JOB.
 0371   REF    6   LAST 1220     07,3427  0 5137 1           TC      JOBWAKE

 0372   REF    2   LAST 1316     07,3430  1 3232 0  NORESET  TCF     IMUFINED          DO NOT RESET POWER SUPPLY
 0373   REF  28  LAST 1319   07,3431  4 4751 1   -2        CS      FOUR           SPECIAL ENTRY TO REGRESS LGYRO FOR X.
 0374   REF   7  LAST 1321   07,3432  27'314 1             ADS     LGYRO

 0375   REF 346  LAST 1317   07,3433  50 002 0  GSELECT    INDEX   Q              SELECT GYRO.
 0376                        07,3434  3 0000 1             CAF     0              PACKED WORD CONTAINS GYRO SELECT BITS
 0377   REF  13  LAST 1300   07,3435  54 064 1             TS      ITEMP4         AND INCREMENT TO LGYRO.
 0378   REF  19  LAST 1293   07,3436  7 4757 1             MASK    SEVEN
 0379   REF  45  LAST 1317   07,3437  6 4737 0             AD      BIT13
 0380   REF   8  LAST 1322   07,3440  27'314 1             ADS     LGYRO
 0381   REF  73  LAST 1319   07,3441  54 003 0             TS      EBANK
 0382   REF  18  LAST 1319   07,3442  7 4357 0             MASK    LOW8
 0383   REF  50  LAST 1319   07,3443  54 061 1             TS      ITEMP1

 0384   REF  20  LAST 1322   07,3444  4 4757 1             CS      SEVEN
 0385   REF  14  LAST 1322   07,3445  7 0064 1             MASK    ITEMP4
 0386   REF  15  LAST 1322   07,3446  54 064 1             TS      ITEMP4

 0387                        07,3447  0 0006 1             EXTEND                 MOVE DP COMMAND TO RUPTREGS FOR TESTING.
 0388   REF  51  LAST 1322   07,3450  5 0061 0             INDEX   ITEMP1
 0389                        07,3451  3 1401 0             DCA     1400
 0390   REF  47  LAST 1300   07,3452  52 071 0             DXCH    RUPTREG1

 0391   REF  48  LAST 1322   07,3453  10 070 1             CCS     RUPTREG1
 0392   REF   1              07,3454  1 3467 0             TCF     MAJ+
 0393                        07,3455  1 3457 0             TCF     +2
 0394   REF   1              07,3456  1 3607 1             TCF     MAJ-

 0395   REF  10  LAST 1300   07,3457  10 071 0             CCS     RUPTREG2
 0396   REF   1              07,3460  1 3464 0             TCF     MIN+
 0397   REF   1              07,3461  1 3411 1             TCF     STRTGYR2
 0398   REF   1              07,3462  1 3604 1             TCF     MIN-
 0399   REF   2  LAST 1322   07,3463  1 3411 1             TCF     STRTGYR2
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REF   1                07,3464  6 3520 0  MIN+      AD      -GYROMIN     SMALL POSITIVE COMMAND. SEE IF AT LEAST
                       07,3465  0 0006 1            EXTEND               16 GYRO PULSES.
REF   3  LAST 1322     07,3466  6 3411 0            BZMF    STRTGYR2

                       07,3467  0 0006 1  MAJ+      EXTEND               DEFINITE POSITIVE OUTPUT.
REF   1                07,3470  3 3630 1            DCA     GYROFRAC
REF  49  LAST 1322     07,3471  20 071 0            DAS     RUPTREG1

REF  16  LAST 1322     07,3472  3 0064 0            CA      ITEMP4       SELECT POSITIVE TORQUING FOR THIS GYRO.
                       07,3473  0 0006 1            EXTEND
REF  20  LAST 1321     07,3474  05 014 1            WOR     CHAN14

REF  10  LAST 1308     07,3475  3 6074 1            CAF     LOW7         LEAVE NUMBER OF POSSIBLE 8192 AUGMENTS
REF  11  LAST 1322     07,3476  7 0071 0            MASK    RUPTREG2     TO INITIAL COMMAND IN MAJOR PART OF LONG
REF  12  LAST 1323     07,3477  56 071 1            XCH     RUPTREG2     TERM STORAGE AND TRUNCATED FRACTION
                       07,3500  0 0006 1  GMERGE    EXTEND               IN MINOR PART. THE MAJOR PART WILL BE
REF  39  LAST 1299     07,3501  7 4744 0            MP      BIT8         COUNTED DOWN TO ZERO IN THE COURSE OF
REF  21  LAST 1300     07,3502  54 062 1            TS      ITEMP2       PUTTING OUT THE ENTIRE COMMAND.
REF  50  LAST 1323     07,3503  3 0070 0            CA      RUPTREG1
                       07,3504  0 0006 1            EXTEND
REF  29  LAST 1310     07,3505  7 4743 1            MP      BIT9
REF  51  LAST 1323     07,3506  54 070 1            TS      RUPTREG1
REF 232  LAST 1312     07,3507  3 0001 0            CA      L
                       07,3510  0 0006 1            EXTEND
REF  71  LAST 1285     07,3511  7 4736 0            MP      BIT14
REF  22  LAST 1323     07,3512  26 062 1            ADS     ITEMP2       INITIAL COMMAND.

                       07,3513  0 0006 1            EXTEND               SEE IF MORE THAN ONE PULSE TRAIN NEEDED
REF  52  LAST 1323     07,3514  3 0071 1            DCA     RUPTREG1     (MORE THAN 16383 PULSES).
REF   1                07,3515  6 7747 1            AD      MINUS1
REF 416  LAST 1321     07,3516  10 000 0            CCS     A
REF   1                07,3517  1 3543 1            TCF     LONGGYRO
                       07,3520   77601 0  -GYROMIN  OCT     -176         MAY BE ADJUSTED TO SPECIFY MINIMUM CMD
                       07,3521  1 3525 1            TCF     +4

REF  72  LAST 1323     07,3522  3 4736 1            CAF     BIT14
REF  23  LAST 1323     07,3523  26 062 1            ADS     ITEMP2
REF 235  LAST 1321     07,3524  3 4755 1            CAF     ZERO

REF  52  LAST 1322     07,3525  50 061 0  +4        INDEX   ITEMP1
                       07,3526  53'401 1            DXCH    1400
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 0435    REF  24  LAST 1323   07,3527  3 0062 0             CA       ITEMP2            ENTIRE COMMAND.
 0436    REF   3  LAST 1315   07,3530  54 047 0  LASTSEG    TS       GYROCMD
 0437                         07,3531  0 0006 1             EXTEND
 0438    REF  43  LAST 1318   07,3532  7 4742 0             MP       BIT10             WAITLIST DT
 0439    REF  37  LAST 1308   07,3533  6 6245 1             AD       THREE             TRUNCATION AND PHASE UNCERTAINTIES.
 0440    REF  45  LAST 1319   07,3534  0 5203 0             TC       WAITLIST
 0441    REF  20  LAST 1319   E3,1474                       EBANK=   CDUIND
 0442    REF   2  LAST 1319   07,3535   03405 0             2CADR    STRTGYRO
 0442                         07,3536   16103 1

 0448    REF  44  LAST 1324   07,3537  3 4742 1  GYROEXIT   CAF      BIT10
 0449                         07,3540  0 0006 1             EXTEND
 0450    REF  21  LAST 1323   07,3541  05 014 1             WOR      CHAN14
 0451    REF  78  LAST 1317   07,3542  1 5261 0             TCF      TASKOVER

 0452    REF  53  LAST 1323   07,3543  50 061 0  LONGGYRO   INDEX    ITEMP1
 0453                         07,3544  53'401 1             DXCH     1400              INITIAL COMMAND OUT PLUS N AUGMENTS OF
 0454    REF  73  LAST 1323   07,3545  3 4736 1             CAF      BIT14             8192. INITIAL COMMAND IS AT LEAST 8192.
 0455    REF  25  LAST 1324   07,3546  6 0062 0             AD       ITEMP2
 0456    REF   4  LAST 1324   07,3547  54 047 0             TS       GYROCMD

 0457                         07,3550  0 0006 1  AUG3       EXTEND                     GET WAITLIST DT TO TIME WHEN TRAIN IS
 0458    REF  45  LAST 1324   07,3551  7 4742 0             MP       BIT10             ALMOST OUT.
 0459    REF   4  LAST 1286   07,3552  6 7745 0             AD       NEG3
 0460    REF  46  LAST 1324   07,3553  0 5203 0             TC       WAITLIST
 0461    REF  21  LAST 1324   E3,1474                       EBANK=   CDUIND
 0462    REF   1              07,3554   03557 0             2CADR    8192AUG
 0462    REF   1              07,3555   16103 1
 0463    REF   1              07,3556  1 3537 1             TCF      GYROEXIT

 0464    REF   7  LAST 1321   07,3557  0 3641 1  8192AUG    TC       CAGETEST

 04641   REF  48  LAST 1321   07,3560  3 4750 1             CAF      BIT4
 04642                        07,3561  0 0006 1             EXTEND
 04643   REF  64  LAST 1317   07,3562  02 012 0             RAND     CHAN12
 04644   REF 417  LAST 1323   07,3563  10 000 0             CCS      A
 04645   REF   3  LAST 1314   07,3564  1 3637 1             TCF      IMUBAD
 0465    REF   9  LAST 1322   07,3565  3 1314 0             CA       LGYRO             ADD 8192 PULSES TO GYROCMD
 0466    REF  74  LAST 1322   07,3566  54 003 0             TS       EBANK
 0467    REF  19  LAST 1322   07,3567  7 4357 0             MASK     LOW8
 0468    REF  54  LAST 1324   07,3570  54 061 1             TS       ITEMP1

 0469    REF  55  LAST 1324   07,3571  50 061 0             INDEX    ITEMP1            SEE IF THIS IS THE LAST AUG.
 0470                         07,3572  11'400 0             CCS      1400
 0471    REF   1              07,3573  1 3577 0             TCF      AUG2              MORE TO COME.

 0472    REF  74  LAST 1324   07,3574  3 4736 1             CAF      BIT14
 0473    REF   5  LAST 1324   07,3575  26 047 0             ADS      GYROCMD
 0474    REF   1              07,3576  1 3531 1             TCF      LASTSEG +1
 0475    REF  56  LAST 1324    07,3577  50 061 0  AUG2      INDEX   ITEMP1
 0476                          07,3600  55'400 0            TS      1400
 0477    REF  75  LAST 1324    07,3601   3 4736 1           CAF     BIT14
 0478    REF   6  LAST 1324    07,3602  26 047 0            ADS     GYROCMD
 0479    REF   1               07,3603   1 3550 0           TCF     AUG3              COMPUTE DT.
 0480   REF   2  LAST 1323   07,3604  6 3520 0  MIN-      AD       -GYROMIN       POSSIBLE NEGATIVE OUTPUT.
 0481                        07,3605  0 0006 1            EXTEND
 0482   REF   4  LAST 1323   07,3606  6 3411 0            BZMF     STRTGYR2

 0483                        07,3607  0 0006 1  MAJ-      EXTEND                  DEFINITE NEGATIVE OUTPUT.
 0484   REF   2  LAST 1323   07,3610  4 3630 0            DCS      GYROFRAC
 0485   REF  53  LAST 1323   07,3611  20 071 0            DAS      RUPTREG1

 0486   REF  17  LAST 1323   07,3612  3 0064 0            CA       ITEMP4         SELECT NEGATIVE TORQUING FOR THIS GYRO.
 0487   REF  30  LAST 1323   07,3613  6 4743 0            AD       BIT9
 0488                        07,3614  0 0006 1            EXTEND
 0489   REF  22  LAST 1324   07,3615  05 014 1            WOR      CHAN14

 0490   REF  54  LAST 1326   07,3616  4 0070 1            CS       RUPTREG1       SET UP RUPTREGS TO FALL INTO GMERGE.
 0491   REF  55  LAST 1326   07,3617  54 070 1            TS       RUPTREG1       ALL NUMBERS PUT INTO GYROCMD ARE
 0492   REF  13  LAST 1323   07,3620  4 0071 0            CS       RUPTREG2       POSITIVE - BIT9 OF CHAN 14 DETERMINES
 0493   REF  11  LAST 1323   07,3621  7 6074 0            MASK     LOW7           THE SIGN OF THE COMMAND.
 0494                        07,3622  4 0000 0            COM
 0495   REF  14  LAST 1326   07,3623  56 071 1            XCH      RUPTREG2
 0496                        07,3624  4 0000 0            COM
 0497   REF   1              07,3625  1 3500 0            TCF      GMERGE

 0498                        07,3626   01700 1  GDESELCT  OCT      1700           TURN OFF SELECT AND ACTIVITY BITS.

 0499                        07,3627   00000 1  GYROFRAC  2DEC     .215 B -21
 0499                        07,3630   00034 0
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P0500                 IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

0501                        07,3631  0 0006 1  ENDIMU    EXTEND               MODE IS BAD IF CAGE HAS OCCURED OR IF
0502   REF  33  LAST 1116   07,3632  00 011 1            READ    DSALMOUT     ISS WARNING IS ON.
0503   REF  55  LAST 1318   07,3633  7 4753 0            MASK    BIT1
0504   REF 418  LAST 1324   07,3634  10 000 0            CCS     A
0505   REF   4  LAST 1324   07,3635  1 3637 1            TCF     IMUBAD

0506   REF   3  LAST  563   07,3636  1 3665 0  IMUGOOD   TCF     GOODEND      WITH C(A) = 0.

0507   REF 236  LAST 1323   07,3637  3 4755 1  IMUBAD    CAF     ZERO
0508   REF   2  LAST  563   07,3640  1 3662 1            TCF     BADEND

0509   REF  53  LAST 1319   07,3641  3 4746 0  CAGETEST  CAF     BIT6         SUBROUTINE TO TERMINATE IMU MODE
0510   REF  64  LAST 1318   07,3642  7 1302 0            MASK    IMODES30     SWITCH IF IMU HAS BEEN CAGED.
0511   REF 419  LAST 1327   07,3643  10 000 0            CCS     A
0512   REF   5  LAST 1327   07,3644  1 3637 1            TCF     IMUBAD       DIRECTLY.
0513   REF 347  LAST 1322   07,3645  0 0002 0            TC      Q            WITH C(A) = +0.

0514   REF  65  LAST 1327   07,3646  4 1302 0  CAGETSTQ  CS      IMODES30     SKIP IF IMU NOT BEING CAGED.
0515   REF  54  LAST 1327   07,3647  7 4746 1            MASK    BIT6
0516   REF 420  LAST 1327   07,3650  10 000 0            CCS     A
0517   REF 348  LAST 1327   07,3651  24 002 0            INCR    Q
0518   REF 349  LAST 1327   07,3652  0 0002 0            TC      Q

0519   REF  66  LAST 1327   07,3653  4 1302 0  CAGETSTJ  CS      IMODES30     IF DURING MODE SWITCH INITIALIZATION
0520   REF  55  LAST 1327   07,3654  7 4746 1            MASK    BIT6         IT IS FOUND THAT THE IMU IS BEING CAGED,
0521   REF 421  LAST 1327   07,3655  10 000 0            CCS     A            SET IMUCADR TO -0 TO INDICATE OPERATION
0522   REF 350  LAST 1327   07,3656  0 0002 0            TC      Q            COMPLETE BUT FAILED. RETURN IMMEDIATELY

0523   REF 237  LAST 1327   07,3657  4 4755 0            CS      ZERO         TO SWRETURN.
0524   REF   4  LAST 1121   07,3660  55 304 0            TS      IMUCADR
0525   REF   7  LAST 1319   07,3661  1 2755 0            TCF     MODEEXIT
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P0526          GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0528     OR AT BADEND FOR A N UNSUCCESSFUL ONE. C(A) OR ARRIVAL =0 FOR IMU, 1 FOR OPTICS.

 0530     REF  15  LAST 1326   07,3662  54 071 0  BADEND    TS      RUPTREG2           DEVICE INDEX.
 0531     REF 238  LAST 1327   07,3663  4 4755 0            CS      ZERO               FOR FAILURE.
 0532     REF   4  LAST 1327   07,3664  1 3667 1            TCF     GOODEND +2

 0533     REF  16  LAST 1328   07,3665  54 071 0  GOODEND   TS      RUPTREG2
 0534     REF 132  LAST 1320   07,3666  4 4753 0            CS      ONE                FOR SUCCESS.

 0535     REF  13  LAST 1300   07,3667  54 072 0            TS      RUPTREG3
 0536     REF  17  LAST 1328   07,3670  50 071 1            INDEX   RUPTREG2           SEE IF USING PROGRAM ASLEEP.
 0537     REF   5  LAST  274   07,3671  11'304 0            CCS     MODECADR
 0538                          07,3672  1 3676 1            TCF     +4                 YES - WAKE IT UP.
 0539     REF   1              07,3673  1 3706 1            TCF     ENDMODE            IF 0, PROGRAM NOT IN YET.

 05392                         07,3674  0 6006 1            EXTEND
 05394    REF   2  LAST 1328   07,3675  1 3707 0            BZF     ENDMODE +1         BZF = TCF IF MODECADR = -0.

 0540     REF 239  LAST 1328   07,3676  3 4755 1            CAF     ZERO               WAKE SLEEPING PROGRAM.
 0541     REF  18  LAST 1328   07,3677  50 071 1            INDEX   RUPTREG2
 0542     REF   6  LAST 1328   07,3700  57'304 1            XCH     MODECADR
 0543     REF   7  LAST 1321   07,3701  0 5137 1            TC      JOBWAKE

 0544     REF  14  LAST 1328   07,3702  4 0072 0            CS      RUPTREG3           ADVANCE LOC IF SUCCESSFUL.
 0545     REF  23  LAST 1220   07,3703  50 064 0            INDEX   LOCCTR
 0546     REF  44  LAST 1267   07,3704  26 164 0            ADS     LOC

 0547     REF  79  LAST 1324   07,3705  1 5261 0            TCF     TASKOVER

 0548     REF  15  LAST 1328   07,3706  3 0072 1  ENDMODE   CA      RUPTREG3           -0 INDICATES OPERATION COMPLETE BUT
 0549     REF  19  LAST 1328   07,3707  50 071 1     +1     INDEX   RUPTREG2           UNSUCCESSFUL: -1 INDICATES COMPLETE AND
 0550     REF   7  LAST 1328   07,3710  55'304 0            TS      MODECADR           SUCCESSFUL.
 0551     REF  80  LAST 1328   07,3711  1 5261 0            TCF     TASKOVER
```

```
P0552            GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

R0554     PROGRAM DESCRIPTION                                        DATE- 21 FEB 1967
R0555                                                        LOG SECTION IMU MODE SWITCHING
R0556     MOD BY- R.MELANSON TO ADD DOCUMENTATION                 ASSEMBLY SUNDISK  REV.  82

R0557     FUNCTIONAL DESCRIPTION-
R0558       TO DELAY FURTHER EXECUTION OF THE CALLING ROUTINE UNTIL ITS SELECTED
R0559       I/O FUNCTION IS COMPLETE.THE FOLLOWING CHECKS ON THE CALLING ROUTINE:S
R0560       MODECADR ARE MADE AND ACTED UPON.
R0561         1) +0 INDICATES INCOMPLETE I/O OPERATION.CALLING ROUTINE IS PUT TO
R0562            SLEEP.
R0563         2) -1 INDICATES COMPLETED I/O OPERATION. STALL BYPASSES JOBSLEEP
R0564            CALL AND RETURNS TO CALLING ROUTINE AT L+3
R0565         3) -0 INDICATES COMPLETED I/O WITH FAILURE. STALL CLEARS MODECADR
R0566            AND RETURNS TO CALLING ROUTINE AT L+2.
R0567         4) VALUE GREATER THAN 0 INDICATES TWO ROUTINES CALLING FOR USE OF
R0568            SAME DEVICE. STALL EXITS TO ABORT WHICH EXECUTES A PROGRAM
R0569            RESTART WHICH IN TURN CLEARS ALL MODECADR REGISTERS.

R0570      CALLING SEQUENCE-
R0571       L    TC    BANKCALL
R0572       L+1 CADR (ONE OF 5 STALL ADDRESSES I.E. IMUSTALL,OPTSTALL,RADSTALL,
R0573                   AOTSTALL,OR ATTSTALL)

R0574      NORMAL-EXIT MODE-
R0575       TCF    JOBSLEEP OR TCF  MODEXIT

R0576     ALARM OR ABORT EXIT MODE-
R0577       TC    ABORT

R0578     OUTPUT-
R0579       MODECADR= CADR IF JOBSLEEP
R0580       MODECADR=+0      IF I/O COMPLETE
R0581       BUF2=L+3         IF I/O COMPLETE AND GOOD.
R0582       BUF2=L+2 IF I/O COMPLETE BUT FAILED.

R0583     ERASABLE INITIALIZATION-
R0584       BUF2 CONTAINS RETURN ADDRESS PLUS 1,(L+2)
R0585       BUF2+1 CONTAINS FBANK VALUE OF CALLING ROUTINE.
R0586       MODECADR OF CALLING ROUTINE CONTAINS +0,-1,-0 OR  CADR RETURN ADDRESS.

R0587     DEBRIS-
R0588       RUPTREG2 AND CALLING ROUTINE MODECADR.

 0589     REF 133  LAST 1328    07,3712  3 4753 1  AOTSTALL CAF     ONE              AOT.
 0590     REF   1               07,3713  0 3717 0           TC      STALL

 0591     REF  84  LAST 1319    07,3714  3 4752 0  RADSTALL CAF     TWO
 0592     REF   2  LAST 1329    07,3715  1 3717 1           TCF     STALL
 0593   REF   3  LAST  960   07,3712               OPTSTALL EQUALS ACTSTALL

 0594   REF 240  LAST 1328   07,3716  3 4755 1  IMUSTALL CAF     ZERO            IMU.

 0595                        07,3717  0 0004 0  STALL    INHINT
 0596   REF  20  LAST 1328   07,3720  54 071 0           TS      RUPTREG2        SAVE DEVICE INDEX.
 0597   REF 422  LAST 1327   07,3721  50 000 1           INDEX   A               SEE IF OPERATION COMPLETE.
 0598   REF   8  LAST 1328   07,3722  11'304 0           CCS     MODECADR
 0599   REF   1              07,3723  1 3741 1           TCF     MODABORT        ALLOWABLE STATES ARE +0, -1, AND -0.
 0600   REF   1              07,3724  1 3735 1           TCF     MODESLP         OPERATION INCOMPLETE.
 0601   REF   1              07,3725  1 3731 0           TCF     MODEGOOD        COMPLETE AND GOOD IF = -1.

 0602   REF  21  LAST 1330   07,3726  50 071 1  MG2      INDEX   RUPTREG2        COMPLETE AND FAILED IF -0. RESET TO +0.
 0603   REF   9  LAST 1330   07,3727  55'304 0           TS      MODECADR        RETURN TO CALLER.
 0604   REF   8  LAST 1327   07,3730  1 2755 0           TCF     MODEEXIT

 0605   REF 423  LAST 1330   07,3731  10 000 0  MODEGOOD CCS     A               MAKE SURE INITIAL STATE -1.
 0606   REF   2  LAST 1330   07,3732  1 3741 1           TCF     MODABORT

 0607   REF  25  LAST 1320   07,3733  24 133 0           INCR    BUF2            IF SO, INCREMENT RETURN ADDRESS AND
 0608   REF   1              07,3734  1 3726 0           TCF     MG2             RETURN IMMEDIATELY, SETTING CADR = +0.

 0609   REF  13  LAST  937   07,3735  0 4645 1  MODESLP  TC      MAKECADR        CALL FROM SWITCHABLE FIXED ONLY.
 0610   REF  22  LAST 1330   07,3736  50 071 1           INDEX   RUPTREG2
 0611   REF  10  LAST 1330   07,3737  55'304 0           TS      MODECADR
 0612   REF   6  LAST 1320   07,3740  1 5133 1           TCF     JOBSLEEP

 0613   REF  26  LAST 1330   07,3741  52 134 0  MODABORT DXCH    BUF2
 06132  REF   6  LAST 1126   07,3742  0 5716 1           TC      BAILOUT1        TWO PROGRAMS USING THE SAME DEVICE.
 0614                        07,3743   01210 0           OCT     1210
```

```
P0615             CONSTANTS FOR MODE SWITCHING ROUTINES

 0616   REF   4  LAST  972       5751               BITS3&4    =       OCT14
 0617   REF   3  LAST 1286       4771               BITS4&6    =       OCT50
 0618                         07,3744   00030 1   BITS4-5   OCT     00030
 0619   REF  40  LAST 1323       4744               IMUSEFLG EQUALS  BIT8           INTERPRETER SWITCH 7.
 0620                         07,3745   77500 1   -COMMAX   DEC     -191
 0621                         07,3746   77477 0   -COMMAX-  DEC     -192
 0622                         07,3747   00074 1   600MS     DEC     60
 0623   REF   5  LAST  968    07,3210             IMUFIN20  =       IMUFINE
 0624   REF   4  LAST  369    07,3750  3 1307 1   GOMANUP   CA      ATTCADR         IS KALCMANU FREE
 0625                         07,3751  0 0006 1             EXTEND
 0626                         07,3752  1 3755 1             BZF     +3

 0627   REF   7  LAST 1233    07,3753  0 5652 0             TC      POODOO          NO
 0628                         07,3754   01210 0             OCT     1210            2 TRYING TO USE SAME DEVICE

 0629                         07,3755  0 0006 1   +3        EXTEND
 0630   REF  27  LAST 1330    07,3756  3 0134 1             DCA     BUF2
 0632   REF   5  LAST 1331    07,3757  53'310 0             DXCH    ATTCADR         SAVE FINAL RETURN FOR KALCMAN3

 0633   REF  43  LAST 1300    07,3760  3 0006 1             CA      BBANK
 0634   REF  21  LAST 1322    07,3761  7 4757 1             MASK    SEVEN
 0635   REF   5  LAST 1331    07,3762  27'310 0             ADS     ATTCADR +1

 0642   REF  32  LAST 1113    07,3763  3 0167 1             CA      PRIORITY
 0643   REF   2  LAST  232    07,3764  7 7725 1             MASK    PRIO37
 0644   REF   2  LAST  369    07,3765  55'311 1             TS      ATTPRIO         SAVE USERS PRIO

 06452  REF   1               07,3766  3 3772 0             CAF     KALEBCON        SET EBANK FOR KALCMAN3
 06453  REF  75  LAST 1324    07,3767  54 003 0             TS      EBANK
 06454  REF  56  LAST 1297    07,3770  0 4635 0             TC      POSTJUMP
 06455  REF   1               07,3771   44004 0             CADR    KALCMAN3
 06456  REF  13  LAST  485    07,3772   03276 1   KALEBCON ECADR    BCDU
```

```
R0646    PROGRAM DESCRIPTION
R0647    IMU STATUS CHECK ROUTINE R02  (SUBROUTINE UTILITY)
R0648    MOD NO - 1
R0649    MOD BY - N.BRODEUR
R0650    FUNCTIONAL DESCRIPTION
R0651
R0652    TO CHECK WHETHER IMU IS ON AND IF ON WHETHER IT IS ALIGNED TO AN
R0653    ORIENTATION KNOWN BY THE CMC. TO REQUEST SELECTION OF THE APPROPRIATE
R0654    PROGRAM IF THE IMU IS OFF OR NOT ALIGNED TO AN ORIENTATION KNOWN BY THE
R0655    CMC. CALLED THROUGH BANKCALL
R0656    CALLING SEQUENCE-
R0657
R0658    L          TC      BANKCALL
R0659    L+1        CADR    R02BOTH
R0660    SUBROUTINES CALLED
R0661
R0662            VARALARM
R0663            FLAGUP
R0664    NORMAL EXIT MODES
R0665
R0666    AT L+2 OF CALLING SEQUENCE
R0667    ALARM OR ABORT EXIT MODES
R0668            GOTOPOOH, WITH ALARM
R0673    ERASABLE INITIALIZATION REQUIRED
R0674
R0675    NONE
R0676    DEBRIS
R0677
R0678    CENTRALS-A,Q,L
 0679                            34,3775                          BANK    34
 0680    REF   1                 04,2000                          SETLOC  R02
 0681                            04,3253                          BANK
 0682    REF   1                                                  COUNT*  $$/R02
 0683                            04,3253   00063 1   DEC51        DEC     51
 0684    REF   7   LAST 1315     04,3254   3 4737 0  R02BOTH      CAF     REFSMBIT
 0685    REF  20   LAST 1315     04,3255   7 0077 0               MASK    FLAGWRD3
 0686    REF 424   LAST 1330     04,3256   1 0000 0               CCS     A
 0687    REF   1                 04,3257   0 3270 1               TC      R02ZERO         ZERO IMUS

 0688    REF  67   LAST 1327     04,3260   3 1302 1               CA      IMODES30
 0689    REF  31   LAST 1326     04,3261   7 4743 1               MASK    BIT9            IS ISS INITIALIZED
 0690                            04,3262   0 0006 1               EXTEND
 0691                            04,3263   1 3265 1               BZF     +2
 0692    REF  49   LAST 1324     04,3264   4 4750 0               CS      BIT4            SEND IMU ALARM CODE 210
 0693    REF   1                 04,3265   6 3273 1               AD      OCT220          SEND REFSMM ALARM
 0694    REF   4   LAST  621     04,3266   0 5744 0               TC      VARALARM

 0695    REF  67   LAST  983     04,3267   0 6001 0               TC      GOTOPOOH

 0700    REF  70   LAST 1254     04,3270   0 5504 0  R02ZERO      TC      UPFLAG
```

```
0701    REF    6  LAST  983   04,3271   00007 0               ADRES   IMUSE
0702    REF   10  LAST 1318   04,3272  1 4631 0               TCF     SWRETURN
07025                         04,3273   00220 1  OCT220       OCT     220
```

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P0703    PROGRAM DESCRIPTION   P06   10FEB67

R0704    TRANSFER THE ISS/CMC FROM THE OPERATE TO THE STANDBY CONDITION.

R0705    THE NORMAL CONDITION OF READINESS OF THE GNCS WHEN NOT IN USE IS STANDBY. IN THIS CONDITION THE IMU
R0707    HEATER POWER IS ON. THE IMU OPERATE POWER IS OFF. THE COMPUTER POWER IS ON. THE OPTICS POWER IS OFF. THE
R0709    CMC  STANDBY ON THE MAIN AND LEB DISKYS IS ON.

R0710    CALLING SEQUENCE:
R0711               ASTRONAUT REQUEST THROUGH DSKY -    V37E 06E.

R0712    SUBROUTINES CALLED:
R0713               GOPERF1
R0716               BANKCALL
R0719               FLAGDOWN
```

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P0810   PRESTAND PREPARES FOR STANDBY BY SNAPSHOTTING THE SCALER AND TIME1 TIME2
R0811   THE LOW 5 BITS OF THE SCALER ARE INSPECTED TO INSURE COMPATABILITY
R0812   BETWEEN THE SCALER READING AND THE TIME1 TIME2 READING.

 08125  REF   1                37,2000                        SETLOC P05P06
 08126                         37,3655                        BANK

 0813   REF   2  LAST   99       0314                         EBANK= TIME2SAV
 0814   REF   1                                               COUNT* $$/P06

 08145  REF  71  LAST 1332     37,3655  0 5504 0  P06         TC     UPFLAG            SET NODOV37 BIT
 08146  REF   5  LAST 1210     37,3656   00074 0              ADRES  NODOFLAG

 0815                          37,3657  0 0004 0  PRESTAND    INHINT
 0816                          37,3660  0 0006 1              EXTEND
 0817   REF  33  LAST 1307     37,3661  3 0025 0              DCA    TIME2             SNAPSHOT TIMEITIME2
 0818   REF   3  LAST 1335     37,3662  52 315 1              DXCH   TIME2SAV
 0819   REF   1                37,3663  0 3714 0              TC     SCALPREP
 0820   REF   1                37,3664  0 3657 0              TC     PRESTAND          T1,T2,SCALER NOT COMPATIBLE
 0821   REF 790  LAST 1320     37,3665  52 155 1              DXCH   MPAC              T1,T2 AND SCALER OK
 0822   REF   1                37,3666  52 317 0              DXCH   SCALSAVE          STORE SCALER
 0823                          37,3667  0 0004 0              INHINT
 0824   REF 311  LAST 1265     37,3670  0 4616 1              TC     BANKCALL
 0825   REF   3  LAST  176     37,3671   17175 1              CADR   RNDREFDR          REFSMM, DRIFT, TRACK FLAGS DOWN

 0826   REF  91  LAST 1210     37,3672  0 5516 0              TC     DOWNFLAG
 0827   REF   7  LAST 1333     37,3673   00007 0              ADRES  IMUSE             IMUSE DOWN
 08271  REF  92  LAST 1335     37,3674  0 5516 0              TC     DOWNFLAG
 08272  REF   6  LAST  838     37,3675   00010 0              ADRES  RNDVZFLG          RNDVZFLG DOWN

 0828   REF  29  LAST 1311     37,3676  3 4741 1              CAF    BIT11
 0829                          37,3677  0 0006 1              EXTEND
 0830   REF  20  LAST  997     37,3700  05 013 0              WOR    CHAN13            SET STANDBY ENABLE BIT

 0831   REF 113  LAST 1242     37,3701  0 5353 1              TC     PHASCHNG          SET RESTART TO POSTAND WHEN STANDBY
 0832                          37,3702   07024 0              OCT    07024               RECOVERS
 0833                          37,3703   20000 0              OCT    20000
 08335  REF   2  LAST 1335       0316                         EBANK= SCALSAVE
 0834   REF   1                37,3704   03734 1              2CADR  POSTAND
 0834   REF   1                37,3705   76060 0
 0835   REF   1                37,3706  3 4774 1              CAF    OCT62
 0836   REF 312  LAST 1335     37,3707  0 4616 1              TC     BANKCALL
 0837   REF  10  LAST  972     37,3710   20623 1              CADR   GOPERF1
 0838                          37,3711  1 3706 1              TCF    -3
 0839                          37,3712  1 3706 1              TCF    -4
 0840                          37,3713  1 3706 1              TCF    -5

 08405  REF   3  LAST  599       4774             OCT62       EQUALS .5SEC             DEC 50 = OCT 62

R0841   THE LOW 5 BITS OF THE SCALER READS 10000 FOR THE FIRST INTERVAL AFTER A
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R0842   T1 INCREMENT. IF SCALPREP DETECTS THIS INTERVAL THE T1,T2 AND SCALER
R0843   DATA ARE NOT COMPATABLE AND RETURN IS TO L+1 FOR ANOTHER READING OF THE
R0844   DATA. OTHERWISE, THE RETURN IS TO L+2 TO PROCEED. ROUTINE ALSO PREPARES
R0845   THE SCALER READING FOR COMPUTATION OF THE INCREMENT TO UPDATE T1T2. (THE
R0846   10 MS BIT (BIT 6) OF THE SCALER IS INCREMENTED 5 MS OUT OF PHASE FROM
R0847   T1.) ADDITION OF 5 MS (BIT 5) TO THE SCALER READING HAS THE EFFECT OF
R0848   ADJUSTING BIT 6 IN THE SCALER TO BE IN PHASE WITH BIT 1 OF T1. THE LOW 5
R0849   BITS OF THE SCALER READING ARE THEN SET TO ZERO, TO TRUNCATE THE SCALER
R0850   DATA TO 10 MS. RESULTS ARE STORED IN MPAC, +1.

 0851                       37,3714  0 0006 1  SCALPREP EXTEND
 0852   REF 791  LAST 1335  37,3715  22 156 0           QXCH    MPAC     +2
 0853   REF   3  LAST  381  37,3716  0 4103 1           TC      FINETIME +1
 0854                       37,3717  0 0003 1           RELINT
 0855   REF 792  LAST 1336  37,3720  52 155 1           DXCH    MPAC
 0856   REF  41  LAST 1317  37,3721  3 4747 1           CA      BIT5                  ADD 5 MS TO THE SCALER READING.
 0857   REF 233  LAST 1323  37,3722  54 001 1           TS      L
 0858   REF 241  LAST 1330  37,3723  3 4755 1           CA      ZERO
 0859   REF 793  LAST 1336  37,3724  20 155 1           DAS     MPAC
 0860   REF   9  LAST  744  37,3725  4 4346 0           CS      LOW5                  SET LOW 5 BITS OF (SCALER+5MS) TO ZERO
 0861   REF 794  LAST 1336  37,3726  7 0155 1           MASK    MPAC     +1           AND STORE RESULTS IN MPAC,+1.
 0862   REF 795  LAST 1336  37,3727  56 155 0           XCH     MPAC     +1
 0863   REF  10  LAST 1336  37,3730  7 4346 0           MASK    LOW5                  TEST LOW 5 BITS OF SCALER FOR THE FIRST
A0864                                                                                 INTERVAL AFTER THE T1 INCREMENT
A0865                                                                                 (NOW = 00000, SINCE BIT 5 ADDED).
 0866   REF 425  LAST 1332  37,3731  10 000 0           CCS     A                     IS IT 1ST INTERVAL AFTER T1 INCREMENT
 0867   REF 796  LAST 1336  37,3732  24 156 0           INCR    MPAC +2               NO
 0868   REF 797  LAST 1336  37,3733  0 0156 0           TC      MPAC +2               YES

R0869   POSTAND RECOVERS TIME AFTER STANDBY.THE SCALER IS SNAPSHOTTED AND THE
R0870   TIME1 TIME2 COUNTER IS SET TO ZERO. THE LOW 5 BITS OF THE SCALER ARE
R0871   INSPECTED TO INSURE COMPATABILITY BETWEEN THE SCALER READING AND THE
R0872   CLEARING OF THE TIME COUNTER. IT THEN COMPUTES THE DIFFERENCE IN SCALER
R0873   VALUES (IN DP) AND ADDS THIS TO THE PREVIOUSLY SNAPSHOTTED VALUES OF
R0874   TIME1 TIME2 AND PLACES THIS NEW TIME INTO THE TIME1 TIME2 COUNTER.

 0875   REF   1                                         COUNT*  $$/P05

 0876   REF  30  LAST 1335  37,3734  4 4741 0  POSTAND  CS      BIT11                 RECOVER TIME AFTER STANDBY.
 0877                       37,3735  0 0006 1           EXTEND
 0878   REF  21  LAST 1335  37,3736  03 013 0           WAND    CHAN13                CLEAR STANDBY ENABLE BIT
 0879                       37,3737  0 0004 0           INHINT
 0880   REF 242  LAST 1336  37,3740  3 4755 1           CA      ZERO
 0881   REF 234  LAST 1336  37,3741  54 001 1           TS      L
 0882   REF  34  LAST 1335  37,3742  52 025 1           DXCH    TIME2                 CLEAR TIME1TIME2
 0883   REF   2  LAST 1335  37,3743  0 3714 0           TC      SCALPREP              STORE SCALER IN MPAC, MPAC+1
 0884   REF   2  LAST 1335  37,3744  0 3737 1           TC      POSTAND +3            T1,T2,SCALER NOT COMPATIBLE
 0885                       37,3745  0 0006 1           EXTEND                        T1,T2 AND SCALER OK
 0886   REF   3  LAST 1335  37,3746  4 0317 0           DCS     SCALSAVE
 0887   REF 798  LAST 1336  37,3747  20 155 1           DAS     MPAC                  FORM DP DIFFERENCE OF POSTSTANDBY SCALER
 0888    REF  46  LAST 1324    37,3750  3 4742 1               CAF     BIT10             MINUS PRESTANDBY SCALER AND SHIFT RIGHT
 0889    REF  11  LAST  884    37,3751  0 7307 1               TC      SHORTMP           5 TO ALIGN BITS WITH TIME1TIME2.
 0890    REF 243  LAST 1336    37,3752  3 4755 1               CAF     ZERO
 0891    REF 799  LAST 1336    37,3753  54 156 1               TS      MPAC      +2      NEEDED FOR TP AGREE
 0892    REF  16  LAST 1319    37,3754  0 7257 0               TC      TPAGREE           MAKE DP DIFF AGREE
 0893    REF 800  LAST 1337    37,3755  10 154 0               CCS     MPAC
 0894    REF   1               37,3756  0 3763 0               TC      POSTCOM           IF DP DIFF NET +, NO SCALER OVERFLOW
 0895    REF   2  LAST 1337    37,3757  0 3763 0               TC      POSTCOM           BETWEEN PRE AND POST STANDBY.
 0896                          37,3760  0 3761 1               TC      +1                IF DP DIFF NET -, SCALER OVERFLOWED. ADD
 0897    REF  47  LAST 1337    37,3761  3 4742 1               CAF     BIT10             BIT 10 TO HIGH DIFF TO CORRECT.
 0898    REF 801  LAST 1337    37,3762  26 154 0               ADS     MPAC
 0899                          37,3763  0 0006 1     POSTCOM   EXTEND                    C(MPAC,+1) IS MAGNITUDE OF DELTA SCALER.
 0900    REF   4  LAST 1335    37,3764  3 0315 0               DCA     TIME2SAV          PRESTANDBY TIME1TIME2
 0901    REF 802  LAST 1337    37,3765  20 155 1               DAS     MPAC
 0902    REF  17  LAST 1337    37,3766  0 7257 0               TC      TPAGREE           FORCE SIGN AGREEMENT
 0903    REF 803  LAST 1337    37,3767  52 155 1               DXCH    MPAC              UPDATED VALUE FOR T1,T2.
 0904    REF  35  LAST 1336    37,3770  20 025 1               DAS     TIME2             LOAD UPDATED VALUE INTO T1,T2, WITH
 09045   REF  93  LAST 1335    37,3771  0 5516 0               TC      DOWNFLAG          CLEAR NODOFLAG
 09046   REF   6  LAST 1335    37,3772   00054 0               ADRES   NODOFLAG

 0905    REF  68  LAST 1332    37,3773  0 6001 0               TC      GOTOPOOH
```

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L         KEYRUPT, UPRUPT                                                                                      USER'S PAGE NO.   1       EO S3

 0001                           14,3774                            BANK    14
 0002    REF    1               04,2000                            SETLOC  KEYRUPT
 0003                           04,3274                            BANK
 0004    REF    1                                                  COUNT*  $$/KEYUP

 0005    REF    9  LAST 1129    04,3274  54 016 1  KEYRUPT1 TS      BANKRUPT
 0006    REF  351  LAST 1327    04,3275  56 002 0           XCH     Q
 0007    REF    8  LAST 1129    04,3276  54 012 0           TS      QRUPT
 0008    REF    2  LAST  438    04,3277  0 4400 1           TC      LODSAMPT          TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0009    REF   11  LAST 1336    04,3300  3 4346 1           CAF     LOW5
 0010                           04,3301  0 0006 1           EXTEND
 0011    REF    2  LAST  218    04,3302  02 015 1           RAND    MNKEYIN           CHECK IF KEYS 5M-1M ON
 0012    REF    6  LAST 1300    04,3303  54 073 1  KEYCOM   TS      RUPTREG4
 0013    REF   28  LAST  915    04,3304  4 0101 0           CS      FLAGWRD5
 0014    REF    1               04,3305  7 4735 0           MASK    DSKYFBIT
 0015    REF   29  LAST 1338    04,3306  26 101 0           ADS     FLAGWRD5

 0016    REF    6  LAST 1099    04,3307  3 4355 0  ACCEPTUP CAF     CHRPRIO           (NOTE: RUPTREG4 = KEYTEMP1)
 0017    REF   28  LAST 1308    04,3310  0 5072 1           TC      NOVAC
 0018    REF   66  LAST  458       0777                     EBANK=  DSPCOUNT
 0019    REF    1               04,3311   02077 0           2CADR   CHARIN
 0019    REF    1               04,3312   60101 1
 0020    REF    7  LAST 1338    04,3313  3 0073 0           CA      RUPTREG4
 0021    REF   24  LAST 1328    04,3314  50 064 0           INDEX   LOCCTR
 0022    REF  804  LAST 1337    04,3315  54 154 0           TS      MPAC              LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
 0023    REF   22  LAST  994    04,3316  0 5270 1           TC      RESUME
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L        KEYRUPT, UPRUPT                                                                            USER'S PAGE NO.   2      EO S3

P0024    UPRUPT PROGRAM

 0025    REF  10  LAST 1338   04,3317  54 016 1  UPRUPT    TS       BANKRUPT
 0026    REF 352  LAST 1338   04,3320  56 002 0            XCH      Q
 0027    REF   9  LAST 1338   04,3321  54 012 0            TS       QRUPT
 0028    REF   3  LAST 1338   04,3322  0 4400 1            TC       LODSAMPT          TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0029    REF 244  LAST 1337   04,3323  3 4755 1            CAF      ZERO
 0030    REF   2  LAST  222   04,3324  56 045 0            XCH      INLINK
 0031    REF   2  LAST  154   04,3325  54 073 1            TS       KEYTEMP1
 0032    REF  35  LAST 1285   04,3326  3 4751 0            CAF      BIT3              TURN ON UPACT LIGHT
 0033                         04,3327  0 0006 1            EXTEND                     (BIT 3 OF CHANNEL 11)
 0034    REF  34  LAST 1327   04,3330  05 011 1            WOR      DSALMOUT
 0035    REF  12  LAST 1338   04,3331  3 4346 1  UPRPT1    CAF      LOW5              TEST FOR TRIPLE CHAR REDUNDANCY
 0036    REF   3  LAST 1339   04,3332  7 0073 1            MASK     KEYTEMP1          LOW5 OF WORD
 0037    REF   4  LAST 1339   04,3333  56 073 0            XCH      KEYTEMP1          LOW5 INTO KEYTEMP1
 0038                         04,3334  0 0006 1            EXTEND
 0039    REF  48  LAST 1337   04,3335  7 4742 0            MP       BIT10             SHIFT RIGHT 5
 0040    REF   1              04,3336  54 734 0            TS       KEYTEMP2
 0041    REF  13  LAST 1339   04,3337  7 4346 0            MASK     LOW5              MID 5
 0042    REF   1              04,3340  6 3374 1            AD       HI10
 0043    REF   1              04,3341  0 3371 1            TC       UPTEST
 0044    REF  49  LAST 1339   04,3342  3 4742 1            CAF      BIT10
 0045                         04,3343  0 0006 1            EXTEND
 0046    REF   2  LAST 1339   04,3344  7 0734 0            MP       KEYTEMP2          SHIFT RIGHT 5
 0047    REF  14  LAST 1339   04,3345  7 4346 0            MASK     LOW5              HIGH 5
 0048                         04,3346  4 0000 0            COM
 0049    REF   2  LAST 1339   04,3347  0 3371 1            TC       UPTEST

 0050    REF   1              04,3350  4 3377 0  UPOK      CS       ELRCODE           CODE IS GOOD. IF CODE = 'ERROR RESET',
 0051    REF   5  LAST 1339   04,3351  6 0073 0            AD       KEYTEMP1          CLEAR UPLOCKFL(SET BIT4 OF FLAGWRD7 = 0)
 0052                         04,3352  0 0006 1            EXTEND                     IF CODE DOES NOT = 'ERROR RESET', ACCEPT
 0053    REF   1              04,3353  1 3361 1            BZF      CLUPLOCK          CODE ONLY IF UPLOCKFL IS CLEAR (=0).

 0054    REF   1              04,3354  3 4750 1            CAF      UPLOCBIT          TEST UPLOCKFL FOR 0 OR 1
 0055    REF  26  LAST  898   04,3355  7 0103 1            MASK     FLAGWRD7
 0056    REF 426  LAST 1336   04,3356  10 000 0            CCS      A
 0057    REF  23  LAST 1338   04,3357  0 5270 1            TC       RESUME            UPLOCKFL = 1
 0058    REF   1              04,3360  0 3307 0            TC       ACCEPTUP          UPLOCKFL = 0

 0059    REF   2  LAST 1339   04,3361  4 4750 0  CLUPLOCK  CS       UPLOCBIT          CLEAR UPLOCKFL (I.E.,SET BIT 4 OF )
 0060    REF  27  LAST 1339   04,3362  7 0103 1            MASK     FLAGWRD7          FLAGWRD7 = 0)
 0061    REF  28  LAST 1339   04,3363  54 103 1            TS       FLAGWRD7
 0062    REF   2  LAST 1339   04,3364  0 3307 0            TC       ACCEPTUP

A0063                                                                                 CODE IS BAD
 0064    REF  29  LAST 1339   04,3365  4 0103 1  TMFAIL2   CS       FLAGWRD7          LOCK OUT FURTHER UPLINK ACTIVITY
 0065    REF   3  LAST 1339   04,3366  7 4750 0            MASK     UPLOCBIT          (BY SETTING UPLOCKFL = 1) UNTIL
 0066    REF  30  LAST 1339   04,3367  26 103 1            ADS      FLAGWRD7          'ERROR RESET' IS SENT VIA UPLINK.
 0067    REF  24  LAST 1339   04,3370  0 5270 1            TC       RESUME
 0069    REF   6  LAST 1339   04,3371  6 0073 0  UPTEST    AD       KEYTEMP1
 0070    REF 427  LAST 1339    04,3372  10 000 0               CCS      A
 0071    REF   1               04,3373  0 3365 1               TC       TMFAIL2
 0072                          04,3374   77740 1  HI10         OCT      77740
 0073    REF   2  LAST 1340    04,3375  0 3365 1               TC       TMFAIL2
 0074    REF 353  LAST 1339    04,3376  0 0002 0               TC       Q

 0075                          04,3377   00022 1  ELRCODE      OCT      22

R0076    'UPLINK ACTIVITY LIGHT' IS TURNED OFF BY .....
R0077              1.      VBRELDSP
R0078              2.      ERROR RESET
R0079              3.      UPDATE PROGRAM(P27) ENTERED BY V70,V71,V72,AND V73.


R0080                                -
R0081    THE RECEPTION OF A BAD CODE(I.E  CCC FAILURE) LOCKS OUT FURTHER UPLINK ACTIVITY BY SETTING BIT4 OF FLAGWRD7 = 1.
R0083    THIS INDICATION WILL BE TRANSFERRED TO THE GROUND BY THE DOWNLINK WHICH DOWNLINKS ALL FLAGWORDS.
R0085    WHEN UPLINK ACTIVITY IS LOCKED OUT ,IT CAN BE ALLOWED WHEN THE GROUND UPLINKS AND 'ERROR RESET' CODE.
R0087    (IT IS RECOMMENDED THAT THE 'ERROR LIGHT RESET' CODE IS PRECEEDED BY 16 BITS THE FIRST OF WHICH IS 1 FOLLOWED
R0089    BY 15 ZEROES. THIS WILL ELIMINATE EXTRANEOUS BITS FROM INLINK WHICH MAY HAVE BEEN LEFT OVER FROM THE ORIGINAL
R0091    FAILURE)
R0092    UPLINK ACTIVITY IS ALSO ALLOWED(UNLOCKED) DURING FRESH START WHEN FRESH START SETS BIT4 OF FLAGWRD7 = 0.
 05124   REF   1               04,3400  4 4753 0               CS       XDSPBIT
```

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R0001   DISPLAYS CAN BE CLASSIFIED INTO THE FOLLOWING CATEGORIES-

R0002       1. PRIORITY DISPLAYS- DISPLAYS WHICH TAKE PRIORITY OVER ALL OTHER DISPLAYS. USUALLY THESE DISPLAYS ARE SENT
R0004          OUT UNDER CRITICAL ALARM CONDITIONS.
R0005       2. EXTENDED VERB DISPLAYS- ALL EXTENDED VERBS AND MARK ROUTINES SHOULD USE EXTENDED VERB (MARK) DISPLAYS.
R0007       3. NORMAL DISPLAYS- ALL MISSION PROGRAM DISPLAYS WHICH INTERFACE WITH THE ASTRONAUT DURING THE NORMAL
R0009          SEQUENCE OF EVENTS.
R0010       4. MISC. DISPLAYS- ALL DISPLAYS NOT HANDLED BY THE DISPLAY INTERFACEROUTINES. THESE INCLUDE SUCH DISPLAYS AS
R0012          MM DISPLAYS AND SPECIAL PURPOSE DISPLAYS HANDLED BY PINBALL.


R0013       5. ASTRONAUT INITIATED DISPLAYS- ALL DISPLAYS INITIATED EXTERNALLY.
R0014   THE FOLLOWING TERMS ARE USED TO DESCRIBE THE STATUS OF DISPLAYS-

R0015       1. ACTIVE-THE DISPLAY WHICH IS (1) BEING DISPLAYED TO THE ASTRONAUT AND WAITING FOR A RESPONSE OR
R0017          (2) WAITING FIRST IN LINE FOR THE ASTRONAUT TO FINISH USING THE DSKY OR (3) BEING DISPLAYED ON THE DSKY
R0019          BUT NOT WAITING FOR A RESPONSE.
R0020       2. INACTIVE -A DISPLAY WHICH HAS (1) BEEN ACTIVE BUT WAS INTERRUPTEDBY A DISPLAY OF HIGHER PRIORITY,
R0022          (2) BEEN PUT INTO THE WAITING LIST AT TIME IT WAS REQUESTED DUE TO THE FACT A HIGHER PRIORITY DISPLAY
R0024          WAS ALREADY GOING, (3) BEEN INTERRUPTED BY THE ASTRONAUT (CALLED A PINBRANCH CONDITION, SINCE THIS TYPE
R0026          OF INACTIVE DISPLAY IS USUALLY REACTIVATED ONLY BY PINBALL) OR (4) A DISPLAY WHICH HAS FINISHED BUT STILL
R0028          HAS INFO SAVED FOR RESTART PURPOSES.


R0029   DISPLAY PRIORITIES WORK AS FOLLOWS-

R0030     INTERRUPTS-
R0031       1. THE ASTRONAUT CAN INTERRUPT ANY DISPLAY WITH AN EXTERNAL DISPLAY REQUEST.
R0033       2. INTERNAL DISPLAYS CAN NOT BE SENT OUT WHEN THE ASTRONAUT IS USING THE DSKY.
R0035       3. PRIORITY DISPLAYS INTERRUPT ALL OTHER TYPES OF INTERNAL DISPLAYS. A PRIORITY DISPLAY INTERRUPTING ANOTHER
R0037          PRIORITY DISPLAY WILL CAUSE AN ABORT UNLESS BIT14 IS SET FOR THE LINUS ROUTINE.
R0039       4. A MARK DISPLAY INTERRUPTS ANY NORMAL DISPLAY.
R0040       5. A MARK THAT INTERRUPTS A MARK COMPLETELY REPLACES IT.

R0041     ORDER OF WAITING DISPLAYS-
R0042       1. ASTRONAUT EXTERNAL USE
R0043       2. PRIORITY
R0044       3. INTERRUPTED MARK
R0045       4. INTERRUPTED NORMAL

R0046       5. MARK TO BE REQUESTED (SEE DESCRIPTION OF ENDMARK)
R0047       6. MARK WAITING
R0048       7. NORMAL WAITING
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L        DISPLAY INTERFACE ROUTINES                                                      USER'S PAGE NO.   2        E0 S3

R0049    THE DISPLAY ROUTINES ARE INTENDED TO SERVE AS AN INTERFACE BETWEEN THE USER AND PINBALL.  THE
R0051    FOLLOWING STATEMENTS CAN BE MADE ABOUT NORMAL DISPLAYS AND PRIORITY DISPLAYS (A DESCRIPTION OF MARK ROUTINES
R0053    WILL FOLLOW LATER):

R0054          1.  ALL ROUTINES THAT END IN R HAVE AN IMMEDIATE RETURN TO THE USER.  FOR ALL FLASHING DISPLAYS THIS RETURN
R0056              IS TO THE USERS CALL CADR +4.  FOR THE ONLY NON FLASHING IMMEDIATE RETURN DISPLAY (GODSPR) THIS RETURN
R0058              IS TO THE USERS CALLING LOC +1.
R0059          2.  ALL ROUTINES NOT ENDING IN R DO NOT DO AN IMMEDIATE RETURN TO THE USER.
R0061          3.  ALL ROUTINES THAT END IN R START A SEPARATE JOB (MAKEPLAY) WITH USERS JOB PRIORITY.
R0063          4.  ALL ROUTINES NOT ENDING IN R BRANCH DIRECTLY TO MAKEPLAY WHICH MAKES THESE DISPLAYS A PART OF THE
R0065              USERS JOB.
R0066          5.  ALL DISPLAY ROUTINES ARE CALLED VIA BANKCALL.
R0067          6.  TO RESTART A DISPLAY THE USER WILL GENERALLY USE A PHASE OF ONE WITH DESIRED RESTART GROUP (SEE
R0069              DESCRIPTION OF RESTARTS).
R0070          7.  ALL FLASHING DISPLAYS HAVE 3 RETURNS TO THE USER FROM ASTRONAUT RESPONSES.  A TERMINATE (V34) BRANCHES
R0072              TO THE USERS CALL CADR +1.  A PROCEED (V33) BRANCHES TO THE USERS CALL CADR +2.  AN ENTER OR RECYCLE
R0074              (V32) BRANCHES TO THE USERS CALL CADR +3.
R0075          8.  ALL ROUTINES MUST BE USED UNDER EXECUTIVE CONTROL.

R0076    A DESCRIPTION OF EACH ROUTINE WITH AN EXAMPLE FOLLOWS:

R0077    GODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A.  NO RETURN IS MADE TO THE USER.

R0079          1. GODSP IS NOT RESTARTABLE
R0080          2. A VERB PASTE WITH GODSP ALWAYS TURNS ON THE FLASH.
A0081                                                        CAF      VXXNYY
A0082                                                        TC       BANKCALL
A0083                                                        CADR     GODSP

A0084                                              VXXNYY    OCT      0XXYY

R0085    GODSPR IS THE SAME AS GODSP ONLY RETURN IS TO THE USER.

A0086                                                        CAF      VXXNYY
A0087                                                        TC       BANKCALL
A0088                                                        CADR     GODSPR

A0089                                                        ...      ...                IMMEDIATE RETURN OF GODSPR

R0090    GOFLASH DISPLAYS A FLASHING VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0092    THE ASTRONAUT (SEE NO. 7 ABOVE).

A0093                                                        CAF      VXXNYY             VXX NYY WILL BE A FLASHING VERB NOUN.
A0094                                                        TC       BANKCALL
A0095                                                        CADR     GOFLASH
A0096                                                        ...      ...                TERMINATE RETURN
A0097                                                        ...      ...                PROCEED RETURN
A0098                                                        ...      ...                ENTER OR RECYCLE RETURN

R0099    GOPERF1 IS ENTERED WITH DESIRED CHECKLIST VALUE IN A.  GOPERF1 WILL DISPLAY THIS VALUE IN R1 BY MEANS OF A
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R0101   V01 N25.A FLASHING PLEASE PERFORM ON CHECKLIST ( V50 N25) IS THEN DISPLAYED.  NO IMMEDIATE RETURN IS MADE TO
R0103   USER (SEE NO. 7 ABOVE).

R0104   GOPERF1 BLANKS REGISTERS R2 AND R3

A0105                                              CAF     OCTXX              CODE FOR CHECKLIST VALUE XX
A0106                                              TC      BANKCALL
A0107                                              CADR    GOPERF1
A0108                                              ...     ...                TERMINATE RETURN
A0109                                              ...     ...                PROCEED RETURN
A0110                                              ...     ...                ENTER RETURN

R0111   GOPERF2 IS ENTERED WITH A VARIABLE NOUN AND V01 ( V00 FOR N10 OR N11) IN A.  GOPERF2 WILL FIRST DISPLAY THE
R0113   REQUESTED NOUN BY MEANS OF A V01NYY OR A V00NYY. PLEASE PERFORM ON NOUN (V50 NYY) THEN BECOMES A FLASHING
R0115   DISPLAY.  NO IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0116   GOPERF2 DOES NOT BLANK ANY REGISTERS

A0117                                              CAF     VXXNYY             VARIABLE NOUN YY. XX=00 OR 01.
A0118                                              TC      BANKCALL
A0119                                              CAD     GOPERF2
A0120                                              ...     ...                TERMINATE RETURN
A0121                                              ...     ...                PROCEED RETURN
A0122                                              ...     ...                ENTER RETURN

R0123   GOPERF3 IS USED FOR A PLEASE PERFORM ON A PROGRAM NUMBER.  THE DESIRED PROGRAM NO. IS ENTERED IN A.  GOPERF3
R0125   DISPLAYS THE NO. BY MEANS OF A V06 N07 FOLLOWED BY A FLASHING V50 N07 FOR A PLEASE PERFORM. NO IMMEDIATE RETURN
R0127   IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0128   GOPERF3 BLANKS REGISTERS R2 AND R3

A0129                                              CAF     DECXX              REQUEST PERFORM ON PXX
A0130                                              TC      BANKCALL
A0131                                              CADR    GOPERF3
A0132                                              ...     ...                TERMINATE RETURN
A0133                                              ...     ...                PROCEED RETURN
A0134                                              ...     ...                ENTER RETURN

R0135   GOPERF4 IS USED FOR A PLEASE PERFORM ON AN OPTION. THE DESIRED OPTION ISENTERED IN A AND STORED IN OPTION1.
R0137   GOPERF4 DISPLAYS R1 AND R2 BY MEANS OF A V04N06 FOLLOWED BY A FLASHING  V50N06 FOR A PLEASE PERFORM. NO
R0139   IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

A0140                                              CAF     OCTXX              REQUEST PERFORM ON OPTION XX
A0141                                              TC      BANKCALL
A0142                                              CADR    GOPERF4
A0143                                              ...     ...                TERMINATE RETURN
A0144                                              ...     ...                PROCEED RETURN
A0145                                              ...     ...                ENTER RETURN

R0146   GOPERF4 BLANKS REGISTER R3
```

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R0147    GODSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN TO THE USER AFTER THE DISPLAY HAS BEEN SENT
R0148    OUT.

A0150                                                   CAF     VXXNYY
A0151                                                   TC      BANKCALL
A0152                                                   CADR    GODSPRET

A0153                                                   ...     ...           RETURN TO USER

R0154    REGODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A.  REGODSP IS THE SAME AS GODSP ONLY REGODSP REPLACES ANY
R0156    ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0157                                                   CAF     VXXNYY
A0158                                                   TC      BANKCALL
A0159                                                   CADR    REGODSP

R0160    REFLASH IS THE SAME AS GOFLASH ONLY REFLASH REPLACES ANY ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0162                                                   CAF     VXXNYY        VXX NYY WILL BE A FLASHING VERB NOUN
A0163                                                   TC      BANKCALL
A0164                                                   CADR    REFLASH
A0165                                                   ...     ...           TERMINATE RETURN
A0166                                                   ...     ...           PROCEED RETURN
A0167                                                   ...     ...           ENTER RETURN

R0168    GOFLASHR IS SAME AS GOFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0170                                                   CAF     VXXNYY
A0171                                                   TC      BANKCALL
A0172                                                   CADR    GOFLASHR
A0173                                                   ...     ...           TERMINATE RETURN
A0174                                                   ...     ...           PROCEED RETURN
A0175                                                   ...     ...           ENTER OR RECYCLE RETURN

A0176                                                   ...     ...           IMMEDIATE RETURN FROM GOFLASHR

R0177    GOPERF1R IS THE SAME AS GOPERF1 ONLY GOPERF1R HAS AN IMMEDIATE RETURN TOUSERS CALL CADR +4.

R0179    GOPERF1R BLANKS REGISTERS R2 AND R3

A0180                                                   CAF     OCTXX         CODE FOR CHECKLIST VALUE XX.
A0181                                                   TC      BANKCALL
A0182                                                   CADR    GOPERF1R
A0183                                                   ...     ...           TERMINATE RETURN
A0184                                                   ...     ...           PROCEED RETURN
A0185                                                   ...     ...           ENTER RETURN

A0186                                                   ...     ...           IMMEDIATE RETURN FROM GOPERF1R

R0187    GOPERF2R IS THE SAME AS GOPERF2 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.
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R0188     GOPERF2R DOES NOT BLANK ANY REGISTERS

A0190                                      CAF     VXXNYY          VARIABLE NOUN YY REQUESTED.  XX=00 OR 01
A0191                                      TC      BANKCALL
A0192                                      CADR    GOPERF2R
A0193                                      ...     ...             TERMINATE RETURN
A0194                                      ...     ...             PROCEED RETURN
A0195                                      ...     ...             ENTER RETURN

A0196                                      ...     ...             IMMEDIATE RETURN HERE FROM GOPERF2R

R0197     GOPERF3R IS THE SAME AS GOPERF3 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

R0199     GOPERF3R BLANKS REGISTERS R2 AND R3

A0200                                      CAF     PROGXX          PERFORM PROGRAM XX
A0201                                      TC      BANKCALL
A0202                                      CADR    GOPERF3R
A0203                                      ...     ...             TERMINATE RETURN
A0204                                      ...     ...             PROCEED RETURN
A0205                                      ...     ...             ENTER RETURN

A0206                                      ...     ...             GOPERF3R IMMEDIATELY RETURNS HERE

R0207     GOPERF4R IS THE SAME AS GOPERF4 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

A0209                                      CAF     OCTXX           REQUEST PERFORM ON OPTIONXX
A0210                                      TC      BANKCALL
A0211                                      CADR    GOPERF4R
A0212                                      ...     ...             TERMINATE RETURN
A0213                                      ...     ...             PROCEED RETURN
A0214                                      ...     ...             ENTER RETURN

A0215                                      ...     ...             IMMEDIATE RETURN TO USER

R0216     GOPERF4R BLANKS REGISTER R3

R0217     REFLASHR IS THE SAME AS REFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0219                                      CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0220                                      TC      BANKCALL
A0221                                      CADR    REFLASHR
A0222                                      ...     ...             TERMINATE RETURN
A0223                                      ...     ...             PROCEED RETURN
A0224                                      ...     ...             ENTER RETURN

A0225                                      ...     ...             IMMEDIATE RETURN TO USER

R0226     REGODSPR IS THE SAME AS REGODSP ONLY A RETURN (IMMEDIATE) IS MADE TO THE USER.
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A0228                                       CAF     VXXNYY
A0229                                       TC      BANKCALL
A0230                                       CADR    REGODSPR

A0231                                       ...     ...                 IMMEDIATE RETURN TO USER
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P0232   GOMARK IS USED TO DISPLAY A MARK VERB NOUN ARRIVING IN A. NO RETURN IS MADE TO THE USER.

R0234   GOXDSP = GOMARK

A0235                                                           CAF      VXXNYY            VXXNYY CONTAINS VERB AND NOUN
A0236                                                           TC       BANKCALL
A0237                                                           CADR     GOMARK            OTHER EXTENDED VERBS USE CADR GOXDSP

R0238   GOMARKR IS THE SAME AS GOMARK ONLY RETURN IS TO THE USER.

R0239   GOXDSPR = GOMARKR

A0240                                                           CAF      VXXNYY
A0241                                                           TC       BANKCALL
A0242                                                           CADR     GOMARKR           OTHER EXTENDED VERBS USE CADR GOXDSPR

A0243                                                           ...      ...               IMMEDIATE RETURN OF GOMARKR

R0244   GOMARKF DISPLAYS A FLASHING MARK VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0246   THE ASTRONAUT (SEE NO. 7 ABOVE ).

R0247   GOXDSPF = GOMARKF

A0248                                                           CAF      VXXNYY            VXXNYY WILL BE A FLASHING MARK VERB NOUN
A0249                                                           TC       BANKCALL
A0250                                                           CADR     GOMARKF           OTHER EXTENDED VERBS USE CADR GOXDSPF
A0251                                                           ...      ...               TERMINATE RETURN
A0252                                                           ...      ...               PROCEED RETURN
A0253                                                           ...      ...               ENTER OR RECYCLE RETURN

R0254   GOMARKFR IS THE SAME AS GOMARKF ONLY AN IMMEDIATE RETURN IS MADE TO THE USER CALL CADR +4.

R0256   GOXDSPFR = GOMARKFR

A0257                                                           CAF      VXXNYY            FLASHING MARK VERB NOUN
A0258                                                           TC       BANKCALL
A0259                                                           CADR     GOMARKFR          OTHER EXTENDED VERBS USE CADR GOXDSPFR
A0260                                                           ...      ...               TERMINATE RETURN
A0261                                                           ...      ...               PROCEED RETURN
A0262                                                           ...      ...               ENTER OR RECYCLE RETURN

A0263                                                           ...      ...               IMMEDIATE RETURN TO THE USER

R0264   GOMARK1 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH ONLY 1 ASTRONAUT RETURN TO THE USER. NO IMMEDIATE
R0266   RETURN IS MADE. THE DESIRED MARK PLEASE PERFORM VERB AND DESIRED NOUN ISENTERED IN A. GOMARK1 DISPLAYS R1, R2, R
R0269   MEANS OF A V05NYY FOLLOWED BY A FLASHING V5XNYY FOR A PLEASE PERFORM. THE ASTRONAUT WILL RESPOND WITH A MARK
R0270   OR MARK REJECT OR AN ENTER. THE ENTER IS THE ONLY ASTRONAUT RESPONSE THAT WILL COME BACK TO THE USER.

A0272                                                           CAF      V5XNYY            X=1,2,3,4    Y= NOUN
A0273                                                           TC       BANKCALL
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A0274                                               CADR    GOMARK1

A0275                                               ...     ...               ENTER RETURN

R0276   *** IF BLANKING DESIRED ON NON R ROUTINES, NOTIFY DISPLAYER.

R0277   GOMARK1R IS THE SAME AS A GOMARK1 ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +2.
A0279                                               CAF     V5XNYY            X=1,2,3,4     YY = NOUN
A0280                                               TC      BANKCALL
A0281                                               CADR    GOMARK1R

A0282                                               ...     ...               ASTRONAUT ENTER RETURN
A0283                                               ...     ...               IMMEDIATE RETURN TO USER

R0284   GOMARK2 IS THE SAME AS GOMARK1 ONLY 3 RETURNS ARE MADE TO THE USER FROM THE ASTRONAUT.
A0286                                               CAF     V5XNYY            X=1,2,3,4    YY=NOUN
A0287                                               TC      BANKCALL
A0288                                               CADR    GOMARK2
A0289                                               ...     ...               TERMINATE RETURN
A0290                                               ...     ...               PROCEED RETURN
A0291                                               ...     ...               ENTER RETURN
R0292   GOMARK2R IS THE SAME AS GOMARK1R ONLY 3 ASTRONAUT RETURNS ARE MADE TO THE USER.

A0294                                               CAF     V5XNYY            X=0,1,2,3,4    YY=NOUN
A0295                                               TC      BANKCALL
A0296                                               CADR    GOMARK2R
A0297                                               ...     ...               TERMINATE RETURN
A0298                                               ...     ...               PROCEED RETURN
A0299                                               ...     ...               ENTER RETURN

A0300                                               ...     ...               IMMEDIATE RETURN TO THE USER

R0301   GOMARK3 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH A 3 COMP. DEC DISPLAY. THE DESIRED MARK PLEASE
R0303   PERFORM VERB AND NOUN ARE ENTERED IN A. GOMARK3 DISPLAYS R1, R2, R3 BY MEANS OF A V06NYY FOLLOWED BY A FLASHING
R0305   V5XNYY FOR A PLEASE PERFORM. GOMARK3 HAS 3 ASTRONAUT RETURNS TO THE USER WITH NO IMMEDIATE RETURN.

A0307                                               CAF     V5XNYY            X=1, 2,3,4 YY=NOUN
A0308                                               TC      BANKCALL
A0309                                               CADR    GOMARK3
A0310                                               ...     ...               TERMINATE RETURN
A0311                                               ...     ...               PROCEED RETURN
A0312                                               ...     ...               ENTER RETURN

R0313   GOMARK4 IS THE SAME AS GOMARK3 ONLY R2 AND R3 ARE BLANKED AND R1 IS DISPLAYED IN OCTAL.

A0315                                               CAF     V5XNYY            X=1,2,3,4 YY=NOUN
A0316                                               TC      BANKCALL
A0317                                               CADR    GOMARK4
A0318                                               ...     ...               TERMINATE RETURN
A0319                                               ...     ...               PROCEED RETURN
```

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A0320                                                     ...     ...                ENTER RETURN

R0321   EXDSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN MADE TO THE USER AFTER THE DISPLAY HAS BEEN
R0323   SENT OUT.

A0324                                                     CAF     VXXNYY
A0325                                                     TC      BANKCALL
A0326                                                     CADR    EXDSPRET

A0327                                                     ...     ...                RETURN TO USER

R0328   KLEENEX CLEANS OUT ALL MARK DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER THE MARK DISPLAYS
R0330   HAVE BEEN CLEANED OUT.

A0331                                                     TC      BANKCALL
A0332                                                     CADR    KLEENEX

A0333                                                     ...     ...                RETURN TO USER

R0334   MARKBRAN IS A SPECIAL PURPOSE ROUTINE USED FOR SAVING JOB VAC AREAS (SEE DESCRIPTION OF MARKBRAN BELOW).

A0336                                                     TC      BANKCALL
A0337                                                     CADR    MARKBRAN

A0338                                                     ...     ...                BAD RETURN IF MARK DISPLAY NOT ACTIVE

A0339                                                                                (GOOD RETURN TO IMMEDIATE RETURN LOC OF
A0340                                                                                LAST FLASHING MARK R ROUTINE)

R0341   PINBRNCH REESTABLISHES THE LAST ACTIVE FLASHING DISPLAY. IF THERE IS NO ACTIVE FLASHING DISPLAY, THE DSKY IS
R0343   BLANKED AND CONTROL IS SENT TO ENDOFJOB.

A0344                                                     TC      POSTJUMP
A0345                                                     CADR    PINBRNCH

R0346   PRIODSP IS USED AS A PRIORITY DISPLAY.  IT WILL DISPLAY A GOFLASH TYPE DISPLAY WITH THREE POSSIBLE RETURNS FROM
R0348   THE ASTRONAUT(SEE NO.7 ABOVE).

R0349        THE MAIN PURPOSE OF PRIODSP IS TO REPLACE THE PRESENT DISPLAY WITH A DISPLAY OF HIGHER PRIORITY AND TO
R0351   PROVIDE A MEANS FOR RESTORING THE OLD DISPLAY WHEN THE PRIORITY DISPLAY
R0352   IS RESPONDED TO BY THE ASTRONAUT.

R0353        THE FORMER DISPLAY IS RESTORED BY AN AUTOMATIC BRANCH TO WAKE UP THE DISPLAY THAT WAS INTERRUPTED BY THE
R0355   PRIO DISPLAY.

A0356                                                     CAF     VXXNYY             VXXNYY WILL BE A FLASHING VERB NOUN
A0357                                                     TC      BANKCALL
A0358                                                     CADR    PRIODSP
A0359                                                     ...     ...                TERMINATE RETURN
A0360                                                     ...     ...                PROCEED RETURN
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A0361                                                   ...     ...               ENTER OR RECYCLE RETURN

R0362   PRIODSPR IS THE SAME AS PRIODSPONLY AN IMMEDIATE RETURN IS MADE TO THE   USERS CALL CADR +4.

A0364                                                   CAF     VXXNYY            VXXNYY WILL BE A FLASHING VERB NOUN
A0365                                                   TC      BANKCALL
A0366                                                   CADR    PRIODSPR
A0367                                                   ...     ...               TERMINATE RETURN
A0368                                                   ...     ...               PROCEED RETURN
A0369                                                   ...     ...               ENTER OR RECYCLE RETURN

A0370                                                   ...     ...               IMMEDIATE RETURN

R0371   PRIOLARM DOES A V05N09 PRIODSPR.
R0372   CLEANDSP CLEANS OUT ALL NORMAL DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER NORMAL
R0374   DISPLAYS ARE CLEANED OUT.

A0375                                                   TC      BANKCALL
A0376                                                   CADR    CLEANDSP

A0377                                                   ...     ...               RETURN TO USER
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P0378   GENERAL INFORMATION
R0379   ------- -----------


R0380   ALARM OR ABORT EXIT MODES--

A0381                                               PRIOBORT TC       ABORT
A0382                                                        OCT      1502

R0383   PRIOBORT IS BRANCED TO WHEN (1)  A NORMAL DISPLAY IS REQUESTED AND  ANOTHER NORMAL DISPLAY IS ALREADY ACTIVE
R0385   (REFLASH AND REGODSP ARE EXCEPTIONS) OR (2) A PRIORITY DISPLAY IS REQUESTED WHEN ANOTHER PRIORITY DISPLAY IS
R0387   ALREADY ACTIVE (A PRIORITY WITH LINUS BIT14 IS AN EXCEPTION).


R0386   ERASABLE INITIALIZATION REQUIRED--

R0389        ACCOMPLISHED BY FRESH START- 1. FLAGWRD4 (USED EXCLUSIVELY BY DISPLAY INTERFACE ROUTINES)
R0391                                     2. NVSAVE = NORMAL VERB AND NOUN       REGISTER.
R0393                                     3. EBANKTEM = NORMAL INACTIVE FLAGWORD(ALSO CONTAINS NORMALS EBANK).


R0395                                     5. R1SAVE = MARKBRAN CONTROL WORD
R0396                                     4. RESTREG = PRIORITY 30 AND SUPERBANK 3.
R0398   OUTPUT--

R0399        NVWORD = PRIO VERB AND NOUN
R0400        NVWORD +1(MARKNV) = MARK VERB AND NOUN
R0401        NVWORD +2(NVSAVE) = NORMAL VERB AND NOUN

R0402        DSPFLG(EBANKSAV) = PRIO FLAGWORD (INCLUDING EBANK)
R0403        DSPFLG +1(MARKEBAN) = MARK FLAGWORD (INCLUDING EBANK)
R0404        DSPFLG +2(EBANKTEM) = NORMAL FLAGWORD (INCLUDIG EBANK)

R0405        CADRFLSH = PRIO USERS CALL CADR +1 LOCATION
R0406        CADRFLSH +1(MARKFLSH) = MARK USERS CALL CADR +1 LOCATION
R0407        CADRFLSH +2(TEMPFLSH) = NORMAL USERS CALL CADR +1 LOCATION

R0408        PRIOTIME = TIME EACH PRIO REQUEST FIRST SENT OUT
R0409        OPTION1 = DESIRED OPTION FROM GOPERF4
R0410        FLAGWRD4 = BIT INFO FOR CONTROL OF ALL DISPLAY ROUTINES
R0411        DSPTEM1 = R1 INFO FOR ASTRONAUT FROM PERFORM DISPLAYS(NORMAL)
R0412   SUBROUTINES USED-- NVSUB, FLAGUP, FLAGDOWN, ENDOFJOB, BLANKSUB, ABORT, JOBWAKE, JOBSLEEP, FINDVAC, PRIOCHNG,
R0414   JAMTERM, NVSUBUSY, FLASHON, ENDIDLE, CHANG1, BANKJUMP, MAKECADR, NOVAC,
R0415   DEBRIS-- (STORED INTO)

R0416        TEMPORARY TEMPORARIES- A, Q, L, MPAC +2, MPAC +3, MPAC +4, MPAC +5, MPAC +6, RUPTREG2, RUPTREG3, CYL,
R0418   EBANK, RUPTREG4, LOC, BANKSET, MODE, MPAC, MPAC +1                         4, FACEREG
R0420        ERASABES(SHARED AND USED WITH OTHER PROGRAMS) CADRSTOR, DSPLIST, LOC, DSPTEM1, OPTION1

R0422        ERASABLES(USED ONLY BY DISPLAY ROUTINES)- NVWORD,+1,+2, DSPFLG,+1,+2, CADRFLSH,+1,+2, PRIOTIME, FLAGWRD4,
R0424   R1SAVE, MARK2PAC,


R0425   DEBRIS-- (USED BUT NOT STORED INTO)- NOUNREG, VERBREG, LOCCTR, MONSAVE1
R0426   FLAGWORD DESCRIPTIONS--
R0427       FLAGWRD4- SEE DESCRIPTION UNDER LOG SECTION ERASABLE ASSIGNMENTS

R0428       DSPFLG, DSPFLG+1, DSPFLG +2-
R0429       ----------------------------
R0430   BITS 1 BLANK R1
R0431        2 BLANK R2
R0432        3 BLANK R3
R0433        4 FLASHING DISPLAY REQUESTED
R0434        5 PERFORM DISPLAY REQUESTED
R0435        6 -----           EXDSPRET            GODSPRET
R0436        7 PRIO DISPLAY    -----                -----
R0437        8 -----         DEC MARK PERFORM      -----
R0438        9 EBANK
R0439       10 EBANK
R0440       11 EBANK
R0441       12 -----           -----       V99PASTE
R0442       13 2ND PART OF PERFORM
R0443       15 REFLASH OR REDO  -----              REFLASH OR REDO
R0444       15 -----          MARK REQUEST          -----
R0445   RESTARTING DISPLAYS--

R0446   RULES FOR THE DSKY OPERATOR--

R0447        1. PROCEED AND TERMINATE SERVE AS RESPONSES TO REQUESTS FOR OPERATOR RESPONSE (FLASHING V/N).  AS LONG
R0449           AS THERE IS ANY REQUEST AWAITING OPERATOR RESPONSE, ANY USE OF PROCEED OR TERMINATE WILL SERVE AS
R0451           RESPONSES TO THAT REQUEST.  CARE SHOULD BE EXERCISED IN ATTEMPTING TO KILL AN OPERATOR INITIATED MONITOR
R0453           WITH PROCEED AND TERMINATE FOR THIS REASON.
R0454        2. THE ASTRONAUT MUST RESPOND TO A PRIORITY DISPLAY NO             SOONER THAN 2 SECONDS FROM THE TIME THE
R0456           PROGRAM SENT OUT THE REQUEST FOR OPERATOR RESPONSE (THE ASTRONAUT WOULD SEE THIS DISPLAY FOR LESS TIME
R0458           DUE TO TIME IT TAKES TO GET DISPLAY SENT OUT.) IF THE ASTRONAUT RESPONDS TOO SOON, THE PRIORITY DISPLAY
R0460            IS SENT OUT AGAIN -- AND AGAIN UNTIL AN ACCUMULATED 2 SECS     FROM THE TIME THE FIRST PRIORITY DISPLAY
R0462           OUT. THE SAME 2 SEC. DELAY WILL OCCUR AT 163.84 SECS OR IN ANY  MULTIPLE OF THAT TIME DUE TO PROGRAM
R0464           CONSIDERATION.
R0465        3. KEY RELEASE BUTTON-
R0466           A) IF THE KEY RELEASE LIGHT IS ON, IT SIMPLY RELEASES THE KEYBOARD AND DISPLAY FOR INTERNAL USE.
R0468           B) IF THE KEY RELEASE LIGHT IS OFF, AND IF SOME REQUEST FOR OPERATOR RESPONSE (FLASHING V/N) IS STILL
R0470              AWAITING RESPONSE  THEN IT RE-ESTABLISHES THE DISPLAYS THAT ORIGINALLY REQUESTED RESPONSE.
R0472           IF AN OPERATOR WANTS THEREFORE TO RE-ESTABLISH BUT CONDITION (A) IS ENCOUNTERED, A SECOND DEPRESSION OF
R0474           KEY RELEASE BUTTON MAY BE NECESSARY.
R0475        4. IT IS IMPORTANT TO ANSWER ALL REQUESTS FOR OPERATOR RESPONSE.
R0476        5. IT IS ALWAYS GOOD PRACTICE TO TERMINATE AN EXTENDED VERB BEFORE ASKING FOR ANOTHER ONE OR THE SAME ONE
R0478           OVER AGAIN.


R0479   SPECIAL CONSIDERATIONS--
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R0480          1. MPAC +2  SAVED ONLY IN MARK DISPLAYS
R0481          2. GODSP( ),REGODSP(R),GOMARK( ) ALWAYS TURN ON THE FLASH IF ENTERED WITH A PASTE VERB REQUEST.
R0483          3. ALL NORMAL DISPLAYS ARE RESTARTABLE EXCEPT GODSP(R), REGODSP(R)
R0484          4. ALL EXTENDED VERBS WITH DISPLAYS SHOULD START WITH A TC TESTXACT AND FINISH WITH A TC ENDEXT.
R0486          5. GODSP(R) AND REGODSP(R) MUST BE IN THE SAME EBANK AND SUPERBANK AS THE LAST NORMAL DISPLAY RESTARTED
R0488             BY A .1 RESTART PHASE CHANGE.
R048           6. IN ORDER TO SET UP A NON DISPLAY .1 RESTART POINT, THE USER MUST MAKE CERTAIN THAT RESTREG CONTAINS THE
R0491             CORRECT PRIORITY AND SUPERBANK AND THAT EBANKTEM CONTAINS THE CO
R04911         7. IF CLEANDSP IS RESTARTED VIA A .1 PHASE CHANGE, CAF ZERO SHOULD BE EXECUTED  BEFORE THE TC BANKCALL.
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P0492    CALLING SEQUENCE FOR BLANKING
A0493                                                          CAF     BITX              X=1,2,3 BLANK R1,R2,R3 RESPECTIVELY
A0494                                                          TC      BLANKET
A0495                                                          ...     ...               RETURN TO USER HERE

R0496    IN ORDER TO USE BLANKET CORRECTLY THE USER MUST USE A DISPLAY ROUTINE THAT ENDS IN R FIRST FOLLOWED BY THE CALL
R0498    TO BLANKET AT THE IMMEDIATE RETURN LOC.

 0499                             5464                         BLOCK   02
 0500    REF    1                 4000                         SETLOC  FFTAG4
 0501                             5464                         BANK

 0502    REF    1                                              COUNT*  $$/DSPLA
 0503    REF  805   LAST 1338     5464   54 162 0   BLANKET    TS      MPAC +6
 0504    REF    1                 5465   4 0160 1              CS      PLAYTEM4
 0505    REF  806   LAST 1354     5466   7 0162 0              MASK    MPAC +6
 0506    REF  807   LAST 1354     5467   50 161 1              INDEX   MPAC +5
 0507    REF    2   LAST 1354     5470   26 160 1              ADS     PLAYTEM4

 0508    REF  354   LAST 1340     5471   0 0002 0              TC      Q

 0511    REF   57   LAST 1331     5472   0 4635 0   ENDMARK    TC      POSTJUMP
 0512    REF    1                 5473    20326 1              CADR    MARKEND

 05121   REF  245   LAST 1339     5474   3 4755 1   CLEARMRK   CAF     ZERO
 05122   REF   16   LAST  718     5475   55 044 1              TS      EXTVBACT

 05123                            5476   0 0004 0      +2      INHINT
 05124   REF    2   LAST 1340     5477   4 4753 0              CS      XDSPBIT
 05125   REF    5   LAST  475     5500   7 0100 1              MASK    FLAGWRD4
 05126   REF    6   LAST 1354     5501   54 100 1              TS      FLAGWRD4

 05127                            5502   0 0003 1              RELINT
 05128   REF  355   LAST 1354     5503   0 0002 0              TC      Q
R0513    ***ALL EXTENDED VERB ROUTINES THAT HAVE AT LEAST ONE FLASHING DISPLAY MUST TCF ENDMARK OR TCF ENDEXT WHEN
R0515    FINISHED.

 0516                          10,2326                         BANK    10
 0517    REF    1              10,2000                         SETLOC  DISPLAYS
 0518                          10,2326                         BANK

 0519    REF    1                                              COUNT*  $$/DSPLA
R0520    NTERONLY IS USED TO DIFFERENTIATE THE MARK ROUTINE WITH ONLY ONE RETURN TO THE USER FROM THE MARKING ROUTINE WIT
R0522    3 RETURNS TO THE USER. THIS ROUTINE IS ONLY USED BY GOMARK1 AND GOMARK1R.

 05291   REF    2   LAST  225  10,2326   0 5474 0   MARKEND    TC      CLEARMRK
 05297   REF    1              10,2327   1 3421 1              TCF     MARKOVER

 0530    REF    1              10,2330   54 155 1   GOMARK     TS      PLAYTEM1          ENTRANCE FOR MARK GODSP
 0531   REF  43  LAST 1317    10,2331   3 4735 1  GOMARS    CAF       BIT15           BIT15 SET FOR ALL MARK REQUESTS
 0532   REF   1               10,2332   1 2500 1            TCF       GOFLASH2

 0533   REF 246  LAST 1354    10,2333   3 4755 1  KLEENEX   CAF       ZERO            CLEAN OUT EXTENDED VERBS
 0534   REF   2  LAST 1354    10,2334  54  155 1  GOMARKF   TS        PLAYTEM1        ENTRANCE FOR MARK GOFLASH

 0535   REF   1               10,2335   3 3031 0            CAF       MARKFMSK        MARK,FLASH
 0536   REF   2  LAST 1355    10,2336   1 2500 1            TCF       GOFLASH2

 0539   REF   3  LAST 1355    10,2337  54  155 1  GOMARK2   TS        PLAYTEM1        MARK GOPERFS-3 AST. RETURNS
 0540   REF   1               10,2340   3 3520 0  MARKFORM  CAF       MPERFMSK        MARK, PERFORM, FLASH
 0541   REF   3  LAST 1355    10,2341   1 2500 1            TCF       GOFLASH2

 0542   REF   4  LAST 1355    10,2342  54  155 1  GOMARK3   TS        PLAYTEM1        USED FOR 3COMP DECIMAL PERFORM
 0543   REF   1               10,2343   3 3505 1            CAF       MARK3MSK
 0544   REF   4  LAST 1355    10,2344   1 2500 1            TCF       GOFLASH2

 0545   REF   5  LAST 1355    10,2345  54  155 1  GOMARK4   TS        PLAYTEM1
 0546   REF   1               10,2346   3 3506 1            CAF       MARK4MSK        MARK,PERFORM,FLASH,BLANK
 0547   REF   5  LAST 1355    10,2347   1 2500 1            TCF       GOFLASH2

 0548   REF   6  LAST 1355    10,2350  54  155 1  GOMARKP   TS        PLAYTEM1        ENTRANCE FOR MARK GODSPR

 0549   REF  44  LAST 1355    10,2351   3 4735 1            CAF       BIT15
 0550   REF   1               10,2352   1 2453 0            TCF       GODSPR2

 0551   REF   7  LAST 1355    10,2353  54  155 1  GOMARKFR  TS        PLAYTEM1        ENTRANCE FOR MARK GOFLASHR

 0552   REF   2  LAST 1355    10,2354   3 3031 0            CAF       MARKFMSK
 0553   REF   1               10,2355   1 2637 0            TCF       GODSPRS

 0559   REF   8  LAST 1355    10,2356  54  155 1  GOMARK2R  TS        PLAYTEM1        MARK GOPERFS-3 AST. RETS+ IMMEDIATE RET.
 0560   REF   2  LAST 1355    10,2357   3 3520 0            CAF       MPERFMSK        MARK, PERFORM, FLASH
 0561   REF   2  LAST 1355    10,2360   1 2637 0            TCF       GODSPRS

 05611  REF   9  LAST 1355    10,2361  54  155 1  GOMARK3R  TS        PLAYTEM1
 05612  REF   2  LAST 1355    10,2362   3 3505 1            CAF       MARK3MSK
 05613  REF   3  LAST 1355    10,2363   1 2637 0            TCF       GODSPRS

 0562   REF 134  LAST 1329    10,2364   3 4753 1  MAKEMARK  CAF       ONE
 0563   REF   1               10,2365   0 2735 1            TC        COPIES

 0564   REF   7  LAST 1354    10,2366   3 0100 0            CA        FLAGWRD4        IS NORM OR PRIO BUSY OR WAITING
 0565   REF   1               10,2367   7 3521 0            MASK      OCT34300
 0566   REF 428  LAST 1340    10,2370  10 0000 0            CCS       A
 0567   REF   1               10,2371   1 2427 0            TCF       CHKPRIO

 0568   REF   8  LAST 1355    10,2372   3 0100 0            CA        FLAGWRD4        IS MARK SLEEPING DUE TO ASTRO BUSY
 0569   REF   1               10,2373   7 4743 1            MASK      MRKNVBIT
 0570                         10,2374   0 0006 1            EXTEND
 0571    REF   1                 10,2375   1 2377 1                BZF      MARKPLAY            NO

 0572    REF 146   LAST 1210     10,2376   1 5155 1                TCF      ENDOFJOB

 0594                            10,2377   0 0004 0   MARKPLAY INHINT
 0595    REF  22   LAST 1285     10,2400   4 4756 0            CS       FIVE                RESET MARK OVER NORM, SET MARK
 0596    REF   9   LAST 1355     10,2401   7 0100 1            MASK     FLAGWRD4
 05965   REF 135   LAST 1355     10,2402   6 4753 1            AD       ONE
 0597    REF  10   LAST 1356     10,2403  54 100 1             TS       FLAGWRD4
 0598                            10,2404   0 0003 1            RELINT

 0599    REF   1                 10,2405   4 1071 1   GOGOMARK CS       MARKFLAG            PERFORM
 0600    REF  42   LAST 1336     10,2406   7 4747 0            MASK     BIT5
 0601    REF 429   LAST 1355     10,2407  10 000 0             CCS      A
 0602    REF   1                 10,2410   1 2413 1            TCF      MARKCOP
 0603    REF   1                 10,2411   4 0370 1            CS       MARKNV
 0604    REF   2   LAST 1356     10,2412  54 370 1             TS       MARKNV

 0605    REF 136   LAST 1356     10,2413   3 4753 1   MARKCOP  CAF      ONE                 MARK INDEX
 0606    REF   1                 10,2414   1 2616 0            TCF      PRIOPLAY

 0607    REF   1                 10,2415   3 0165 0   COPYTOGO CA       MPAC2SAV
 0608    REF 808   LAST 1354     10,2416  54 156 1             TS       MPAC +2

 0609    REF   1                 10,2417  50 164 1    COPYPACS INDEX    COPINDEX
 0610    REF   1                 10,2420   3 3531 0            CAF      PRIOOCT
 0611    REF   1                 10,2421  54 162 0             TS       GENMASK

 0612    REF   2   LAST 1356     10,2422  50 164 1             INDEX    COPINDEX
 0613    REF   1                 10,2423   3 1070 1            CAF      EBANKSAV
 0614    REF   1                 10,2424  54 160 1             TS       TEMPOR2             ACTIVE EBANK AND FLAG

 0615    REF  76   LAST 1331     10,2425  54 003 0             TS       EBANK

 0616    REF 356   LAST 1354     10,2426   0 0002 0            TC       Q

R0617    PINCHEK CHECKS TO SEE IF THE CURRENT MARK REQUEST IS MADE BY THE ASTRONAUT WHILE INTERRUPTING A GOPLAY DISPLAY
R0619    (A NORMAL OR A PRIO). IF THE ASTRONAUT TRIES TO MARK DURING A PRIO, THE CHECK FAIL LIGHT GOES ON AND THE MARK
R0621    REQUEST IS ENDED. IF HE TRIES TO MARK DURING A NORM, THE MARK IS ALLOWED. IN THIS CASE THE NORM IS PUT TO SLEEP
R0623    UNTIL ALL MARKING IS FINISHED.

R0624          IF THE MARK REQUEST COMES FROM THE PROGRAM DURING A TIME THE ASTRONAUT IS NOT INTERRUPTING A NORMAL OR A
R0626    PRIO, THE MARK REQUEST IS PUT TO SLEEP UNTIL THE +RESENT ACTIVE DISPLAY IS RESPONDED TO BY THE ASTRONAUT.

 0628    REF  11   LAST 1356     10,2427   3 0100 0   CHKPRIO  CA       FLAGWRD4            MARK ATTEMPT DURING PRIO
 0629    REF   1                 10,2430   7 3254 0            MASK     OCT24100
 0630    REF 430   LAST 1356     10,2431  10 000 0             CCS      A
 0631    REF   1                 10,2432   1 3454 0            TCF      MARSLEEP

 0632    REF  12   LAST 1356     10,2433   4 0100 1            CS       FLAGWRD4
 0633   REF   1              10,2434  7 4751 1            MASK    MKOVBIT          SET MARK OVER NORM
 0634                        10,2435  0 0004 0            INHINT
 0635   REF  13   LAST 1356  10,2436  26 100 1            ADS     FLAGWRD4

 0636   REF   1              10,2437  1 2534 0            TCF     SETNORM

 0637   REF   3   LAST 1356  10,2440  3 0370 0  MARKPERF  CA      MARKNV
 0638   REF   1              10,2441  7 4144 0            MASK    VERBMASK
 0639   REF   1              10,2442  1 3120 0            TCF     NV50DSP

 0640   REF  10   LAST 1355  10,2443  54 155 1  GODSP     TS      PLAYTEM1

 0641   REF 247   LAST 1355  10,2444  3 4755 1  GODSP2    CAF     ZERO
 0642   REF   6   LAST 1355  10,2445  1 2500 1            TCF     GOFLASH2

 0643   REF  11   LAST 1357  10,2446  54 155 1  GODSPRET  TS      PLAYTEM1         ENTRANCE FOR A GODSP WITH A PASTE

 0644   REF  56   LAST 1327  10,2447  3 4746 0            CAF     BIT6             SET BIT6 TO GO BACK TO USER AFTER NVSUB
 0645   REF   7   LAST 1357  10,2450  1 2500 1            TCF     GOFLASH2

 0646   REF  12   LAST 1357  10,2451  54 155 1  GODSPR    TS      PLAYTEM1

 0647   REF 248   LAST 1357  10,2452  3 4755 1  GODSPR1   CAF     ZERO
 0648   REF   3   LAST 1354  10,2453  54 160 1  GODSPR2   TS      PLAYTEM4

 0649   REF 249   LAST 1357  10,2454  3 4755 1            CAF     ZERO             * DONT MOVE
 0650   REF   1              10,2455  1 2641 1            TCF     GODSPRS1

R0651        CLEANDSP IS USED FOR CLEARING OUT A NORMAL DISPLAY THAT IS PRESENTLY ACTIVE OR A NORMAL DISPLAY THAT IS
R0653   SET UP TO BE STARTED OR RESTARTED.

R0654        NORMALLY THE USER WILL NOT NEED TO USE THIS ROUTINE SINCE A NEW NORMAL DISPLAY AUTOMATICALLY CLEARS OUT AN
R0656   OLD DISPLAY.

R0657        CALLING SEQUENCE FOR CLEANDSP-

A0658                                                     TC      BANKCALL
A0659                                                     CADR    CLEANDSP

 0660   REF 250   LAST 1357  10,2456  3 4755 1  CLEANDSP  CAF     ZERO
 0661   REF  13   LAST 1357  10,2457  54 155 1  REFLASH   TS      PLAYTEM1

 0662   REF   1              10,2460  3 3504 0            CAF     REDOMASK         FLASH AND PERMIT
 0663   REF   8   LAST 1357  10,2461  1 2500 1            TCF     GOFLASH2

 0664   REF  14   LAST 1357  10,2462  54 155 1  REFLASHR  TS      PLAYTEM1

 0665   REF   2   LAST 1357  10,2463  3 3504 0            CAF     REDOMASK         FLASH AND PERMIT
 0666   REF   4   LAST 1355  10,2464  1 2637 0            TCF     GODSPRS
 0667    REF  15  LAST 1357   10,2465  54 155 1  REGODSP  TS       PLAYTEM1

 0668    REF  76  LAST 1325   10,2466  3 4736 1           CAF      BIT14
 0669    REF   9  LAST 1357   10,2467  1 2500 1           TCF      GOFLASH2

 0670    REF  16  LAST 1358   10,2470  54 155 1  REGODSPR TS       PLAYTEM1

 0671    REF  77  LAST 1358   10,2471  3 4736 1           CAF      BIT14
 0672    REF   2  LAST 1355   10,2472  1 2453 0           TCF      GODSPR2

 06721   REF  17  LAST 1358   10,2473  54 155 1  CLOCPLAY TS       PLAYTEM1
 06722   REF   1              10,2474  3 3543 0           CAF      CLOCKCON
 06723   REF  10  LAST 1358   10,2475  1 2500 1           TCF      GOFLASH2

 0673    REF  18  LAST 1358   10,2476  54 155 1  GOFLASH  TS       PLAYTEM1

 0674    REF  50  LAST 1332   10,2477  3 4750 1           CAF      BIT4                 LEAVE ONLY FLASH BIT SET
 0675    REF   4  LAST 1357   10,2500  54 160 1  GOFLASH2 TS       PLAYTEM4

 0676    REF   1              10,2501  0 2722 1           TC       SAVELOCS

 0677                         10,2502  0 0003 1           RELINT

 0678    REF   1              10,2503  1 2546 0           TCF      MAKEPLAY             BRANCH DIRECT WITH NO SEPARATE JOB CALL

 0679    REF  19  LAST 1358   10,2504  54 155 1  PRIODSPR TS       PLAYTEM1

 0680    REF   1              10,2505  3 3523 0           CAF      BITS7+4
 0681    REF   5  LAST 1357   10,2506  1 2637 0           TCF      GODSPRS

 0682    REF  20  LAST 1358   10,2507  54 155 1  PRIODSP  TS       PLAYTEM1

 0683    REF   2  LAST 1358   10,2510  3 3523 0  SETPRIO  CAF      BITS7+4
 0684    REF  11  LAST 1358   10,2511  1 2500 1           TCF      GOFLASH2

 0685    REF 251  LAST 1357   10,2512  3 4755 1  MAKEPRIO CAF      ZERO
 0686    REF   3  LAST 1356   10,2513  54 164 0           TS       COPINDEX

 0687    REF   1              10,2514  0 3374 1           TC       LINUSCHK
 0688    REF   1              10,2515  1 2522 1           TCF      HIPRIO               LINUS RETURN
 0689    REF  14  LAST 1357   10,2516  3 0100 0           CA       FLAGWRD4
 0690    REF   1              10,2517  7 3542 0           MASK     OCT20100             IS PRIO IN ENDIDLE OR BUSY
 0691    REF 431  LAST 1356   10,2520  10 000 0           CCS      A
 0692    REF   1              10,2521  1 2575 0           TCF      PRIOBORT             YES, ABORT

 0693    REF  15  LAST 1358   10,2522  3 0100 0  HIPRIO   CA       FLAGWRD4             MARK ACTIVE
 0694    REF   1              10,2523  7 5642 0           MASK     OCT40400
 0695                         10,2524  0 0006 1           EXTEND
 0696    REF   1              10,2525  1 2530 1           BZF      ASKIFNRM             NO
 0697   REF 252  LAST 1358    10,2526  3 4755 1  SETMARK   CAF    ZERO
 0698   REF   1               10,2527  1 2774 0            TCF    JOBXCHS

 0699   REF  16  LAST 1358    10,2530  3 0100 0  ASKIFNRM  CA     FLAGWRD4          NORMAL ACTIVE
 0700   REF   1               10,2531  7 3540 1            MASK   OCT10200          BITS 13+8
 0701                         10,2532  0 0006 1            EXTEND
 0702   REF   1               10,2533  1 2536 1            BZF    OKTOCOPY          NO

 0703   REF 137  LAST 135     10,2534  3 4753 1  SETNORM   CAF    ONE
 0704   REF   2  LAST 1359    10,2535  1 2774 0            TCF    JOBXCHS

 0705   REF   1               10,2536  0 2734 0  OKTOCOPY  TC     COPYNORM
 0706   REF   1               10,2537  0 3205 0            TC     WITCHONE

 0707   REF   8  LAST 1328    10,2540  0 5137 1            TC     JOBWAKE

 0708   REF   1               10,2541  0 3222 0            TC     XCHTOEND

 0709   REF  20  LAST 1304    10,2542  3 0025 0  REDOPRIO  CA     TIME1             SAVE TIME PRIODSP SENT OUT
 0710   REF   1               10,2543  55'165 0            TS     PRIOTIME

 0711   REF 253  LAST 1359    10,2544  3 4755 1  KEEPPRIO  CAF    ZERO              START UP PRIO DISPLAY
 0712   REF   2  LAST 1356    10,2545  1 2616 0            TCF    PRIOPLAY

 0713   REF  33  LAST 1331    10,2546  3 0167 1  MAKEPLAY  CA     PRIORITY          SAVE USERS PRIORITY
 07131  REF   3  LAST 1331    10,2547  7 7725 1            MASK   PRIO37
 07132  REF   1               10,2550  54 163 1            TS     USERPRIO

 07133  REF   1               10,2551  3 7721 1            CAF    PRIO33            RAISE PRIORITY FOR FAST JOBS AFTER WAKE
 07134  REF  14  LAST  ■95    10,2552  0 5146 1            TC     PRIOCHNG

 07135  REF   5  LAST 1358    10,2553  3 0160 0            CA     PLAYTEM4          IS IT MARK OR PRIO OR NORM
 0714   REF   1               10,2554  7 3522 0            MASK   BITS15+7
 0715   REF 432  LAST 1358    10,2555  10 000 0            CCS    A
 0716   REF   1               10,2556  1 2512 1            TCF    MAKEPRIO          ITS PRIO
 0717   REF   1               10,2557  1 2561 0            TCF    IFLEGAL
 0718   REF   1               10,2560  1 2364 0            TCF    MAKEMARK          ITS MARK

 0719   REF  85  LAST 1329    10,2561  3 4752 0  IFLEGAL   CAF    TWO
 0720   REF   4  LAST 1358    10,2562  54 164 0            TS     COPINDEX

 0721   REF   2  LAST 1358    10,2563  0 3374 1            TC     LINUSCH■

 0722   REF   1               10,2564  1 2577 1            TCF    OKTOPLAY          LINUS RETURN
 0723   REF   3  LAST  230    10,2565  4 1072 1            CS     EBANKTEM
 0724   REF  51  LAST 1358    10,2566  7 4750 0            MASK   BIT4
 0725   REF 433  LAST 1359    10,2567  10 000 0            CCS    A
 0726   REF   2  LAST 1359    10,2570  1 2577 1            TCF    OKTOPLAY          NO

 0727   REF  17  LAST 1359    10,2571  3 0100 0            CA     FLAGWRD4          WAS NORM ASLEEP
 0728    REF    1                 10,2572  7 3513 1              MASK     NBUSMASK         ARE ANY NORMS ASLEEP
 0729                             10,2573  0 0006 1              EXTEND
 0730    REF    3   LAST 1359     10,2574  1 2577 1              BZF      OKTOPLAY         NO

 0731    REF    8   LAST 1331     10,2575  0 5552 0   PRIOBORT   TC       POODOO
 0732                             10,2576   01502 1              OCT      1502

 0733    REF    1                 10,2577  0 2736 1   OKTOPLAY   TC       COPIES2

 07331   REF    2   LAST 1359     10,2600  3 0163 0              CA       USERPRIO
 07332                            10,2601  0 0006 1              EXTEND
 07333   REF   25   LAST 1299     10,2602  04 007 1              ROR      SUPERBNK
 07334   REF    3   LAST  227     10,2603  54 366 0              TS       RESTREG

 0737    REF   13   LAST 1359     10,2604  3 0100 0              CA       FLAGWRD4         PRIO OR MARK GOING
 0738    REF    1                 10,2605  7 3514 0              MASK     PMMASK
 0739    REF  434   LAST 1359     10,2606  10 000 0              CCS      A
 0740    REF    1                 10,2607  1 2754 1              TCF      GOSLEEPS         YES

 0741                             10,2610  1 2612 1              TCF      +2
 0742    REF    2   LAST 1360     10,2611  1 2754 1              TCF      GOSLEEPS         MARK GOING

R0743    COULD PUT NORM BUSY CHECK HERE TO SAVE TIME
 0744    REF    2   LAST 1359     10,2612  0 3205 0              TC       WITCHONE         IS IT NVSUB BUSY, ENDIDLE OR NOONE
 0745    REF    9   LAST 1359     10,2613  0 5137 1              TC       JOBWAKE

 0746    REF    2   LAST 1359     10,2614  0 3222 0              TC       XCHTOEND

 0747    REF   86   LAST 1359     10,2615  3 4752 0   PLAYJUM1   CAF      TWO
 0748    REF    5   LAST 1359     10,2616  54 164 0   PRIOPLAY   TS       COPINDEX

 0749    REF    1                 10,2617  1 3070 1              TCF      GOPLAY

 0750    REF   21   LAST 1358     10,2620  54 155 1   EXDSPRET   TS       PLAYTEM1

 0751    REF    1                 10,2621  3 7734 0              CAF      BIT15+6
 0752    REF   12   LAST 1358     10,2622  1 2500 1              TCF      GOFLASH2

 0753    REF    2   LAST  946     10,2623  55'045 0   GOPERF1    TS       NORMTEM1         STORE DESIRED CHECKLIST VALUE
 0754    REF    1                 10,2624  3 3476 1              CAF      V01N25           USED TO DISPLAY CHECKLIST VALUE IN R1

 0755    REF   22   LAST 1360     10,2625  54 155 1   GOPERFS    TS       PLAYTEM1

 0756    REF    1                 10,2626  3 3475 1              CAF      PERFMASK         LEAVE ONLY FLASH, PERFORM, BLANKING
 0757    REF   13   LAST 1360     10,2627  1 2500 1              TCF      GOFLASH2

 0758    REF   23   LAST 1360     10,2630  54 155 1   GOPERF2    TS       PLAYTEM1         DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

 0759    REF    1                 10,2631  3 3501 0              CAF      PERF2MSK
 0760    REF   14   LAST 1360     10,2632  1 2500 1              TCF      GOFLASH2
 0764    REF    1               10,2633  0 2715 0  GOPERF4   TC       PUPRS4

 0765    REF   15   LAST 1360   10,2634  1 2500 1            TCF      GOFLASH2

 0766    REF   24   LAST 1360   10,2635  54 155 1  GOFLASHR  TS       PLAYTEM1

 0767    REF   52   LAST 1359   10,2636  3 4750 1            CAF      BIT4             LEAVE ONLY FLASH BIT SET
 0768    REF    6   LAST 1359   10,2637  54 160 1  GODSPRS   TS       PLAYTEM4

 0769    REF   38   LAST 1324   10,2640  3 6245 1            CAF      THREE

 0770                           10,2641  0 0004 0  GODSPRS1  INHINT                    IMMEDIATE RETURN IS CALL CADR +4
 0771    REF   16   LAST 1328   10,2642  54 072 0            TS       RUPTREG3

 0772    REF   34   LAST 135    10,2643  3 0167 1            CA       PRIORITY         MAKE DISPLAY ONE HIGHER THAN USER
 0773    REF    4   LAST 135    10,2644  7 7725 1            MASK     PRIO37
 0774    REF   11   LAST 1112   10,2645  54 063 0            TS       NEWPRIO

 07741   REF    7   LAST 1361   10,2646  3 0160 0            CA       PLAYTEM4         IS THIS A FLASHING R DISPLAY
 07742   REF   53   LAST 1361   10,2647  7 4750 0            MASK     BIT4
 07743   REF  435   LAST 1361   10,2650  10 000 0            CCS      A
 07744   REF    1               10,2651  1 2657 0            TCF      VACDSP           YES, MAKE DSPLAY JOB A VAC
 07745   REF   12   LAST 1361   10,2652  3 0063 1            CA       NEWPRIO          NO, MAKE DSPLAY JOB A NOVAC
 07746   REF   29   LAST 1338   10,2653  0 5072 1            TC       NOVAC
 07747   REF    4   LAST  781   E7,1471                      EBANK=   WHOCARES
 07748   REF    2   LAST 1358   10,2654   02546 1            2CADR    MAKEPLAY
 07748                          10,2655   20067 1
 07749   REF    1               10,2656  1 2665 1            TCF      BOTHJOBS

 0775    REF   44   LAST 1331   10,2657  3 0006 1  VACDSP    CA       BBANK
 0776                           10,2660  0 0006 1            EXTEND
 0777    REF   26   LAST 1360   10,2661  04 007 1            ROR      SUPERBNK
 0778    REF  235   LAST 1336   10,2662  54 001 1            TS       L
 0779    REF    1               10,2663  3 3537 0            CAF      MAKEGEN
 0780    REF    3   LAST  360   10,2664  0 5116 1            TC       SPVAC

 0781    REF    2   LAST 1358   10,2665  0 2722 1  BOTHJOBS  TC       SAVELOCS         COPY TEMPS INTO PERMANENT REGISTERS

 0782                           10,2666  0 0006 1            EXTEND                    SAVE NVWORD AND USERS MPAC +2
 0783    REF  809   LAST 1356   10,2667  3 0156 0            DCA      MPAC +1
 0784    REF   25   LAST 1338   10,2670  50 064 0            INDEX    LOCCTR
 0785    REF  810   LAST 1361   10,2671  52 156 1            DXCH     MPAC +1

 0786                           10,2672  0 0006 1            EXTEND                    SAVE USERS CADR, FLAGS AND EBANK
 0787    REF  811   LAST 1361   10,2673  3 0160 0            DCA      MPAC +3
 0788    REF   26   LAST 1361   10,2674  50 064 0            INDEX    LOCCTR
 0789    REF  812   LAST 1361   10,2675  52 160 1            DXCH     MPAC +3

 0790    REF   27   LAST 1361   10,2676  3 0064 0            CA       LOCCTR
 0791    REF  813   LAST 1361   10,2677  54 161 0            TS       MPAC +5
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L         DISPLAY INTERFACE ROUTINES                                                   USER'S PAGE NO.  22       EO S3

 0792    REF    1                 10,2700   0 2727 1              TC      SAVELOCR
 0793                             10,2701   0 0003 1              RELINT

 0794    REF   13   LAST 1294     10,2702   1 4640 0              TCF     BANKJUMP            CALL CADR +4

 0795    REF    3   LAST 1360     10,2703   55'043 0   GOPERF1R   TS      NORMTEM1            DESIRED CHECKLIST VALUE

 0796    REF    2   LAST 1360     10,2704   3 3476 1              CAF     V01N25              DISPLAYS CHECKLIST VALUE IN R1

 0797    REF   25   LAST 1361     10,2705   54 155 1   GOPERFRS   TS      PLAYTEM1

 0798    REF    2   LAST 1360     10,2706   3 3475 1              CAF     PERFMASK            LEAVE ONLY FLASH, PERFORM, BLANKING
 0799    REF    6   LAST 1358     10,2707   1 2637 0              TCF     GODSPRS

 0800    REF   26   LAST 1362     10,2710   54 155 1   GOPERF2R   TS      PLAYTEM1            DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

 0801    REF    2   LAST 1360     10,2711   3 3501 0              CAF     PERF2MSK
 0802    REF    7   LAST 1362     10,2712   1 2637 0              TCF     GODSPRS

 0806    REF    2   LAST 1361     10,2713   0 2715 0   GOPERF4R   TC      PURRS4

 0807    REF    8   LAST 1362     10,2714   1 2637 0              TCF     GODSPRS

 0808    REF    8   LAST  976     10,2715   55'144 0   PURRS4     TS      OPTION1             DESIRED OPTION CODE

 0809    REF    1                 10,2716   3 3502 0              CAF     V04N06
 0810    REF   27   LAST 1362     10,2717   54 155 1              TS      PLAYTEM1

 0811    REF    1                 10,2720   3 3503 1              CAF     PERF4MSK            FLASH,PERFORM AND BLANK R3
 0812    REF  357   LAST 1356     10,2721   0 0002 0              TC      Q

 0813                             10,2722   0 0004 0   SAVELOCS   INHINT

 0815    REF    1                 10,2723   4 3512 0              CS      OCT3400             EBANK BITS
 0816    REF    8   LAST 1361     10,2724   7 0160 1              MASK    PLAYTEM4
 0817    REF   77   LAST 1356     10,2725   6 0003 1              AD      EBANK
 0818    REF    9   LAST 1362     10,2726   54 160 1              TS      PLAYTEM4

 0819    REF  358   LAST 1362     10,2727   22 002 0   SAVELOCR   LXCH    Q

 0820    REF   14   LAST 1330     10,2730   0 4645 1              TC      MAKECADR
 0821    REF    1                 10,2731   54 157 0              TS      PLAYTEM3

 0822    REF   17   LAST 1361     10,2732   6 0072 1              AD      RUPTREG3            NOT USED FOR NON R ROUTINES
 0823    REF  236   LAST 1361     10,2733   0 0001 0              TC      L

 0824    REF  254   LAST 1359     10,2734   3 4755 1   COPYNORM   CAF     ZERO
 0825    REF    6   LAST 1360     10,2735   54 164 0   COPIES     TS      COPINDEX
 0826                             10,2736   0 0004 0   COPIES2    INHINT
 0827    REF   10   LAST 1362     10,2737   3 0160 0              CA      PLAYTEM4            FLAGWORD
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0828   REF    7  LAST 1362   10,2740   50 164 1              INDEX   COPINDEX
0829   REF    2  LAST 1356   10,2741   55'070 0              TS      EBANKSAV        EQUIV TO DSPFLG

0830   REF    1              10,2742   7 3530 0              MASK    CADRMASK        FLASH AND GODSPEET
0831                         10,2743   0 0006 1              EXTEND
0832   REF    1              10,2744   1 2750 0              BZF     SKIPADD

0833   REF    2  LAST 1362   10,2745   3 0157 1              CA      PLAYTEM3
0834   REF    8  LAST 1363   10,2746   50 164 1              INDEX   COPINDEX
0835   REF    2  LAST  195   10,2747   54 372 0              TS      CADRFLSH

0836   REF   20  LAST 1362   10,2750   3 0155 0   SKIPADD    CA      PLAYTEM1        VERB NOUN
0837   REF    9  LAST 1363   10,2751   50 164 1              INDEX   COPINDEX
0838   REF    2  LAST  745   10,2752   54 367 1              TS      NVWORD

0842   REF    1              10,2753   1 3231 0              TCF     RELINTQ

0843   REF   10  LAST 1363   10,2754   50 164 1   GOSLEEPS   INDEX   COPINDEX
0844   REF    2  LAST 1356   10,2755   3 3531 0              CA      PRIOOCT
0845   REF    1              10,2756   7 2760 0              MASK    WAITMASK
0846   REF    1              10,2757   0 3544 1              TC      UPENT2
0847                         10,2760    03004 0   WAITMASK   OCT     3004
0848   REF  136  LAST 1357   10,2761   4 4753 0              CS      ONE
0849   REF   11  LAST 1363   10,2762   6 0164 1              AD      COPINDEX
0850   REF    1              10,2763   54 154 0              TS      FACEREG

0851   REF    2  LAST 1363   10,2764   50 154 1   XCHSLEEP   INDEX   FACEREG
0852   REF    1              10,2765   3 3510 0              CAF     WAKECADR
0853                         10,2766   0 0004 0              INHINT
0854   REF   10  LAST 1360   10,2767   0 5137 1              TC      JOBWAKE         FIND CADR IN JOB AREA

0855   REF    3  LAST 1360   10,2770   0 3222 0              TC      XCHTOEND        CAUSES AWAKENED JOB TO GO TO ENDOFJOB

0858   REF    3  LAST 1363   10,2771   50 154 1              INDEX   FACEREG         REPLACE SAME CADR BUT NEW JOB AREA
0859   REF    2  LAST 1363   10,2772   3 3510 0              CAF     WAKECADR
0860   REF    7  LAST 1330   10,2773   1 5133 1              TCF     JOBSLEEP

0861   REF    4  LAST 1363   10,2774   54 154 0   JOBXCHS    TS      FACEREG         CONTROLS TYPE OF DISPLAY PUT TO SLEEP
0862   REF    3  LAST 1360   10,2775   0 3205 0              TC      WITCHONE
0863   REF   11  LAST 1363   10,2776   0 5137 1              TC      JOBWAKE
0864   REF    5  LAST 1363   10,2777   3 0154 1              CA      FACEREG
0865   REF   28  LAST 1361   10,3000   50 064 0              INDEX   LOCCTR
0866   REF    6  LAST 1363   10,3001   54 154 0              TS      FACEREG

0867   REF    1              10,3002   3 3015 0              CAF     XCHQADD
0868   REF    1              10,3003   0 3223 1              TC      XCHNYLOC

0869   REF    7  LAST 1363   10,3004   50 154 1              INDEX   FACEREG
0870   REF    1              10,3005   3 3532 0              CA      MARKOCT
0871   REF    1              10,3006   7 3534 1              MASK    IDLESLEP
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 0872    REF    1               10,3007  0 3554 0           TC       DOWNENT2
 0873                           10,3010   74004 0 IDLEMASK OCT       74004              * DONT MOVE

 0874    REF    9  LAST 1363    10,3011  50 154 1           INDEX    FACEREG            BIT SHOWS PRIO INTERRUPTED NORM OR MARK
 0875    REF   43  LAST 1356    10,3012  3 4747 1           CA       BIT5               BIT5 FOR MARK, BIT4 FOR NORMAL
 0876    REF   29  LAST 1322    10,3013  6 4751 0           AD       FOUR
 0877    REF    2  LAST 1363    10,3014  0 3544 1           TC       UPENT2             FLAG ROUTINE DOES RELINT
 0878    REF    1               10,3015   02764 0 XCHQADD  GENADR   XCHSLEEP           * DONT MOVE
 0879    REF   19  LAST 1360    10,3016  3 0100 0           CA       FLAGWRD4
 0880    REF    7  LAST 1357    10,3017  7 4751 1           MASK     MKOVBIT            MARK OVER NORM ?
 0881    REF  436  LAST 1361    10,3020  10 0000 0          CCS      A
 0882    REF    2  LAST 1356    10,3021  0 2377 0 GENMARK  TC       MARKPLAY           USED AS GENADR FOR JOBWAKE
 0883    REF    2  LAST 1359    10,3022  1 2536 1           TCF      OKTOCOPY

 0884    REF  255  LAST 1362    10,3023  3 4755 1 MARKWAKE CAF      ZERO
 0885    REF    2  LAST 1356    10,3024  54 160 1 WAKEPLAY TS       TEMPOR2

 0886    REF    3  LAST 1364    10,3025  50 160 0           INDEX    TEMPOR2
 0887    REF    1               10,3026  3 3524 1           CA       BITS5+11
 0888    REF   30  LAST 1364    10,3027  6 4751 0           AD       FOUR
 0889    REF    2  LAST 1364    10,3030  0 3554 0           TC       DOWNENT2
 0890                           10,3031   40010 1 MARKFMSK OCT      40010              ***DONT MOVE

 0891    REF    4  LAST 1364    10,3032  50 160 0           INDEX    TEMPOR2
 0892    REF    3  LAST 1363    10,3033  3 3510 0           CAF      WAKECADR
 0893                           10,3034  0 0004 0           INHINT
 0894    REF   12  LAST 1363    10,3035  0 5137 1           TC       JOBWAKE

 0895    REF    1               10,3036  1 3335 0           TCF      ENDRET

R0896         ALL .1 RESTARTS BRANCH DIRECTLY TO INITDSP. NORMAL DISPLAYS ARE THEONLY DISPLAYS ALLOWED TO USE .1 RESTARTS
R0898    INITDSP FIRST RESTORES THE EBANK AND THE SUPERBANK TO THE MOST RECENT NORMAL EBANK AND SUPERBANK.
R0900         IF THE MOST RECENT NORMAL DISPLAY REQUEST WAS NOT FINISHED, CONTROLIS SENT BACK TO THE LAST NORMAL USER.
R0902    OTHERWISE THE NORMAL DISPLAY SET UP IN THE NORMAL DISPLAY REGS IS STARTED UP IMMEDIATELY.

 0904    REF    4  LAST 1359    10,3037  3 1072 0 INITDSP  CA       EBANKTEM           RESTORE MOST RECECT NORMAL EBANK
 0905    REF   78  LAST 1362    10,3040  54 003 0           TS       EBANK

 0906    REF    4  LAST 1360    10,3041  3 0366 1           CA       RESTREG            SUPERBANK AND JOB PRIORITY
 0907    REF    1               10,3042  0 4727 1           TC       SUPERSW            RESTORE SUPERBANK

 0908    REF    5  LAST 1361    10,3043  7 7725 1           MASK     PRIO37
 0909    REF   15  LAST 1359    10,3044  0 5146 1           TC       PRIOCHNG

 0910    REF   39  LAST 1361    10,3045  4 6245 0           CS       THREE
 0911    REF    3  LAST  231    10,3046  6 0374 1           AD       TEMPFLSH
 0912    REF   19  LAST 1362    10,3047  1 4640 0           TCF      BANKJUMP

 0913                           10,3050  0 0003 1 PINBRNCH RELINT                      FOR GOPIN USERS
 09135   REF    1               10,3051  3 1073 1           CA       MARK2PAC           NEEDED TO SAVE MPAC +2 FOR MARK USERS
 0914   REF 814  LAST 1361   10,3052  54 156 1              TS      MPAC +2          ONLY

 0915   REF  20  LAST 1364   10,3053   3 0100 0             CA      FLAGWRD4         PINBRANCH CONDITION
 0916   REF   1              10,3054   7 7740 1             MASK    PINMASK
 0917   REF 437  LAST 1364   10,3055  10 000 0              CCS     A
 0918                        10,3056   1 3061 1             TCF     +3
 0919   REF   1              10,3057   1 3471 1             TCF     ERASER           ** NOTHING IN ENDIDLE
 0920   REF   3  LAST 1364   10,3060   1 2377 1             TCF     MARKPLAY

 0921   REF  72  LAST 1335   10,3061   0 5504 0  NORMBNCH   TC      UPFLAG           SET PINBRANCH BIT
 0922   REF   1              10,3062    00105 0             ADRES   PINBRFLG

 0923   REF   1              10,3063   3 4736 1             CAF     PRIODBIT         PRIO INTERRUPTED
 0924   REF  21  LAST 1365   10,3064   7 0100 1             MASK    FLAGWRD4
 0925   REF 438  LAST 1365   10,3065  10 000 0              CCS     A
 0926   REF   1              10,3066   1 2544 1             TCF     KEEPPRIO

 0927   REF   1              10,3067   1 2615 0             TCF     PLAYJUM1

 0928   REF   1              10,3070   0 2417 1  NVDSP      TC      COPYPACS

 09281  REF   5  LAST 1364   10,3071   3 0160 0             CA      TEMPOR2          SET UP BLANK BITS FOR NVMONOPT IN CASE
 09282  REF  22  LAST 1331   10,3072   7 4757 1             MASK    SEVEN            USER REQUESTS BLANKING MONITOR
 09283  REF 237  LAST 1362   10,3073  54 001 1              TS      L

 0929   REF  46  LAST 1322   10,3074   4 4737 1             CS      BIT13
 0930   REF  12  LAST 1363   10,3075  50 164 1              INDEX   COPINDEX
 0931   REF   1              10,3076   7 1070 0             MASK    DSPFLG
 0932   REF  13  LAST 1365   10,3077  50 164 1              INDEX   COPINDEX
 0933   REF   2  LAST 1365   10,3100  55'070 0              TS      DSPFLG

 0934   REF  41  LAST 1331   10,3101   7 4744 0             MASK    BIT8             BIT8 SET IF DEC MARK PERFORM DISPLAY
 0935   REF  33  LAST 1267   10,3102  54 141 1              TS      TEM1

 0936   REF 315  LAST 1365   10,3103   3 0156 0             CA      MPAC +2
 0937   REF   2  LAST 1356   10,3104  54 165 1              TS      MPAC2SAV

 0938   REF   2  LAST 1364   10,3105  55'073 0              TS      MARK2PAC         * FOR DISK ONLY *
 0939   REF  14  LAST 1365   10,3106  50 164 1              INDEX   COPINDEX
 0940   REF   3  LAST 1363   10,3107  10 367 1              CCS     NVWORD
 0941   REF   1              10,3110   1 3117 1             TCF     NVDSP1
 0942   REF   1              10,3111   1 3233 1             TCF     CLEANEND
 0943   REF   4  LAST 1357   10,3112   4 0370 1             CS      MARKNV
 0944   REF   5  LAST 1365   10,3113  54 370 1              TS      MARKNV           IN CASE MARKPLAY AWAKENED AFTER SLEEPING
 0945   REF  12  LAST 1326   10,3114   7 6074 0             MASK    LOW7
 0946   REF   1              10,3115   6 3515 0             AD      V05N00M1
 0947   REF  34  LAST 1365   10,3116   6 0141 0             AD      TEM1
 0948   REF 139  LAST 1363   10,3117   6 4753 1  NVDSP1     AD      ONE
 0949   REF   1              10,3120   0 4155 1  NV50DSP    TC      NVMONOPT
 0950   REF   1              10,3121   1 3245 0             TCF     REST             IF BUSY
 0951   REF   6  LAST  468   10,3122  0 4433 1             TC     FLASHOFF       IN CASE OF EXTENDED VERB NON FLASH

 0952   REF   1              10,3123  0 2415 0             TC     CCPYTOGO       MPACS DESTROYED BY NVSUB
 0953   REF  94  LAST 1337   10,3124  0 5516 0             TC     DOWNFLAG       UNSET SLEEPING BITS
 0954   REF   1              10,3125   00102 1             ADRES  MRKNVFLG
 09541  REF  95  LAST 1366   10,3126  0 5516 0             TC     DOWNFLAG
 09542  REF   1              10,3127   00103 0             ADRES  NRMNVFLG
 09543  REF  96  LAST 1366   10,3130  0 5516 0             TC     DOWNFLAG
 09544  REF   1              10,3131   00104 1             ADRES  PRONVFLG
 0955   REF   6  LAST 1365   10,3132  3 0160 0  BLANKCHK   CA     TEMPOR2        BLANK BITS 1,2,3 IF SET
 0956   REF   2  LAST  439   10,3133  0 4255 1             TC     BLANKSUB
 0957   REF   1              10,3134  1 3070 1             TCF    NVDSP
 0958   REF  44  LAST 1364   10,3135  3 4747 1  PERFCHEK   CAF    BIT5           BIT 5 FOR PERFORM
 0959   REF   7  LAST 1366   10,3136  7 0160 1             MASK   TEMPOR2
 0960   REF 439  LAST 1365   10,3137  10 000 0             CCS    A              IS THIS A GOPERF DISPLAY
 0961   REF   1              10,3140  1 3163 1             TCF    1STOR2ND       YES

 0962   REF  54  LAST 1361   10,3141  3 4750 1  GOANIDLE   CAF    BIT4
 0963   REF   8  LAST 1366   10,3142  7 0160 1             MASK   TEMPOR2
 0964   REF 440  LAST 1366   10,3143  10 000 0             CCS    A
 0965   REF   1              10,3144  1 3260 1             TCF    FLASHSUB       IT IS

 0966   REF   9  LAST 1366   10,3145  4 0160 1             CS     TEMPOR2        IS THIS A GODSPRET
 0967   REF  57  LAST 1357   10,3146  7 4746 1             MASK   BIT6
 0968   REF 441  LAST 1366   10,3147  10 000 0             CCS    A
 0969   REF   1              10,3150  1 3155 1             TCF    ISITNOO

 09691  REF  15  LAST 1365   10,3151  50 164 1             INDEX  COPINDEX
 09692  REF   3  LAST 1363   10,3152  3 0372 1             CA     CADRFLSH
 09693  REF 816  LAST 1365   10,3153  54 157 0             TS     MPAC +3
 09694  REF   1              10,3154  1 3353 0             TCF    ENDIT

 0972   REF  16  LAST 1366   10,3155  50 164 1  ISITNOO    INDEX  COPINDEX       IS THIS A PASTE
 0973   REF   4  LAST 1365   10,3156  3 0367 0             CA     NVWORD
 0974   REF  13  LAST 1365   10,3157  7 6074 0             MASK   LOW7           CHECK MADE FOR PINBRNCH AND PRIO ON MARK
 0975                        10,3160  0 0006 1             EXTEND
 0976   REF   2  LAST 1366   10,3161  1 3260 1             BZF    FLASHSUB       YES, ASSUME PASTE ALWAYS ON FLASH

 0977   REF 147  LAST 1356   10,3162  1 5155 1             TCF    ENDOFJOB       NOT FLASH, NOT GOPERF , THERFORE EXIT

 0978   REF  10  LAST 1366   10,3163  3 0160 0  1STOR2ND   CA     TEMPOR2
 0979   REF  47  LAST 1365   10,3164  7 4737 1             MASK   BIT13
 0980   REF 442  LAST 1366   10,3165  10 000 0             CCS    A
 0981   REF   1              10,3166  1 3141 1             TCF    GOANIDLE       SECOND

 0982   REF  48  LAST 1366   10,3167  3 4737 0             CA     BIT13
 0983   REF  17  LAST 1366   10,3170  50 164 1             INDEX  CCPINDEX
 0984   REF   3  LAST 1365   10,3171  27'070 0             ADS    DSPFLG

 09845                       10,3172  22 007 0             ZL
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L          DISPLAY INTERFACE ROUTINES                                                   USER'S PAGE NO.  27        EO 53

 0985                       10,3173  0 0006 1           EXTEND                 IS IT MARK
 0986     REF   1           10,3174  6 2440 0           BZMF     MARKPERF      YES

 0987     REF  36  LAST 1302  10,3175  7 4740 1           MASK     BIT12
 09871                      10,3176  0 0006 1           EXTEND
 09872    REF   1           10,3177  1 3203 1           BZF      V50PASTE
 09874    REF   3  LAST  745  10,3200  4 1067 0           CS       NVWORD1       NVOWRD1= -0 IS V97. NVWORD1= -400 IS V99
 098741 REF   1             10,3201  6 3541 1           AD       V97N00
 09875    REF   2  LAST 1357  10,3202  1 3120 0           TCF      NV50DSP
 0988     REF   1           10,3203  3 3500 1 V50PASTE CAF      V50N00
 0989     REF   3  LAST 1367  10,3204  1 3120 0           TCF      NV50DSP       DISPLAY SECOND PART OF GOPERF

 0990     REF  45  LAST 1366  10,3205  4 4747 0 WITCHONE CS       BIT5          TURN OFF KEY RELEASE LIGHT
 0991                       10,3206  0 0006 1           EXTEND
 0992     REF  35  LAST 1339  10,3207  03 011 1           WAND     DSALMOUT

 0993     REF  22  LAST 1365  10,3210  3 0100 0           CA       FLAGWRD4
 0994     REF   1           10,3211  7 3514 1           MASK     NVBUSMSK      IS IT NVSUB ASLEEP
 0995     REF 143  LAST 1366  10,3212  10 000 0           CCS      A
 0996     REF 140  LAST 1365  10,3213  3 4753 1           CAF      ONE
 0997     REF 238  LAST 1365  10,3214  54 001 1           TS       L
 0998     REF 256  LAST 1364  10,3215  3 4755 1           CAF      ZERO
 0999     REF 239  LAST 1367  10,3216  50 001 0           INDEX    L
 1000     REF  11  LAST  458  10,3217  57 042 0           XCH      CADRSTOR

 1001                       10,3220  0 0004 0           INHINT
 1002     REF 359  LAST 1362  10,3221  0 0002 0           TC       Q

 1003     REF   6  LAST  448  10,3222  3 4217 1 XCHTOEND CAF      ENDINST       TC ENDOFJOB REPLACES GENADR IN LOC FOR
 1004     REF  29  LAST 1363  10,3223  56 064 0 XCHNYLOC XCH      LOCCTR        WAS THIS ADDRESS SLEEPING
 1005                       10,3224  0 0006 1           EXTEND
 1006     REF   2  LAST 1363  10,3225  6 3231 1           BZMF     RELINTQ       NO
 1007     REF  30  LAST 1367  10,3226  56 064 0           XCH      LOCCTR        YES
 1008     REF  31  LAST 1367  10,3227  50 064 0           INDEX    LOCCTR
 1009     REF  45  LAST 1328  10,3230  54 164 0           TS       LOC

 1010                       10,3231  0 0003 1 RELINTQ  RELINT
 1011     REF 360  LAST 1367  10,3232  0 0002 0           TC       Q             BACK TO USER

 1012     REF   4  LAST  889  10,3233  3 7720 0 CLEANEND CAF      PRIO32        ONE LOWER THAN DISPLAYS SLEEPING
 1014     REF  44  LAST 1308  10,3234  0 5105 0           TC       FINDVAC
 1015     REF   2  LAST  211     0371                     EBANK=   NVSAVE
 1016     REF   1           10,3235   04231 0           2CADR    JAMTERM
 1016     REF   1           10,3236   04060 0

 1017     REF   3  LAST 1366  10,3237  1 3261 0           TCF      FLASHSUB +1

 1018     REF  23  LAST 1367  10,3240  3 0100 0 ISITPRIO CA       FLAGWRD4
 1019     REF   1           10,3241  7 3266 1           MASK     ITISMASK      IS PINBRFLG, MARKIDFLG SET
 1020                       10,3242  0 0006 1           EXTEND
 1021  REF   2  LAST 1358   10,3243  1 2575 0           BZF     PRIOBORT
 1022  REF 148  LAST 1366   10,3244  1 5155 1           TCF     ENDOFJOB

 1023  REF  12  LAST 1367   10,3245  11'042 1  TEST     CCS     CADRSTOR       IS SOMEONE IN ENDIDLE
 1024  REF 149  LAST 1368   10,3246  1 5155 1           TCF     ENDOFJOB       YES
 1025  REF   1              10,3247  1 3251 0           TCF     RESTSLEP

 1026  REF 150  LAST 1368   10,3250  1 5155 1           TCF     ENDOFJOB

 1027  REF   2  LAST 1356   10,3251  3 0162 1  RESTSLEP CA      GENMASK        SET NVSLEEP BITS
 1028  REF   1              10,3252  7 3517 0           MASK    ASTROMSK
 1029  REF   3  LAST 1364   10,3253  0 3544 1           TC      UPENT2
 1030                       10,3254   24100 0  OCT24100 OCT     24100          *** DONT MOVE

 1031  REF  18  LAST 1366   10,3255  50 164 1           INDEX   COPINDEX
 1032  REF   1              10,3256  3 3507 0           CAF     NVCADR
 1033  REF   2  LAST  464   10,3257  0 4442 1           TC      NVSUBUSY       BUSY OR ABORT IF ILLEGAL

 1034  REF   4  LAST  447   10,3260  0 4427 1  FLASHSUB TC      FLASHON

 1035  REF  19  LAST 1368   10,3261  3 0164 1           CA      COPINDEX       COPINDEX DESTROYED BY ENDIDLE
 1036  REF   1              10,3262  54 157 0           TS      COPMPAC

 1037  REF   3  LAST 1368   10,3263  3 0162 1           CA      GENMASK
 1038  REF   1              10,3264  7 3010 1           MASK    IDLEMASK
 1039  REF   4  LAST 1368   10,3265  0 3544 1           TC      UPENT2
 1040                       10,3266   40040 1  ITISMASK OCT     40040          *** ENDIDLE ALLOW *** DONT MOVE

 1041  REF   2  LAST  222   10,3267  3 1074 0           CA      R1SAVE         IS THIS A REPEAT AND RETURN DISPLAY
 1042  REF  20  LAST 1368   10,3270  50 164 1           INDEX   COPINDEX
 1043  REF  36  LAST 1339   10,3271  7 4751 1           MASK    BIT3
 1044  REF 444  LAST 1367   10,3272  10 000 0           CCS     A
 1045  REF   1              10,3273  1 3360 0           TCF     UNSETR1        YES

 1046  REF  13  LAST 1368   10,3274  11'042 1           CCS     CADRSTOR       SEE IF SOMEONE ALREADY IN ENDIDLE
 1047  REF   1              10,3275  1 3240 0           TCF     ISITPRIO
 1048                       10,3276  1 3300 0           TCF     +2
 1049  REF   2  LAST 1368   10,3277  1 3240 0           TCF     ISITPRIO

 1050  REF   1              10,3300  0 4207 0           TC      ENDIDLE
 1051  REF   1              10,3301  1 3372 0  IDLERET1 TCF     TERMATE

 1052  REF   1              10,3302  1 3411 1           TCF     PROCEED        ENDIDLE RETURNS HERE ON PROCEED

 1053  REF   1              10,3303  4 3526 1           CS      LOWLOAD
 1054  REF 817  LAST 1366   10,3304  6 0154 1           AD      MPAC           VERBREG
 1055                       10,3305  0 0006 1           EXTEND
 1056  REF 445  LAST 1368   10,3306  26 000 0           DIM     A
 1057                       10,3307  0 0006 1           EXTEND
 1058  REF   1              10,3310  1 3461 0           BZF     LOADITIS       V21 OR V22 OR V23 ON DSKY
 1059   REF  87  LAST 1360   10,3311  3 4752 0  OKTCENT  CAF     TWO
 1060   REF   1              10,3312  54 161 0  ENDOUT   TS      OUTHERE

 1061   REF  24  LAST 1367   10,3313  3 0100 0           CA      FLAGWRD4      CHECK NATURE OF ENDIDLE RETURN
 1062   REF   2  LAST 1300   10,3314  7 4101 1           MASK    OCT60000
 1063   REF 446  LAST 1368   10,3315  10 000 0           CCS     A
 1064   REF   1              10,3316  1 3321 0           TCF     TIMECHEK      PRIO ENDIDLE RETURN
 1065   REF   1              10,3317  1 3427 1           TCF     NORMRET       NORMAL ENDIDLE RETURN
 1066   REF   1              10,3320  1 3413 0           TCF     MARKRET       MARK ENDIDLE RETURN

 1067   REF  21  LAST 1359   10,3321  4 0025 1  TIMECHEK CS      TIME1
 1068   REF   2  LAST 1359   10,3322  6 1165 1           AD      PRIOTIME
 1069   REF 447  LAST 1369   10,3323  10 000 0           CCS     A
 1070                        10,3324  4 0000 0           COM
 1071   REF   3  LAST 1305   10,3325  6 7731 0           AD      OCT37776
 1072   REF 141  LAST 1367   10,3326  6 4753 1           AD      ONE
 1073   REF   1              10,3327  6 3570 0           AD      -2SEC
 1074                        10,3330  0 0006 1           EXTEND
 1075   REF   2  LAST 1365   10,3331  6 2544 0           BZMF    KEEPPRIO

 1076   REF   2  LAST 1369   10,3332  1 3427 1           TCF     NORMRET

 1084   REF 142  LAST 1369   10,3333  3 4753 1  NORMWAKE CAF     ONE
 1085   REF   1              10,3334  1 3024 0           TCF     WAKEPLAY

 1086   REF   2  LAST 1369   10,3335  10 161 0  ENDRET   CCS     OUTHERE
 1087   REF 143  LAST 1369   10,3336  6 4753 1           AD      ONE
 1088                        10,3337  1 3341 0           TCF     +2            NORMAL ENDIDLE EXIT
 1089   REF 151  LAST 1369   10,3340  1 5155 1           TCF     ENDOFJOB
 1090   REF   2  LAST 1368   10,3341  50 157 1           INDEX   COPMPAC
 1091   REF   4  LAST 1366   10,3342  6 0372 1           AD      CADRFLSH
 1092   REF 818  LAST 1368   10,3343  54 157 0           TS      MPAC +3

 1093   REF   4  LAST 1368   10,3344  3 0162 1           CA      GENMASK       REMOVE ENDIDLE AND PINBRANCH BITS
 1094   REF   1              10,3345  7 3347 0           MASK    PINIDMSK
 1095   REF   3  LAST 1364   10,3346  0 3554 0           TC      DOWNENT2
 1096                        10,3347   74044 1  PINIDMSK OCT     74044         *** DONT MOVE

 1097   REF  40  LAST 1364   10,3350  4 6245 0           CS      THREE         BLANK EVERYTHING EXCEPT MM
 1098   REF   2  LAST  263   10,3351  0 4154 0           TC      NVSUB
 1099                        10,3352  1 3353 0           TCF     +1

 1100   REF   3  LAST 1360   10,3353  3 0163 0  ENDIT    CA      USERPRIO      RETURN TO USERS PRIORITY
 1101   REF   6  LAST 1364   10,3354  7 7725 1           MASK    PRIO37
 1102   REF  16  LAST 1364   10,3355  0 5146 1           TC      PRIOCHNG
 1103   REF 819  LAST 1369   10,3356  3 0157 1           CA      MPAC +3
 1104   REF  20  LAST 1364   10,3357  1 4640 0           TCF     BANKJUMP

 1105   REF  21  LAST 1368   10,3360  50 164 1  UNSETR1  INDEX   COPINDEX      RESET REPEAT AND RETURN REQUEST
 1106   REF  37  LAST 1368   10,3361  4 4751 1           CS      BIT3
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  1107    REF    3  LAST 1368    10,3362  7 1074 1             MASK     R1SAVE
  1108    REF    4  LAST 1370    10,3363  55'074 1             TS       R1SAVE

  1109    REF  257  LAST 1367    10,3364  3 4755 1             CAF      ZERO              *** 205 ONLY MARKBRAN USERS IN
  1110    REF    2  LAST 1364    10,3365  0 4727 1             TC       SUPERSW           SUPERBANK 0

  1111    REF   41  LAST 1369    10,3366  3 6245 1  -1         CAF      THREE             RETURN TO USERS IMMEDIATE RETURN LOC
  1112    REF   22  LAST 1369    10,3367  50 164 1  IMMEDRET  INDEX    COPINDEX
  1113    REF    5  LAST 1369    10,3370  6 0372 1             AD       CADRFLSH
  1114    REF   21  LAST 1369    10,3371  1 4640 0             TCF      BANKJUMP

  1115    REF  258  LAST 1370    10,3372  3 4755 1  TERMATE    CAF      ZERO              ASTRONAUT TERMINATE (V34) RETURNS TO
  1116    REF    1               10,3373  1 3312 0             TCF      ENDOUT

  1117    REF   11  LAST 1362    10,3374  4 0160 1  LINUSCHR   CS       PLAYTEM4          IS THIS A LINUS
  1118    REF   78  LAST 1358    10,3375  7 4736 0             MASK     BIT14
  1119    REF  448  LAST 1369    10,3376  10 000 0             CCS      A
  1120    REF    5  LAST 1294    10,3377  1 6737 0             TCF      Q+1               NO
  1121    REF    3  LAST 1363    10,3400  4 0157 0             CS       PLAYTEM3          YES, IS IT ALREADY IN ENDIDLE
  1122    REF   23  LAST 1370    10,3401  50 164 1             INDEX    COPINDEX
  1123    REF    6  LAST 1370    10,3402  6 0372 1             AD       CADRFLSH
  1124                           10,3403  0 0006 1             EXTEND
  1125                           10,3404  1 3406 1             BZF      +2                YES

  1126    REF  361  LAST 1367    10,3405  0 0002 0             TC       Q                 NO
  1127    REF   12  LAST  470    10,3406  11'012 1             CCS      DSPLOCK           IS THE ASTRONAUT BUSY
  1128    REF  152  LAST 1369    10,3407  0 5155 0             TC       ENDOFJOB          END THE NEW DISPLAY, ITS ALREADY ACTIVE
  1129    REF  362  LAST 1370    10,3410  0 0002 0             TC       Q

R1130     MORE LOGIC COULD BE INCORPORATED HERE TO MAKE SURE A RECYCLE IS A RECYCLAND CONVERSLY THAT A LOAD IS A LOAD.
  1132    REF  144  LAST 1369    10,3411  3 4753 1  PROCEED    CAF      ONE               ASTRONAUT PROCEED (V33) RETURNS
  1133    REF    2  LAST 1370    10,3412  1 3312 0             TCF      ENDOUT

R1139           LASTPLAY CHECKS TO SEE IF (1) THE LAST NORMAL DISPLAY WAS EITHER INTERRUPTED BY A PRIO OR A MARK (MARK
R1140     COULD ONLY HAPPEN DURING PINBRANCH) OR IF (2) THE LAST NORMAL DISPLAY WAS REQUESTED WHILE A HIGHER PRIORITY
R1142     DISPLAY WAS GOING RESULTING IN THE NORMAL BEING PUT TO SLEEP.

R1143           IF EITHER OF THE ABOVE 2 CONDITIONS EXISTS , THE NORMAL DISPLAY IS AWAKENED TO GO TO PLAYJUM1 WHICH STARTS
R1145     UP THE MOST RECENT VALID NORMAL DISPLAY. IF THESE 2 CONDITIONS DO NOT EXIST, CONTROL GOES TO PLAYJUM1 WHICH IS
R1147     STARTED IMMEDIATELY WITH THE ASSUMPTION THAT THE MOST RECENT NORMAL DISPLAY IS ALREADY IN-ENDIDLE(DURING A
R1149     PINBRANCH) OR THAT A RESTART HAS OCCURRED AND THE DISPLAY CAN BE STARTED AS A .1 RESTART.

  1163    REF   26  LAST 1312    10,3413  4 6242 1  MARKRET    CS       SIX
  1164    REF   25  LAST 1369    10,3414  7 0100 1             MASK     FLAGWRD4
  1165                           10,3415  0 0004 0             INHINT                     *** MAY MOVE DISPLAY FLAGWORD OUT OF
  1166    REF   26  LAST 1370    10,3416  54 100 1             TS       FLAGWRD4

  1167                           10,3417  0 0003 1             RELINT                     INHINT REALM
  1168    REF    2  LAST 1364    10,3420  1 3335 0             TCF      ENDRET
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 1169   REF   2  LAST 1323   10,3421  3 7747 1  MARKOVER CAF      MINUS1       RUPTREG2 IS - MEANS ENDOFJOB TO ENDRET
 1170   REF   3  LAST 1369   10,3422 54 161 0            TS       OUTHERE

 1171   REF  27  LAST 1370   10,3423  3 0100 0           CA       FLAGWRD4     IS ENDIDFLG SET
 1172   REF  12  LAST 1294   10,3424  7 4355 1           MASK     PRIO30       IS NORMAL OR PRIO IN ENDIDLE
 1173   REF 449  LAST 1370   10,3425 10 000 0            CCS      A
 1174   REF   1              10,3426  1 3061 1           TCF      NORMBNCH

 1175   REF  28  LAST 1371   10,3427  3 0100 0  NORMRET  CA       FLAGWRD4     IS MARK SLEEPING
 1176   REF   2  LAST 1364   10,3430  7 3524 0           MASK     BITS5+11     OR WAITING
 1177   REF 450  LAST 1371   10,3431 10 000 0            CCS      A
 1178   REF   1              10,3432  1 3023 1           TCF      MARKWAKE

 1179   REF  29  LAST 1371   10,3433  3 0100 0           CA       FLAGWRD4     NO
 1180   REF   1              10,3434  7 3525 1           MASK     BITS4+10     IS NORMAL INTERRUPTED OR WAITING
 1181   REF 451  LAST 1371   10,3435 10 000 0            CCS      A
 1182   REF   1              10,3436  1 3333 0           TCF      NORMWAKE     YES

 1183   REF   5  LAST 1364   10,3437  3 1072 0           CA       EBANKTEM     NO, WAS IT A FLASH REQUEST
 1184   REF   4  LAST 1331   10,3440  7 4771 0           MASK     OCT50        OR A GODSPRET
 1185   REF 452  LAST 1371   10,3441 10 000 0            CCS      A
 1186   REF   3  LAST 1370   10,3442  1 3335 0           TCF      ENDRET       YES
 1187   REF   3  LAST 1367   10,3443  3 0371 1           CA       NVSAVE
 1188                        10,3444  0 0006 1           EXTEND
 1189   REF   4  LAST 1371   10,3445  1 3335 0           BZF      ENDRET

 1190   REF   5  LAST  468   10,3446  3 5025 0           CAF      PRIO15
 1191                        10,3447  0 0004 0           INHINT
 1192   REF  30  LAST 1351   10,3450  0 5072 1           TC       NOVAC
 1193   REF   5  LAST 1366      0307                     EBANK=   NVWORD
 1194   REF   2  LAST 1365   10,3451   02615 1           2CADR    PLAYJUM1
 1194                        10,3452   20060 0

 1195   REF   5  LAST 1371   10,3453  1 3335 0           TCF      ENDRET

 1196   REF  30  LAST 1371   10,3454  3 0100 0  MARSLEEP CA       FLAGWRD4     IS MARK ALREADY IN
 1197   REF   3  LAST 1371   10,3455  7 3524 0           MASK     BITS5+11
 1198   REF 453  LAST 1371   10,3456 10 000 0            CCS      A
 1199   REF 153  LAST 1370   10,3457  1 5155 1           TCF      ENDOFJOB     YES
 11991  REF   3  LAST 1360   10,3460  1 2754 1           TCF      GOSLEEPS

 1200   REF   3  LAST 1369   10,3461 50 157 1   LOADITIS INDEX    COPMPAC
 1201   REF   6  LAST 1371   10,3462  3 0367 0           CA       NVWORD
 1202   REF  14  LAST 1366   10,3463  7 6074 0           MASK     LOW7
 1203                        10,3464  4 0000 0           COM
 1204   REF 820  LAST 1369   10,3465  6 0155 0           AD       MPAC +1      NOUNREG
 1205                        10,3466  0 0006 1           EXTEND
 1206   REF   1              10,3467  1 2311 0           BZF      OKTOENT      NO, THEN LOAD IS VALID
 1207   REF   6  LAST  836   10,3470  1 3050 0           TCF      PINBRNCH     YES, ACCEPT LOAD BUT ASK FOR LAST AGAIN
 1208   REF  42  LAST 1370   10,3471  4 6245 0  ERASER    CS      THREE         BLANK EVEFYTHINGEXCEPT MM
 1209   REF   3  LAST 1369   10,3472  0 4154 0            TC      NVSUB
 1210   REF 154  LAST 1371   10,3473  1 5155 1            TCF     ENDOFJOB
 1211   REF 155  LAST 1372   10,3474  1 5155 1            TCF     ENDOFJOB

 1212                        10,3475   00036 1  PERFMASK  OCT     0036          FLASH,PERFORM,BLANK R2 AND R3
 1213                        10,3476   00231 1  V01N25    VN      00125
 1214                        10,3477   01407 0  V06N07    VN      00607         GOPERF3 VN DISPLAY BEFORE V50
 1215                        10,3500   14400 0  V50N00    VN      5000
 1216                        10,3501   00030 1  PERF2MSK  OCT     00030         FLASH, PERFORM
 1217                        10,3502   01006 0  V04N06    VN      00406
 1218                        10,3503   00014 1  PERF4MSK  OCT     14            FLASH, BLANK R3
 1219   REF   7  LAST 1371   10,3050            GOAGIN    EQUALS  PINBRNCH
 1220                        10,3504   20010 1  REDUMASK  OCT     20010         BITS 4 AND 14
 1221                        10,3505   40230 1  MARK3MSK  OCT     40230         MARK,DECIMAL NOUN, PERFORM,FLASH
 1222                        10,3506   40036 0  MARK4MSK  OCT     40036         MARK,PERFORM,FLASH,BLANK 2 AND 3
 1223   REF   1              10,3507   20542 0  NVCADR    CADR    REDOPRIO
 1224   REF   4  LAST 1365   10,3510   20377 0  WAKECADR  CADR    MARKPLAY
 1225   REF   3  LAST 1371   10,3511   20615 1            CADR    PLAYJUM1

 1226                        10,3512   03400 0  OCT3400   OCT     3400          EBANK MASK
 1227                        10,3513   11210 1  NBUSMASK  OCT     11210
 1228                        10,3514   66521 1  PMMASK    OCT     66521
 1229   REF   4  LAST  446      4144            VERBMASK  =       MID7          (OCT 37600)
 1230                        10,3515   01177 1  V05NOOM1  OCT     1177          V05 MINUS ONE
 1231   REF   1              10,2330            GOXDSP    EQUALS  GOMARK
 1232   REF   1              10,2350            GOXDSPR   EQUALS  GOMARKR
 1233   REF  12  LAST  703   10,2334            GOXDSPF   EQUALS  GOMARKF
 1234   REF [illegible]  LAST  489   10,2353            GOXDSPFR  EQUALS  GOMARKFR
 1235   REF   2  LAST  253      5472            ENDEXT    EQUALS  ENDMARK
 1236   REF  14  LAST 1111      0165            MPAC2SAV  EQUALS  BANKSET
 1238                        10,3516   00700 0  NVBUSMSK  OCT     700
 12385                       10,3517   00704 1  ASTROMSK  OCT     704
 1239                        10,3520   40030 0  MPERFMSK  OCT     40030         BIT 15,5,4 FOR MARK,PERFORM,FLASH
 1240                        10,3521   34300 0  OCT34300  OCT     34300
 1241                        10,3522   40100 1  BITS15+7  OCT     40100
 1242                        10,3523   00110 1  BITS7+4   OCT     110
 1243   REF   3  LAST 1363      1070            DSPFLG    EQUALS  EBANKSAV
 1244   REF   1                 1071            MARKFLAG  EQUALS  MARKEBAN
 1245   REF   6  LAST 1371      1072            SAVEFLAG  EQUALS  EBANKTEM
 1246                        10,3524   02020 1  BITS5+11  OCT     2020          * DONT MOVE
 1247                        10,3525   01010 1  BITS4+10  OCT      1010         * DONT MOVE
 1249                        10,3526   00026 0  LOWLOAD   DEC     22
 1250                        10,3527   77730 0  BUSYMASK  OCT     77730
 1252                        10,3530   00050 1  CADRMASK  OCT     50
 1253   REF   4  LAST 1314      7740            PINMASK   EQUALS  13,14,15
 1254   REF   2  LAST 1366   10,3070            GOPLAY    EQUALS  NVDSP
A1255                                           PRIOSAVE  EQUALS  R1SAVE
 1256   REF 821  LAST 1371      0157            COPMPAC   EQUALS  MPAC +3
 1257   REF 822  LAST 1372      0160            TEMPOR2   EQUALS  MPAC +4
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  1258    REF 823  LAST 1372       0161               OUTHERE   EQUALS MPAC +5
  1259    REF  46  LAST 1367       0164               COPINDEX  EQUALS LOC
  1260    REF  37  LAST 1077       0163               USERPRIO  EQUALS MODE
  1261    REF 824  LAST 1373       0162               GENMASK   EQUALS MPAC +6
  1262                          10,3531   20144 1    PRIOOCT   OCT    20144              PRIO
  1263                          10,3532   42424 0    MARKOCT   OCT    42424              MARK
  1264                          10,3533   11254 1              OCT    11254              NORM

  1265                          10,3534   74704 1    IDLESLEP  OCT    74704
  1266                          10,3535   67777 1    OCT67777  OCT    67777
  1267    REF  12  LAST  725       5464               LINUS     EQUALS BLANKET
  1268    REF 825  LAST 1373       0154               FACEREG   EQUALS MPAC
  1269    REF 826  LAST 1373       0155               PLAYTEM1  EQUALS MPAC +1
  1270    REF 827  LAST 1373       0157               PLAYTEM3  EQUALS MPAC +3
  1271    REF 828  LAST 1373       0160               PLAYTEM4  EQUALS MPAC +4
  1273                          10,3536   40420 0    OCT40420  OCT    40420
  1274    REF   3  LAST 1361    10,3537   02546 1    MAKEGEN   GENADR MAKEPLAY
  1275                          10,3540   10200 1    OCT10200  OCT    10200
  1276                          10,3541   30200 0    V97N00    VN     09700              PASTE FOR V97 OR V99
  12761                         10,3542   20100 1    OCT20100  OCT    20100
  12762                         10,3543   24030 1    CLOCKCON  OCT    24030              FLASH, PERFORM, V99 OR V97 PASTE,REFLASH
```

```
 0001                          10,3544                          BANK    10
 0002   REF    2  LAST 1354    10,2000                          SETLOC  DISPLAYS
 0003                          10,3544                          BANK
 0004   REF    2 LAST 1354 TO  1374:     654     654*           COUNT*  $$/DSPLA

 0005                          10,3544   0 0004 0   UPENT2      INHINT
 0006   REF    3  LAST 1286    10,3545   7 5660 0               MASK    OCT77770
 0007   REF  240  LAST 1367    10,3546   54 001 1               TS      L
 0008   REF   31  LAST 1371    10,3547   4 0100 1               CS      FLAGWRD4
 0009   REF  241  LAST 1374    10,3550   7 0001 1               MASK    L
 0010   REF   32  LAST 1374    10,3551   26 100 1               ADS     FLAGWRD4
 0011                          10,3552   0 0003 1   JOIN        RELINT
 0012   REF    6  LAST 1370    10,3553   1 6737 0               TCF     Q+1

 0013                          10,3554   0 0004 0   DOWNENT2    INHINT
 0014   REF    4  LAST 1374    10,3555   7 5660 0               MASK    OCT77770
 0015                          10,3556   4 0000 0               COM
 0016   REF   33  LAST 1374    10,3557   7 0100 1               MASK    FLAGWRD4
 0017   REF   34  LAST 1374    10,3560   54 100 1               TS      FLAGWRD4
 0018   REF    1               10,3561   1 3552 1               TCF     JOIN

 0032   REF   23  LAST 1365       4757              OCT7        EQUALS  SEVEN
```

```
R0033
R0034       UPFLAG AND DOWNFLAG ARE ENTIRELY GENERAL FLAG SETTING AND CLEARING SUBROUTINES.   USING THEM, WHETHER OR
R0036   NOT IN INTERRUPT, ONE MAY SET OR CLEAR ANY SINGLE, NAMED BIT IN ANY ERASABLE REGISTER, SUBJECT OF COURSE TO
R0038   EBANK SETTING.    A "NAMED" BIT, AS THE WORD IS USED HERE, IS ANY BIT WITH A NAME FORMALLY ASSIGNED BY THE YUL
R0040   ASSEMBLER.

R0041       AT PRESENT THE ONLY NAMED BITS ARE THOSE IN THE FLAGWORDS.   ASSEMBLER CHANGES WILL MAKE IT POSSIBLE TO
R0043   NAME ANY BIT IN ERASABLE MEMORY.

R0044       CALLING SEQUENCES ARE AS FOLLOWS:-

R0045                          TC      UPFLAG                            TC      DOWNFLAG
R0046                          ADRES   NAME OF FLAG                      ADRES   NAME OF FLAG

R0047       RETURN IS TO THE LOCATION FOLLOWING THE "ADRES" ABOUT .58 MS AFTER THE "TC".

R0049       UPON RETURN A CONTAINS THE CURRENT FLAGWRD SETTING.

 0050                            5504                           BLOCK   02
 0051   REF   3  LAST 1294       4000                           SETLOC  FFTAG1
 0052                            5504                           BANK
 0053   REF   1                                                 COUNT*  $$/FLAG

 0054   REF 363  LAST 1370       5504   3 0002 0  UPFLAG        CA      Q
 0055   REF   2  LAST  743       5505   0 5522 1                TC      DEBIT
 0056                            5506   4 0000 0                COM                          +(15 - BIT)
 0057                            5507   0 0006 1                EXTEND
 0058   REF  16  LAST 1026       5510   04 001 1                ROR     LCHAN                SET BIT
 0059   REF  57  LAST 1325       5511   50 061 0  COMFLAG       INDEX   ITEMP1
 0060   REF  31  LAST  965       5512   54 074 0                TS      FLAGWRD0
 0061   REF  27  LAST 1300       5513   22 063 1                LXCH    ITEMP3
 0062                            5514   0 0003 1                RELINT
 0063   REF 242  LAST 1374       5515   0 0001 0                TC      L


 0064   REF 364  LAST 1375       5516   3 0002 0  DOWNFLAG      CA      Q
 0065   REF   3  LAST 1375       5517   0 5522 1                TC      DEBIT
 0066   REF 243  LAST 1375       5520   7 0001 1                MASK    L                    RESET BIT
 0067   REF   2  LAST  743       5521   1 5511 0                TCF     COMFLAG


 0068   REF 145  LAST 1370       5522   6 4753 1  DEBIT         AD      ONE                  GET DE BITS
 0069                            5523   0 0004 0                INHINT
 0070   REF  28  LAST 1375       5524   54 063 0                TS      ITEMP3
 0071   REF   3  LAST 1092       5525   3 4762 0                CA      LOW4                 DEC15
 0072   REF  58  LAST 1375       5526   54 061 1                TS      ITEMP1
 0073   REF  29  LAST 1375       5527   50 063 1                INDEX   ITEMP3
 0074                            5530   2'7777 0                CA      0 -1                 ADRES
 0075   REF 244  LAST 1375       5531   54 001 1                TS      L
 0076   REF 259  LAST 1370       5532   3 4755 1                CA      ZERO
 0077                                 5533  0 0006 1          EXTEND
 0078   REF  59   LAST 1375           5534  10 061 1          DV       ITEMP1         A = FLAGWRD, L = (15 - BIT)
 0079   REF  60   LAST 1376           5535  52 062 1          DXCH     ITEMP1
 0080   REF  61   LAST 1376           5536  50 061 0          INDEX    ITEMP1
 0081   REF  32   LAST 1375           5537  3 0074 1          CA       FLAGWRD0
 0082   REF 245   LAST 1375           5540  54 001 1          TS       L              CURRENT STATE
 0083   REF  26   LAST 1324           5541  50 062 0          INDEX    ITEMP2
 0084   REF  45   LAST 1355           5542  4 4735 0          CS       BIT15          -(15 - BIT)
 0085   REF 365   LAST 1375           5543  0 0002 0          TC       Q
```

```
P0086   DELAYJOB- A GENERAL ROUTINE TO DELAY A JOB A SPECIFIC AMOUNT OF TIME BEFORE PICKING UP AGAIN.

R0088   ENTRANCE REQUIREMENTS...
A0089                                                          CAF      DT              DELAY JOB FOR DT CENTISECS
A0090                                                          TC       BANKCALL
A0091                                                          CADR     DELAYJOB

 0092                          06,3764                         BANK     06
 0093   REF   1                00,2000                         SETLOC   DLAYJOB
 0094                          00,3735                         BANK

P0095   THIS MUST REMAIN IN BANK 0 *****************************************
 0096   REF   1                                                COUNT*   $$/DELAY
 0097                          00,3735   0 0004 0   DELAYJOB   INHINT
 0098   REF 366  LAST 1376     00,3736  54 002 1               TS       Q               STORE DELAY DT IN Q FOR DLY -1 IN

 0099   REF   1                00,3737   3 4752 0              CAF      DELAYNUM        WAITLIST
 0100   REF  56  LAST 1324     00,3740  54 070 1    DELLOOP    TS       RUPTREG1
 0101   REF 454  LAST 1371     00,3741  50 000 1               INDEX    A
 0102   REF   4  LAST  222     00,3742   3 1326 1              CA       DELAYLOC        IS THIS DELAYLOC AVAILABLE
 0103                          00,3743   0 0006 1              EXTEND
 0104   REF   1                00,3744   1 3752 0              BZF      OK2DELAY        YES

 0105   REF  57  LAST 1377     00,3745  10 070 1               CCS      RUPTREG1        NO, TRY NEXT DELAYLOC
 0106   REF   1                00,3746   1 3740 0              TCF      DELLOOP

 0107   REF  28  LAST 1331     00,3747  52 134 0               DXCH     BUF2
 0108   REF   7  LAST 1330     00,3750   0 5716 1              TC       BAILOUT1        NO AVAILABLE LOCS.
 0109                          00,3751   01104 0               OCT      1104

 0110   REF   1                00,3752   3 3772 0   OK2DELAY   CA       TCSLEEP         SET WAITLIST IMMEDIATE RETURN
 0111   REF   7  LAST 1132     00,3753  54 061 1               TS       WAITEXIT

 0112   REF  30  LAST 1105     00,3754   3 0004 0              CA       FBANK
 0113   REF  58  LAST 1377     00,3755   6 0070 0              AD       RUPTREG1        STORE BBANK FOR TASK CALL
 0114   REF 246  LAST 1376     00,3756  54 001 1               TS       L

 0115   REF   1                00,3757   3 3773 1              CAF      WAKECAD         STORE CADR FOR TASK CALL
 0116   REF   2  LAST 1119     00,3760   1 5211 1              TCF      DLY2 -1         DLY IS IN WAITLIST ROUTINE

 0117   REF  15  LAST 1362     00,3761   0 4645 1   TCGETCAD   TC       MAKECADR        GET CALLERS FCADR

 0118   REF  59  LAST 1377     00,3762  50 070 0               INDEX    RUPTREG1
 0119   REF   5  LAST 1377     00,3763  55'326 0               TS       DELAYLOC        SAVE DELAY CADRS

 0120   REF   8  LAST 1363     00,3764   0 5133 0              TC       JOBSLEEP

 0121   REF 260  LAST 1375     00,3765   3 4755 1   WAKER      CAF      ZERO
 0122   REF  45  LAST 1361     00,3766  50 006 1               INDEX    BBANK
 0123   REF   6  LAST 1377     00,3767  57'326 1               XCH      DELAYLOC        MAKE DELAYLOC AVAILABLE
 0124   REF  13  LAST 1364   00,3770  0 5137 1              TC      JOBWAKE

 0125   REF  81  LAST 1328   00,3771  0 5261 1              TC      TASKOVER

 0126   REF   1              00,3772   03757 1  TCSLEEP   GENADR  TCGETCAD -2
 0127   REF   1              00,3773   03765 0  WAKECAD   GENADR  WAKEP
```

```
P0128   GENTRAN, A BLOCK TRANSFER ROUTINE.

R0129   WRITTEN BY D. EYLES
R0130   MOD 1 BY KERNAN                                                  UTILITYM REV 17 11/18/67

R0132   MOD 2 BY SCHULENBERG  (REMOVE RELINT)    SKIPPER REV 4 2/28/68

R0133             THIS ROUTINE IS USEFULL FOR TRANSFERING N CONSECUTIVE ERASABLE OR FIXED QUANTITIES TO SOME OTHER N
R0135   CONSECUTIVE ERASABLE LOCATIONS.  IF BOTH BLOCKS OF DATA ARE IN SWITCHABLE EBANKS, THEY MUST BE IN THE SAME ONE.

R0137             GENTRAN IS CALLABLE IN A JOB AS WELL AS A RUPT.  THE CALLING SEQUENCE IS:

A0139                                       I          CA       N-1              # OF QUANTITIES MINUS ONE.
A0140                                       I +1       TC       GENTRAN          IN FIXED-FIXED.
A0141                                       I +2       ADRES    L                STARTING ADRES OF DATA TO BE MOVED.
A0142                                       I +3       ADRES    M                STARTING ADRES OF DUPLICATION BLOCK.
A0143                                       I +4                                 RETURNS HERE.

R0144             GENTRAN TAKES 25 MCT'S (300 MICROSECONDS) PER ITEM + 5 MCT'S (60 MICS) FOR ENTERING AND EXITING.

R0146             A, L AND ITEMP1 ARE NOT PRESERVED.

 0147                              5544                        BLOCK   02
 0148   REF    2  LAST 1354        4000                        SETLOC  FFTAG4
 0149                              5544                        BANK

 0150   REF   62  LAST 1376        0061                        EBANK=  ITEMP1

 0151   REF    1                                               COUNT*  $$/TRAN

 0152                              5544   0 0004 0   GENTRAN   INHINT
 0153   REF   63  LAST 1379        5545  54 061 1              TS      ITEMP1           SAVE N-1.
 0154   REF  367  LAST 1377        5546  50 002 0              INDEX   Q                C(Q) = ADRES L.
 0155                              5547   6 0000 1             AD      0                ADRES (L + N - 1).
 0156   REF  455  LAST 1377        5550  50 000 1              INDEX   A
 0157                              5551   3 0000 1             CA      0                C(ABOVE).
 0158   REF  247  LAST 1377        5552  54 001 1              TS      L                SAVE DATA.
 0159   REF   64  LAST 1379        5553   3 0061 0             CA      ITEMP1
 0160   REF  368  LAST 1379        5554  50 002 0              INDEX   Q
 0161                              5555   6 0001 0             AD      1                ADRES (M + N - 1).
 0162   REF  456  LAST 1379        5556  50 000 1              INDEX   A
 0163                              5557  22 000 1              LXCH    0                STUFF IT.
 0164   REF   65  LAST 1379        5560  10 061 1              CCS     ITEMP1           LOOP UNTIL N-1 = 0.
 0165   REF    2  LAST  297        5561   1 5545 1             TCF     GENTRAN +1
 0166   REF    5  LAST 1294        5562   1 6741 1             TCF     Q+2              RETURN TO CALLER.
```

```
P0167   B5OFF   ZERO BIT 5 OF EXTVBACT, WHICH IS SET BY TESTXACT.

R0168             MAY BE USED AS NEEDED BY ANY EXTENDED VERB WHICH HAS DONE TESTXACT

 0170   REF   1                                                   COUNT* $$/EXTVB

 0171   REF  46  LAST 1367      5563  4 4747 0  B5OFF     CS      BIT5
 0172   REF  17  LAST 1354      5564  7 1044 1            MASK    EXTVBACT
 0173   REF  18  LAST 1380      5565  5 5044 1            TS      EXTVBACT
 0174   REF 156  LAST 1372      5566  0 5155 0            TC      ENDOFJOB
```

```
R0001           THE FOLLOWING SUBROUTINE MAY BE CALLED TO DISPLAY A NON-ABORTIVE ALARM CONDITION. IT MAY BE CALLED
R0003    EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL.

R0004           CALLING SEQUENCE IS AS FOLLOWS:

R0005           TC       ALARM
R0006           OCT      AAANN              ALARM NO. NN IN GENERAL AREA AAA.
R0007                                       (RETURNS HERE)

 0008                         5567                          BLOCK   02
 0009    REF   1              4000                          SETLOC FFTAG7
 0010                         5567                          BANK

 0011    REF   8  LAST  471   0375                          EBANK= FAILREG

 0012    REF   1                                            COUNT* $$/ALARM
R0013    ALARM TURNS ON THE PROGRAM ALARM LIGHT, BUT DOES NOT DISPLAY.

 0014                         5567  0 0004 0  ALARM     INHINT

 0015    REF 369  LAST 1379   5570  3 0002 0            CA      Q
 0016    REF   4  LAST 1276   5571  55'363 1  ALARM2    TS      ALMCADR
 0017    REF 370  LAST 1381   5572  50 002 0            INDEX   Q
 0018                         5573  3 0000 1            CA      0
 0019    REF 248  LAST 1379   5574  54 001 1  BORTENT   TS      L

 0020    REF  46  LAST 1377   5575  3 0006 1  PRIOENT   CA      BBANK
 0021                         5576  0 0006 1   +1       EXTEND
 0022    REF  27  LAST 1361   5577  04 007 1            ROR     SUPERBNK          ADD SUPER BITS.
 0023    REF   5  LAST 1381   5600  55'364 0            TS      ALMCADR +1

 0024    REF 371  LAST 1381   5601  3 0002 0  LARMENT   CA      Q                 STORE RETURN FOR ALARM
 0025    REF  66  LAST 1379   5602  54 061 1            TS      ITEMP1

 0026    REF   9  LAST 1381   5603  10 375 1  CHKFAIL1  CCS     FAILREG           IS ANYTHING IN FAILREG
 0027    REF   1              5604  1 5607 1            TCF     CHKFAIL2          YES TRY NEXT REG
 0028    REF  10  LAST 1381   5605  22 375 0            LXCH    FAILREG
 0029    REF   1              5606  1 5621 0            TCF     PROGLARM          TURN ALARM LIGHT ON FOR FIRST ALARM

 0030    REF  11  LAST 1381   5607  10 376 1  CHKFAIL2  CCS     FAILREG +1
 0031    REF   1              5610  1 5613 1            TCF     FAIL3
 0032    REF  12  LAST 1381   5611  22 376 0            LXCH    FAILREG +1
 0033    REF   1              5612  1 5624 0            TCF     MULTEXIT

 0034    REF  13  LAST 1381   5613  3 0377 1  FAIL3     CA      FAILREG +2
 0035    REF  32  LAST 1128   5614  7 4733 0            MASK    POSMAX
 0036    REF 457  LAST 1379   5615  10 000 0            CCS     A
 0037    REF   1              5616  1 5630 0            TCF     MULTFAIL
 0038    REF  14  LAST 1381   5617  22 377 1            LXCH    FAILREG +2
 0039    REF   2  LAST 1381   5620  1 5624 0            TCF     MULTEXIT
 0040   REF  47  LAST 1317        5621  4 1036 1  PROGLARM CS      DSPTAB +11D
 0041   REF   2  LAST 1358        5622  7 5642 0           MASK    OCT40400
 0042   REF  48  LAST 1382        5623  27'036 1           ADS     DSPTAB +11D

 0043   REF  67  LAST 1381        5624  56 061 0  MULTEXIT XCH     ITEMP1          OBTAIN RETURN ADDRESS IN A
 0044                             5625  0 0003 1           RELINT
 0045   REF 458  LAST 1381        5626  50 000 1           INDEX   A
 0046                             5627  0 0001 0           TC      1

 0047   REF 249  LAST 1381        5630  3 0001 0  MULTFAIL CA      L
 0048   REF  46  LAST 1376        5631  6 4735 1           AD      BIT15
 0049   REF  15  LAST 1381        5632  54 377 0           TS      FAILREG +2

 0050   REF   3  LAST 1381        5633  1 5624 0           TCF     MULTEXIT

R0051   PRIOLARM DISPLAYS V05N09 VIA PRIODSPR WITH 3 RETURNS TO THE USER FROM THE ASTRONAUT AT CALL LOC +1,+2,+3 AND
R0053   AN IMMEDIATE RETURN TO THE USER AT CALL LOC +4. EXAMPLE FOLLOWS,
A0054                                                      CAF     OCTXX           ALARM CODE
A0055                                                      TC      BANKCALL
A0056                                                      CADR    PRIOLARM

A0057                                                      ...     ...
A0058                                                      ...     ...
A0059                                                      ...     ...             ASTRONAUT RETURN
A0060                                                      TC      PHASCHNG        IMMEDIATE RETURN TO USER. RESTART
A0061                                                      OCT     X.1             PHASE CHANGE FOR PRIO DISPLAY

 0062                          10,3562                     BANK    10
 0063   REF   3  LAST 1374     10,2000                     SETLOC  DISPLAYS
 0064                          10,3562                     BANK

 0065   REF   3 LAST 1374 TO 1375:     14    668*          COUNT*  $$/DSPLA
 0066                          10,3562  0 0004 0  PRIOLARM INHINT                  * * * KEEP IN DISPLAY ROUTINES BANK
 0067   REF 250  LAST 1382     10,3563  54 001 1           TS      L               SAVE ALARM CODE

 0068   REF  29  LAST 1377     10,3564  3 0133 0           CA      BUF2            2 CADR OF PRIOLARM USER
 0069   REF   6  LAST 1381     10,3565  55'363 1           TS      ALMCADR
 0070   REF  30  LAST 1382     10,3566  3 0134 1           CA      BUF2 +1
 0071   REF   1                10,3567  0 5576 0           TC      PRIOENT +1      * LEAVE L ALONE
 0072                          10,3570   77467 1  -2SEC    DEC     -200            *** DONT MOVE
 0073   REF   6  LAST  930     10,3571  3 5006 1           CAF     V05N09
 0074   REF   2  LAST  515     10,3572  1 2504 0           TCF     PRIODSPR

 0075                             5634                     BLOCK   02
 0076   REF   2  LAST 1381        4000                     SETLOC  FFTAG7
 0077                             5634                     BANK

 0078   REF   2 LAST 1381 TO 1382:     37     37*          COUNT*  $$/ALARM
 0079                             5634  0 0004 0  BAILOUT  INHINT
 0080   REF 372  LAST 1381        5635  3 0002 0           CA      Q
 0081    REF   7  LAST 1382       5636  55'363 1             TS       ALMCADR

 0082    REF 373  LAST 1382       5637  50 002 0             INDEX    Q
 0083                             5640  3 0000 1             CAF      0
 0084    REF   1                  5641  0 5574 1             TC       BORTENT
 0085                             5642   40400 1  OCT40400   OCT      40400

 0086                             5643  0 0004 0             INHINT
 0087    REF  88  LAST 1369       5644  3 4752 0  WHIMPER    CA       TWO
 0088    REF  24  LAST 1294       5645  6 0005 1             AD       Z
 0089    REF   2  LAST  830       5646  54 017 0             TS       BRUPT
 0090                             5647  5 0017 1             RESUME
 0091    REF  58  LAST 1354       5650  0 4635 0             TC       POSTJUMP          RESUME SENDS CONTROL HERE
 0092    REF   2  LAST  832       5651   12765 0             CADR     ENEMA
 0093                             5652  0 0004 0  POODOO     INHINT
 0094    REF 374  LAST 1383       5653  3 0002 0             CA       Q
 0095    REF   8  LAST 1383       5654  55'363 1  ABORT2     TS       ALMCADR
 0096    REF 375  LAST 1383       5655  50 002 0             INDEX    Q
 0097                             5656  3 0000 1             CAF      0
 0098    REF   2  LAST 1383       5657  0 5574 1             TC       BORTENT
 0099                             5660   77770 1  OCT77770   OCT      77770             DON'T MOVE

 0100    REF   3  LAST 1096       5661  3 4765 1             CAF      OCT35             4.35SPOT FOR GOPOODOO
 0101    REF 251  LAST 1382       5662  54 061 1             TS       L
 0102                             5663  4 0000 0             COM
 0103    REF   9  LAST  865       5664  52 761 0             DXCH     -PHASE4
 0104                             5665  0 0004 0  GOPOODOO   INHINT
 01042   REF 313  LAST 1335       5666  0 4616 1             TC       BANKCALL          RESET STATEFLG, REINTFLG, AND NODOFLAG.
 01044   REF   1                  5667   27755 0             CADR     FLAGS
 0105    REF  31  LAST 1339       5670  3 0103 0             CA       FLAGWRD7          IS SERVICER CURRENTLY IN OPERATION?
 0106    REF   3  LAST  280       5671  7 4746 1             MASK     V37FLBIT
 0107    REF 459  LAST 1382       5672  10 000 0             CCS      A
 0108    REF   1                  5673  1 5701 0             TCF      STRTIDLE
 0109    REF 314  LAST 1383       5674  0 4616 1             TC       BANKCALL          TERMINATE GRPS 1, 3, 5, AND 6
 0110    REF   2  LAST  230       5675   12652 0             CADR     V37KLEAN
 01102   REF 315  LAST 1383       5676  0 4616 1             TC       BANKCALL          TERMINATE GRPS 2, 4, 1, 3, 5, AND 6
 01104   REF   2  LAST  212       5677   12643 0             CADR     MR.KLEAN                 (I.E., GRP 4 LAST)
 0111    REF   2  LAST  865       5700  1 5644 0             TCF      WHIMPER
 0112    REF   1                  5701  3 5743 1  STRTIDLE   CAF      BBSERVDL
 01122   REF   3  LAST 1370       5702  0 4727 1             TC       SUPERSW
 01124   REF 316  LAST 1383       5703  0 4616 1             TC       BANKCALL          PUT SERVICER INTO ITS "GROUND" STATE
 01125   REF   1                  5704   57321 0             CADR     SERVIDLE          AND PROCEED TO GOTOPOOH.
 0114                             5705  0 0004 0  CCSHOLE    INHINT
 0115    REF 376  LAST 1383       5706  3 0002 0             CA       Q
 0116    REF   1                  5707  0 5654 0             TC       ABORT2
 0117                             5710   01103 1  OCT1103    OCT      1103
 0118                             5711  0 0004 0  CURTAINS   INHINT
 0119    REF 377  LAST 1383       5712  3 0002 0             CA       Q
 0120    REF   2  LAST 1286       5713  0 5571 1             TC       ALARM2
 0121                             5714   00217 0  OCT217     OCT      00217
 0122   REF    9  LAST 1383      5715  0 1363 0                   TC      ALMCADR             RETURN TO USER

 0123                            5716  0 0004 0  BAILOUT1 INHINT
 0124   REF   10  LAST 1384      5717  53'364 0                   DXCH    ALMCADR
 0125   REF    1                 5720  3 5742 0                   CAF     ADR40400
 0126   REF   68  LAST 1382      5721  54 061 1  BOTHABRT TS      ITEMP1
 0127   REF  378  LAST 1383      5722  50 002 0                   INDEX   Q
 0128                            5723  3 0000 1                   CAF     0
 0129   REF  252  LAST 1383      5724  54 001 1                   TS      L
 0130   REF    1                 5725  1 5603 0                   TCF     CHKFAIL1
 0131                            5726  0 0004 0  POODOO1  INHINT
 0132   REF   11  LAST 1384      5727  53'364 0                   DXCH    ALMCADR
 0133   REF    1                 5730  3 5741 0                   CAF     ADR77770
 0134   REF    1                 5731  1 5721 1                   TCF     BOTHABRT

 0135                            5732  0 0004 0  ALARM1   INHINT
 0136   REF   12  LAST 1384      5733  53'364 0                   DXCH    ALMCADR
 0137                            5734  0 0004 0  ALMNCADR INHINT
 0138   REF  379  LAST 1384      5735  50 002 0                   INDEX   Q
 0139                            5736  3 0000 1                   CA      0
 0140   REF  253  LAST 1384      5737  54 001 1                   TS      L
 0141   REF    1                 5740  1 5601 1                   TCF     LARMENT

 0142   REF    5  LAST 1374      5741  1 5660 0  ADR77770 TCF     OCT77770
 0143   REF    3  LAST 1382      5742  1 5642 0  ADR40400 TCF     OCT40400
 0144   REF  157  LAST 1380      5155            DOALARM  EQUALS  ENDOFJOB
 01444  REF   54  LAST  894   E7,1515                     EBANK=  DVCNTR
 01445  REF    2  LAST 1383      5743   56067 0  BBSERVDL BBCON   SERVIDLE
R0145   CALLING SEQUENCE FOR VARALARM

A0146                                                     CAF     (ALARM)
A0147                                                     TC      VARALARM

R0148   VARALARM TURNS ON PROGRAM ALARM LIGHT BUT DOES NOT DISPLAY
 0149                            5744  0 0004 0  VARALARM INHINT

 0150   REF  254  LAST 1384      5745  54 001 1                   TS      L                   SAVE USERS ALARM CODE

 0151   REF  380  LAST 1384      5746  3 0002 0                   CA      Q                   SAVE USERS Q
 0152   REF   13  LAST 1384      5747  55'363 1                   TS      ALMCADR

 0153   REF    2  LAST 1382      5750  0 5575 0                   TC      PRIOENT
 0154                            5751   00014 1  OCT14    OCT     14                  DONT MOVE

 0155   REF   14  LAST 1384      5752  0 1363 0                   TC      ALMCADR             RETURN TO USER

 0156   REF    3  LAST 1383      5644            ABORT    EQUALS  WHIMPER
 0157                         13,3755                     BANK    13
 0158   REF    1              13,2000                     SETLOC  ABTFLGS
 0159                         13,3755                     BANK
 0160    REF    1                                                        COUNT* $$/ALARM

 0161    REF    1                13,3755   4 4747 0  FLAGS      CS      STATEBIT
 0162    REF   21  LAST 1332     13,3756   7 0077 0             MASK    FLAGWRD3
 0163    REF   22  LAST 1385     13,3757  54 077 0              TS      FLAGWRD3
 0164    REF    3  LAST 1220     13,3760   4 4745 1             CS      REINTBIT
 0165    REF   20  LAST  862     13,3761   7 0106 1             MASK    FLGWRD10
 0166    REF   21  LAST 1385     13,3762  54 106 1              TS      FLGWRD10
 0167    REF    3  LAST  229     13,3763   4 4753 0             CS      NODOBIT
 0168    REF   31  LAST 1315     13,3764   7 0076 1             MASK    FLAGWRD2
 0169    REF   32  LAST 1385     13,3765  54 076 1              TS      FLAGWRD2
 0170    REF  381  LAST 1384     13,3766   0 0002 0             TC      Q
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R0001    PROGRAM NAME:     P27
R0002    WRITTEN BY:       KILROY/ DE WOLF

R0003    MOD NO:           6
R0004    MOD BY:           KILROY
R0005    DATE:             01DEC67

R0006    LOG SECTION:      UPDATE PROGRAM.

R0007    FUNCT. DESCR:     P27 (THE UPDATE PROGRAM) PROCESSES COMMANDS AND DATA
R0008                           INSERTIONS REQUESTED BY THE GROUND VIA UPLINK.
R0009                           THE P27 PROGRAM WILL ACCEPT UPDATES
R0010                           ONLY DURING P00 FOR THE LM, AND ONLY DURING P00,
R0011                      P02, AND FRESH START FOR THE CSM

R0012    CALLING SEQ:      PROGRAM IS INITIATED BY UPLINK ENTRY OF VERBS 70, 71, 72 AND 73.

R0014    SUBROUTINES:      TESTXACT, NEWMODEX, NEWMODEX +3, GOXDSPF, BANKCALL, FINDVAC, INTPRET, INTSTALL, TPAGREE,
R0016                      INTWAKEU, ENDEXT, POSTJUMP, FALTON, NEWPHASE, PHASCHNG

R0017    NORMAL EXIT:      TC ENDEXT

R0018    ALARM/ABORT:      TC FALTON FOLLOWED BY TC ENDEXT

R0019    RESTARTS:         P27 IS RESTART PROTECTED IN TWO WAYS...
R0020                      1. PRIOR TO VERIFLAG INVERSION(WHICH IS CAUSED BY THE GROUND/ASTRONAUT'S VERIFICATION OF UPDATE
R0022                         DATA BY SENDING A V33E WHEN V21N02 IS FLASHING)---
R0023                         NO PROTECTION EXCEPT PRE-P27 MODE IS RESTORED, COAST + ALIGN DOWNLIST IS SELECTED AND UPLINK
R0025                         ACTIVITY LIGHT IS TURNED OFF.(JUST AS IF A V34E WAS SENT DURING P27 DATA LOADS).
R0027                         V70,V71,V72 OR V73 WILL HAVE TO BE COMPLETELY RESENT BY USER.
R0029                      2. AFTER VERIFLAG INVERSION(WHEN UPDATE OF THE SPECIFIED ERASABLES IS BEING PERFORMED)---
R0031                         PROTECTED AGAINST RESTARTS.

R0032    DEBRIS:           UPBUFF   (20D)  TEMP STORAGE FOR ADDRESSES AND CONTENTS.
R0033                      UPVERB   (1)    VERB NUMBER MINUS 70D (E.G. FOR V72, UPVERB = 72D - 70D = 2)
R0035                      UPOLDMOD (1)    FOR MAJOR MODE INTERRUPTED BY P27.
R0036                      COMPNUMB (1)    TOTAL NUMBER OF COMPONENTS TO BE TRANSMITTED.
R0038                      UPCOUNT  (1)    ACTUAL NUMBER OF COMPONENTS RECEIVED.
R0039                      UPTEMP   (1)    SCRATCH, BUT USUALLY CONTAINS COMPONENT NUMBER TO BE CHANGED DURING VERIFY CYCLE


R0041    INPUT:

R0042     ENTRY:              DESCRIPTION

R0043     V70EXXXXXEXXXXXE (LIFTOFF TIME INCREMENT) DOUBLE PRECISION OCTAL TIME INCREMENT, XXXXX XXXXX,
R0045                         IS ADDED TO TEPHEM, SUBTRACTED FROM AGC CLOCK(TIME2,TIME1), SUBTRACTED FROM CSM STATE
R0047                         VECTOR TIME(TETCSM) AND SUBTRACTED FROM LEM STATE VECTOR TIME(TETLEM).
R0049                         THE DP OCTAL TIME INCREMENT IS SCALED AT 2(28).
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R0050     V71EIIEAAAAE       (CONTIGUOUS BLOCK UPDATE) II-2 OCTAL COMPONENTS,XXXXX,
R0051      XXXXXE            ARE LOADED INTO ERASABLE STARTING AT ECADR, AAAA.
R0052     XXXXXE             IT IS .GE. 3 .AND. .LE. 20D.,
R0053                        AND (AAAA + II - 3) DOES NOT PRODUCE AN ADDRESS IN THE
R0054     9 NEXT BANK
R0055       .                SCALING IS SAME AS INTERNAL REGISTERS.

R0056      V72EIIE           (SCATTER UPDATE) (II-1)/2 OCTAL COMPONENTS,XXXXX, ARE
R0057      AAAAEXXXXXE       LOADED INTO ERASABLE LOCATIONS, AAAA.
R0058      AAAAEXXXXXE       II IS .GE. 3 .AND. .LE. 19D, AND MUST BE ODD.
R0060       .                SCALING IS SAME AS INTERNAL REGISTERS.

R0061      V73EXXXXXEXXXXXE (OCTAL CLOCK INCREMENT) DOUBLE PRECISION OCTAL TIME
R0062                        INCREMENT XXXXX XXXXX, IS ADDED TO THE AGC CLOCK, IN
R0063                        CENTISECONDS SCALED AT (2)28.
R0064                        THIS LOAD IS THE OCTAL EQUIVALENT OF V55.

R0065     OUTPUT:          IN ADDITION TO THE ABOVE REGISTER LOADS, ALL UPDATES
R0066                      COMPLEMENT BIT3 OF FLAGWORD7.

R0067     ADDITIONAL NOTES: VERB 71, JUST DEFINED ABOVE WILL BE USED TO PERFORM BUT NOT LIMITED TO THE FOLLOWING UPDATES--

R0069                      1. CSM/LM STATE VECTOR UPDATE
R0072                      2. REFSMMAT UPDATE

R0073               THE FOLLOWING COMMENTS DELINEATE EACH SPECIAL UPDATE----

R0074     1. CSM/LM STATE VECTOR UPDATE(ALL DATA ENTRIES IN OCTAL)

R0075     ENTRIES:         DATA DEFINITION:                                               SCALE FACTORS:
R0077     V71E             CONTIGUOUS BLOCK UPDATE VERB
R0078       21E            NUMBER OF COMPONENTS FOR STATE VECTOR UPDATE
R0080      AAAAE           ECADR OF 'UPSVFLAG'
R0082     XXXXXE           STATE VECTOR IDENTIFIER: 00001 FOR CSM, 77776 FOR LEM - EARTH SPHERE OF INFLUENCE SCALING
R0083                                               00002 FOR CSM, 77775 FOR LEM - LUNAR SPHERE OF INFLUENCE SCALING
R0084     XXXXXEXXXXXE     X POSITION
R0086     XXXXXEXXXXXE     Y POSITION
R0088     XXXXXEXXXXXE     Z POSITION
R0090     XXXXXEXXXXXE     X VELOCITY
R0092     XXXXXEXXXXXE     Y VELOCITY
R0094     XXXXXEXXXXXE     Z VELOCITY
R0096     XXXXXEXXXXXE     TIME FROM AGC CLOCK ZERO
R0098     V33E             VERB 33 TO SIGNAL THAT THE STATE VECTOR IS READY TO BE STORED.

R0144     2. REFSMMAT(ALL DATA ENTRIES IN OCTAL)
R0145     ENTRIES:         DATA DEFINITIONS:                                              SCALE FACTORS:
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R0147    V71E                 CONTIGUOUS BLOCK UPDATE VERB
R0148      24E                NUMBER OF COMPONENTS FOR REFSMMAT UPDATE
R0150     AAAAE               ECADR OF 'REFSMMAT'
R0152    XXXXXEXXXXXE         ROW 1 COLUMN 1                                      2(-1)
R0154    XXXXXEXXXXXE         ROW 1 COLUMN 2                                      2(-1)
R0156    XXXXXEXXXXXE         ROW 1 COLUMN 3                                      2(-1)
R0158    XXXXXEXXXXXE         ROW 2 COLUMN 1                                      2(-1)
R0160    XXXXXEXXXXXE         ROW 2 COLUMN 2                                      2(-1)
R0162    XXXXXEXXXXXE         ROW 2 COLUMN 3                                      2(-1)
R0164    XXXXXEXXXXXE         ROW 3 COLUMN 1                                      2(-1)
R0166    XXXXXEXXXXXE         ROW 3 COLUMN 2                                      2(-1)
R0168    XXXXXEXXXXXE         ROW 3 COLUMN 3                                      2(-1)
R0170    V33E                 VERB 33 TO SIGNAL THAT REFSMMAT IS READY TO BE STORED.


  0171                         07,3773                       BANK    07
  0172    REF   7  LAST  297   43,2000                       SETLOC  EXTVERBS
  0173                         43,3724                       BANK

  0174    REF   4  LAST  985   E3,1706                       EBANK=  TEPHEM

  0175    REF   1                                            COUNT*  $$/P27
  0176    REF   1              43,3724  3 4755 1  V70UPDAT   CAF     UP70             COMES HERE ON V70E
  0177    REF   2  LAST  262   43,3725  1 3733 1             TCF     V73UPDAT +1


  0178    REF   1              43,3726  3 4753 1  V71UPDAT   CAF     UP71             COMES HERE ON V71E
  0179    REF   3  LAST 1388   43,3727  1 3733 1             TCF     V73UPDAT +1


  0180    REF   1              43,3730  3 4752 0  V72UPDAT   CAF     UP72             COMES HERE ON V72E
  0181    REF   4  LAST 1388   43,3731  1 3733 1             TCF     V73UPDAT +1


  0182    REF   1              43,3732  3 6245 1  V73UPDAT   CAF     UP73             COMES HERE ON V73E

  0183    REF   1              43,3733  55'166 0   +1        TS      UPVERBSV         SAVE UPVERB UNTIL IT'S OK TO ENTER P27

  0184    REF  19  LAST  298   43,3734  0 2076 1             TC      TESTXACT         GRAB DISPLAY IF AVAILABLE, OTHERWISE
 A0185                                                                                TURN*OPERATOR ERROR* ON AND TERMINATEJOB

  0186    REF  24  LAST 1294   43,3735  3 1011 0             CA      MODREG           CHECK IF UPDATE ALLOWED
  0187                         43,3736  0 0006 1             EXTEND                   FIRST CHECK FOR MODREG = +0, -0
  0188                         43,3737  1 3742 1             BZF     +3               (+0 = P00, -0 = FRESHSTART)
  0189    REF  59  LAST 1383   43,3740  0 4635 0  UPERROR    TC      POSTJUMP         TURN ON 'OPERATOR ERROR' LIGHT
  0190    REF   1              43,3741   11762 1             CADR    UPERROUT +2      GO TO COMMON UPDATE PROGRAM EXIT

  0191    REF  25  LAST 1388   43,3742  31'011 0             CAE     MODREG           UPDATE ALLOWED.
  01915   REF   1              43,3740            CKMDMORE   =       UPERROR
  0192    REF   2  LAST  104   43,3743  55'171 0             TS      UPOLDMOD         SAVE CURRENT MAJOR MODE
 0193   REF   2  LAST 1388   43,3744  31'166 1            CAE     UPVERBSV          SET UPVERB TO INDICATE TO P27
 0194   REF   2  LAST  104   43,3745  55'172 0            TS      UPVERB            WHICH EXTENDED VERB CALLED IT.

 0195   REF 146  LAST 1375   43,3746  3 4753 1            CAF     ONE
 0196   REF   2  LAST  104   43,3747  55'173 1            TS      UPCOUNT           INITIALIZE UPCOUNT TO 1

 0197   REF  60  LAST 1388   43,3750  0 4635 0            TC      POSTJUMP          LEAVE EXTENDED VERB BANK AND
 0198   REF   1              43,3751   11401 1            CADR    UPPART2           GO TO UPDATE PROGRAM(P27) BANK.


 0211   REF 261  LAST 1377      4755             UP70     EQUALS  ZERO
 0212   REF 147  LAST 1389      4753             UP71     EQUALS  ONE
 0213   REF  89  LAST 1383      4752             UP72     EQUALS  TWO
 0214   REF  43  LAST 1372      6245             UP73     EQUALS  THREE


 0215                        04,3401                      BANK    04
 0216   REF   2  LAST 1225   04,2000                      SETLOC  UPDATE2
 0217                        04,3401                      BANK

 0218   REF   1                                           COUNT*  $$/P27

 0219                        04,3401             UPPART2  EQUALS                    UPDATE PROGRAM - PART 2

 0220   REF 114  LAST 1335   04,3401  0 5353 1            TC      PHASCHNG          SET RESTART GROUP 6 TO RESTORE OLD MODE
 0221                        04,3402   07026 1            OCT     07026             AND DOWNLIST AND EXIT IF RESTART OCCURS.
 0222                          ,3403   30000 1            OCT     30000             PRIORITY SAME AS CHRPRIO
 0223   REF      LAST  204      1174                      EBANK=  UPBUFF
 0224   REF   1              04,3404   03712 0            2CADR   UPOUT +1
 0224   REF   1                        101 2 0

 0225   REF 143  LAST 138    04,3406  3 4753 1            CAF     ONE
 0226   REF      LAST  802   04,3407  56'332 1            TS      DNLSTCOD          DOWNLIST

 0227   REF      LAST  802   04,3410    5311 1            TC      NEWMODEX          SET MAJOR MODE = 27
 0228                        04,3411   00033 1            DEC     27

 0229   REF   3  LAST 1389   04,3412  51'172 1            INDEX   UPVERB            BRANCH DEPENDING ON WHETHER THE UPDATE
 0230                        04,3413  1 3414 1            TCF     +1                VERB REQUIRES A FIXED OR VARIABLE NUMBER
 0231                        04,3414  1 3417 1            TCF     +3                V70 FIXED.              (OF COMPONENTS.
 0232   REF   1              04,3415  1 3422 1            TCF     OHWELL1           V71 VARIABLE - GO GET NO. OF COMPONENTS
 0233   REF   2  LAST 1389   04,3416  1 3422 1            TCF     OHWELL1           V72 VARIABLE - GO GET NO. OF COMPONENTS
 0234   REF  90  LAST 1339   04,3417  3 4752 0            CA      TWO               V73 (AND V70) FIXED
 0235   REF   3  LAST  204   04,3420  55'170 1            TS      COMPNUMB          SET NUMBER OF COMPONENTS TO 2.
 0236   REF   1              04,3421  1 3445 0            TCF     OHWELL2           GO GET THE TWO UPDATE COMPONENTS

 0237   REF   1              04,3422  3 3515 0   OHWELL1  CAF     ADUPBUFF          * REQUEST USER TO SEND NUMBER  *
 0238   REF 829  LAST 1373   04,3423  54 156 1            TS      MPAC +2           * OF COMPONENTS PARAMETER(II). *
 0239   REF   1              04,3424  3 3516 0     +2     CAF     UPLOADNV          (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0240   REF 317  LAST 1383   04,3425  0 4616 1            TC      BANKCALL          DISPLAY A FLASHING V21N01
 0241    REF  11  LAST  717   04,3426   20334 1             CADR    GOXDSPF        TO REQUEST II.
 0242    REF   1              04,3427  1 3712 1             TCF     UPOUT4         V34 TERMINATE UPDATE(P27) RETURN
 0243    REF   3  LAST 1389   04,3430  1 3424 1             TCF     OHWELL1 +2
 0244    REF   1              04,3431  0 3506 1             TC      CK4V32         DATA OR V32 RETURN
 0245    REF  50  LAST 1285   04,3432  4 4752 1             CS      BIT2
 0246    REF   5  LAST 1389   04,3433  6 1174 1             AD      UPBUFF         IS II(NUMBER OF COMPONENTS PARAMETER)
 0247                         04,3434  0 0006 1             EXTEND                 .GE. 3 AND .LE. 20D.
 0248    REF   4  LAST 1390   04,3435  6 3424 0             BZMF    OHWELL1 +2
 0249    REF   6  LAST 1390   04,3436  4 1174 0             CS      UPBUFF
 0250    REF   1              04,3437  6 4362 1             AD      UP21
 0251                         04,3440  0 0006 1             EXTEND
 0252    REF   5  LAST 1390   04,3441  6 3424 0             BZMF    OHWELL1 +2
 0253    REF   7  LAST 1390   04,3442  31'174 1             CAE     UPBUFF
 0254    REF   4  LAST 1389   04,3443  55'170 1             TS      COMPNUMB       SAVE II IN COMPNUMB


R0257              UPBUFF LOADING SEQUENCE

 02571   REF   3  LAST 1389   04,3444  25'173 0             INCR    UPCOUNT        INCREMENT COUNT OF COMPONENTS RECEIVED.
 0258    REF   1              04,3445  3 3662 0  OHWELL2    CAF     ADUPBFM1       CALCULATE LOCATION(ECADR) IN UPBUFF
 0259    REF   4  LAST 1390   04,3446  6 1173 0             AD      UPCOUNT        WHERE NEXT COMPONENT SHOULD BE STORED.
 0260    REF 830  LAST 1389   04,3447  54 156 1    +2       TS      MPAC +2        PLACE ECADR INTO R3.
 0261    REF   2  LAST 1389   04,3450  3 3516 0    +3       CAF     UPLOADNV       (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0262    REF 318  LAST 1389   04,3451  0 4616 1             TC      BANKCALL       DISPLAY A FLASHING V21N01
 0263    REF  12  LAST 1390   04,3452   20334 1             CADR    GOXDSPF        TO REQUEST DATA.
 0264    REF   2  LAST 1390   04,3453  1 3712 1             TCF     UPOUT4         V34 TERMINATE UPDATE(P27) RETURN.
 0265    REF   2  LAST 1390   04,3454  1 3450 1             TCF     OHWELL2 +3     V33 PROCEED RETURN
 0266    REF   2  LAST 1390   04,3455  0 3506 1             TC      CK4V32         DATA OR V32 RETURN
 0267    REF   5  LAST 1390   04,3456  4 1173 1             CS      UPCOUNT        HAVE WE FINISHED RECEIVING ALL
 0268    REF   6  LAST 1390   04,3457  6 1170 0             AD      COMPNUMB       THE DATA WE EXPECTED.
 0269                         04,3460  0 0006 1             EXTEND
 0270    REF   1              04,3461  6 3463 0             BZMF    UPVERIFY       YES- GO TO VERIFICATION SEQUENCE
 0272    REF   3  LAST 1390   04,3462  1 3444 1             TCF     OHWELL2 -1     NO- REQUEST ADDITIONAL DATA.


R0273              VERIFY SEQUENCE

 0274    REF   1              04,3463  3 3514 1  UPVERIFY   CAF     ADUPTEMP       PLACE ECADR WHERE COMPONENT NO. INDEX
 0275    REF 831  LAST 1390   04,3464  54 156 1             TS      MPAC +2        IS TO BE STORED INTO R3.
 0276    REF   1              04,3465  3 3517 1             CAF     UPVRFYNV       (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0277    REF 319  LAST 1390   04,3466  0 4616 1             TC      BANKCALL       DISPLAY A FLASHING V21N02 TO REQUEST
 0278    REF  13  LAST 1390   04,3467   20334 1             CADR    GOXDSPF        DATA CORRECTION OR VERIFICATION.
 0279    REF   3  LAST 1390   04,3470  1 3712 1             TCF     UPOUT4         V34 TERMINATE UPDATE(P27) RETURN
 0280    REF   1              04,3471  1 3520 1             TCF     UPSTORE        V33 DATA SENT IS GOOD. GO STORE IT.
 0281    REF   3  LAST 1390   04,3472  0 3506 1             TC      CK4V32         COMPONENT NO. INDEX OR V32 RETURN
 0282    REF   4  LAST  104   04,3473  3 1167 0             CA      UPTEMP         DOES THE COMPONENT NO. INDEX JUST SENT
 0283                         04,3474  0 0006 1             EXTEND                 SPECIFY A LEGAL COMPONENT NUMBER?
 0284    REF   2  LAST 1390   04,3475  6 3463 0             BZMF    UPVERIFY       NO, IT IS NOT POSITIVE NONZERO
 0285    REF   5  LAST 1390   04,3476  4 1167 1             CS      UPTEMP
 0288    REF   6  LAST 1390   04,3477  6 1170 0             AD      COMPNUMB
 0289   REF  56  LAST 1327   04,3500  6 4753 1             AD      BIT1
 0290                        04,3501  0 0006 1             EXTEND
 0291   REF   3  LAST 1390   04,3502  6 3463 0             BZMF    UPVERIFY       NO
 0292   REF   2  LAST 1390   04,3503  3 3662 0             CAF     ADUPBFM1       YES- BASED ON THE COMPONENT NO. INDEX
 0293   REF   6  LAST 1390   04,3504  6 1167 0             AD      UPTEMP         CALCULATE THE ECADR OF LOCATION IN
 0294   REF   4  LAST 1390   04,3505  1 3447 1             TCF     OHWELL2 +2     UPBUFF WHICH USER WANTS TO CHANGE.

 0295   REF   2  LAST 1389   04,3712            UPOUT4     EQUALS  UPOUT +1       COMES HERE ON V34 TO TERMINATE UPDATE


R0296                  CHECK FOR VERB 32 SEQUENCE

 0297   REF 832  LAST 1390   04,3506  4 0154 0  CK4V32     CS      MPAC           ON DATA RETURN FROM 'GOXDSPF'
 0298   REF  58  LAST 1366   04,3507  7 4746 1             MASK    BIT6           ON DATA RETURN FROM "GOXDSP"& THE CON-
 0299   REF 460  LAST 1383   04,3510  10 000 0             CCS     A              TENTS OF MPAC = VERB.  SO TEST FOR V32.
 0300   REF 382  LAST 1385   04,3511  0 0002 0             TC      Q              IT'S NOT A V32, IT'S DATA.  PROCEED.
 0301   REF 383  LAST 1391   04,3512  50 002 0             INDEX   Q
 0302                        04,3513  7'7771 0             TC      Q -6           V32 ENCOUNTERED - GO BACK AND GET DATA

 0305   REF   7  LAST 1391   04,3514   01167 0  ADUPTEMP   ADRES   UPTEMP         ADDRESS OF TEMP STORAGE FOR CORRECTIONS
 0306   REF   8  LAST 1390   04,3515   01174 1  ADUPBUFF   ADRES   UPBUFF         ADDRESS OF UPDATE DATA STORAGE BUFFER
 0307                        04,3516   05201 1  UPLOADNV   VN      2101           VERB 21 NOUN 01
 0308                        04,3517   05202 1  UPVRFYNV   VN      2102           VERB 21 NOUN 02
 0309   REF   4  LAST 1099      4362            UP21       =       MD1            DEC 21 = MAX NO OF COMPONENTS +1
 03121  REF  23  LAST 1356      4756            UPDTPHAS   EQUALS  FIVE

R0313                  PRE-STORE AND FAN TO APPROPRIATE BRANCH SEQUENCE

 0314                        04,3520            UPSTORE    EQUALS                 GROUND HAS VERIFIED UPDATE. STORE DATA.

 0315                        04,3520  0 0004 0             INHINT

 0316   REF  32  LAST 1383   04,3521  30 103 0             CAE     FLAGWRD7       INVERT VERIFLAG(BIT3 OF FLAGWRD7) TO
 0317   REF 255  LAST 1384   04,3522  56 001 0             XCH     L              INDICATE TO THE GROUND(VIA DOWNLINK)
 0318   REF   1              04,3523  3 4751 0             CAF     VERIFBIT       THAT THE V33 (WHICH THE GROUND SENT TO
 0319                        04,3524  0 0006 1             EXTEND                 VERIFY THE UPDATE) HAS BEEN SUCCESSFULLY
 0320   REF  17  LAST 1375   04,3525  06 001 0             RXOR    LCHAN          RECEIVED BY THE UPDATE PROGRAM
 0321   REF  33  LAST 1391   04,3526  54 103 1             TS      FLAGWRD7

 0322   REF 115  LAST 1389   04,3527  0 5353 1             TC      PHASCHNG       SET RESTART GROUP 6 TO REDO THE UPDATE
 0323                        04,3530   04026 1             OCT     04026          DATA STORE IF A RESTART OCCURS.
 0324                        04,3531  0 0004 0             INHINT                 (BECAUSE PHASCHNG DID A RELINT)

 0325   REF  91  LAST 1389   04,3532  4 4752 1             CS      TWO            GO TO UPENDVAC IF INSTALL IS REQUIRED,
 0326   REF   4  LAST 1389   04,3533  6 1172 1             AD      UPVERB         THAT IS, IF IT'S A V70 - V72.
 0327                        04,3534  0 0006 1             EXTEND                 GO TO UPEND73 IF IT'S A V73.
 0328   REF   1              04,3535  6 3544 1             BZMF    UPENDVAC

R0330                  VERB 73 BRANCH
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 0331                          04,3536  0 0006 1  UPEND73  EXTEND                     V73-PERFORM DP OCTAL AGC CLOCK INCREMENT
 0332   REF   9  LAST 1391     04,3537  3 1175 0           DCA     UPBUFF
 0333   REF  10  LAST 1392     04,3540  53'205 0           DXCH    UPBUFF +8D
 0334   REF   1                04,3541  0 3567 0           TC      TIMEDIDL
 0335   REF   9  LAST  836     04,3542  0 4364 1           TC      FALTON             ERROR- TURN ON *OPERATOR ERROR* LIGHT
 0336   REF   3  LAST 1391     04,3543  0 3712 0           TC      UPOUT +1           GO TO COMMON UPDATE PROGRAM EXIT

 0337   REF   7  LAST 1338     04,3544  3 4355 0  UPENDVAC CAF     CHRPRIO            (USE EXTENDED VERB PRIORITY)
 0338   REF  45  LAST 1367     04,3545  0 5105 0           TC      FINDVAC            GET VAC AREA FOR 'CALL INTSTALL'
 0339   REF   5  LAST 1388     E3,1706                     EBANK=  TEPHEM
 0340   REF   1                04,3546   03551 0           2CADR   UPJOB              (NOTE: THIS WILL ALSO SET EBANK FOR
 0340   REF   1                04,3547   10103 1
 0341   REF 158  LAST 1384     04,3550  0 5155 0           TC      ENDOFJOB           'TEPHEM' UPDATE BY V70)

 0342   REF 242  LAST 1265     04,3551  0 6037 0  UPJOB    TC      INTPRET            THIS COULD BE A STATE VECTOR UPDATE--SO
 0343                          04,3552   77624 1           CALL                       WAIT(PUT JOB TO SLEEP) IF ORBIT INT(OI)
 0344   REF  38  LAST 1223     04,3553   27414 0                   INTSTALL           IS IN PROGRESS--OR--GRAB OI AND RETURN
A0345                                                                                 TO UPWAKE IF OI IS NOT IN PROGRESS.

 0346                          04,3554   77776 1  UPWAKE   EXIT

 0347   REF 116  LAST 1391     04,3555  0 5353 1           TC      PHASCHNG           RESTART PROTECT(GROUP 6)
 0348                          04,3556   04026 1           OCT     04026

 0350   REF  73  LAST 1365     04,3557  0 5504 0           TC      UPFLAG             SET INTEGRATION RESTART BIT
 0351   REF   5  LAST 1242     04,3560   00236 0           ADRES   REINTFLG
 0352                          04,3561  0 0004 0           INHINT
 0355                          04,3562            UPPART3  EQUALS

 0356   REF   5  LAST 1391     04,3562  51'172 1           INDEX   UPVERB             BRANCH TO THE APPROPRIATE UPDATE VERB
 0357                          04,3563  1 3564 1           TCF     +1                 ROUTINE TO ACTUALLY PERFORM THE UPDATE
 0358   REF   1                04,3564  1 3723 0           TCF     UPEND70            V70
 0359   REF   1                04,3565  1 3632 1           TCF     UPEND71            V71
 0360   REF   1                04,3566  1 3664 1           TCF     UPEND72            V72

P0361            ROUTINE TO INCREMENT CLOCK(TIME2,TIME1) WITH CONTENTS OF DP WORD AT UPBUFF.

 0363                          04,3567  0 0006 1  TIMEDIDL EXTEND
 0364   REF   8  LAST 1391     04,3570  23'157 0           QXCH    UPTEMP             SAVE Q FOR RETURN
 0365   REF 262  LAST 1389     04,3571  3 4755 1           CAF     ZERO               ZERO AND SAVE TIME2,TIME1
 0366                          04,3572  22 007 0           ZL
 0367   REF  36  LAST 1337     04,3573  52 025 1           DXCH    TIME2
 0368   REF  11  LAST 1392     04,3574  53'217 0           DXCH    UPBUFF +18D        STORE IN CASE OF OVERFLOW

 0369   REF   1                04,3575  3 4756 1           CAF     UPDTPHAS           DO
 0370   REF 256  LAST 1391     04,3576  54 001 1           TS      L                  A
 0371                          04,3577  4 0000 0           COM                        QUICK
 03711  REF   5  LAST  865     04,3600  52 765 1           DXCH    -PHASE6            PHASCHNG
 0372                          04,3601  0 0004 0  TIMEDIDR INHINT

 0373   REF 263  LAST 1392    04,3602  3 4755 1           CAF      ZERO
 0374                          04,3603  22 007 0           ZL                          PICK UP INCREMENTER(AND ZERO
 0375   REF 833  LAST 1391    04,3604  54 156 1           TS       MPAC +2            IT IN CASE OF RESTARTS) AND
 0376   REF  12  LAST 1392    04,3605  53'205 0           DXCH     UPBUFF +8D         STORE IT
 0377   REF 834  LAST 1393    04,3606  52 155 1           DXCH     MPAC               INTO MPAC FOR TPAGREE.

 0378                          04,3607  0 0006 1           EXTEND
 0379   REF  13  LAST 1393    04,3610  3 1217 1           DCA      UPBUFF +18D
 0380   REF 835  LAST 1393    04,3611  20 155 1           DAS      MPAC               FORM SUM IN MPAC
 0381                          04,3612  0 0006 1           EXTEND
 0382   REF   1               04,3613  1 3622 0           BZF      DELTATOK           TEST FOR OVERFLOW
 0383   REF 264  LAST 1393    04,3614  3 4755 1           CAF      ZERO
 0384   REF  14  LAST 1393    04,3615  53'217 0           DXCH     UPBUFF +18D        OVERFLOW, RESTORE OLD VALUE OF CLOCK
 0385   REF  37  LAST 1392    04,3616  20 025 1           DAS      TIME2              AND TURN ON OPERATOR ERROR

 0386   REF 117  LAST 1392    04,3617  0 5353 1           TC       PHASCHNG           RESTART PROTECT(GROUP 6)
 0387                          04,3620   04026 1           OCT      04026

 0388   REF   9  LAST 1392    04,3621  0 1167 0           TC       UPTEMP             GO TO ERROR EXIT

 0389   REF  18  LAST 1337    04,3622  0 7257 0  DELTATOK TC       TPAGREE            FORCE SIGN AGREEMENT
 0390   REF 836  LAST 1393    04,3623  52 155 1           DXCH     MPAC
 0391   REF  38  LAST 1393    04,3624  20 025 1           DAS      TIME2              INCREMENT TIME2,TIME1

 0392   REF 118  LAST 1393    04,3625  0 5353 1           TC       PHASCHNG           RESTART PROTECT(GROUP 6)
 0393                          04,3626   04026 1           OCT      04026

 0394                          04,3627  0 0004 0           INHINT
 0395   REF  10  LAST 1393    04,3630  51'167 0           INDEX    UPTEMP             (CODED THIS WAY FOR RESTART PROTECTION)
 0396                          04,3631  0 0001 0           TC       1                  NORMAL RETURN
R0397            VERB 71 BRANCH

 0402   REF  15  LAST 1393    04,3632  31'175 0  UPEND71  CAE      UPBUFF +1          SET EBANK
 0403   REF  79  LAST 1364    04,3633  54 003 0           TS       EBANK                 AND
 0404   REF  20  LAST 1324    04,3634  7 4357 0           MASK     LOW8               CALCULATE
 0405   REF  11  LAST 1393    04,3635  55'167 1           TS       UPTEMP             S-REG VALUE OF RECEIVING AREA

 0406   REF   5  LAST 1324    04,3636  6 7745 0           AD       NEG3               IN THE PROCESS OF
 0407   REF   7  LAST 1390    04,3637  6 1170 0           AD       COMPNUMB           PERFORMING
 0408                          04,3640  0 0006 1           EXTEND                      THIS UPDATE
 0409   REF   1               04,3641  1 3647 0           BZF      STORLP71           WILL WE
 0410   REF  32  LAST 1332    04,3642  7 4743 1           MASK     BITS               OVERFLOW
 0411   REF 461  LAST 1391    04,3643  10 000 0           CCS      A                  INTO THE NEXT EBANK....
 0412   REF   2  LAST 1388    04,3644  1 3760 1           TCF      UPERROUT           YES

 0413   REF   6  LAST 1393    04,3645  3 7745 0           CA       NEG3               NO- CALCULATE NUMBER OF
 0414   REF   8  LAST 1393    04,3646  6 1170 0           AD       COMPNUMB           WORDS TO BE STORED MINUS ONE
 0415   REF 837  LAST 1393    04,3647  54 154 0  STORLP71 TS       MPAC               SAVE NO. OF WORDS REMAINING MINUS ONE
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L         UPDATE PROGRAM                                                                         USER'S PAGE NO.   9        E3 S4

 0416     REF 462  LAST 1393    04,3650  50 000 1              INDEX    A                 TAKE NEXT UPDATE WORD FROM
 0417     REF  16  LAST 1393    04,3651  3 1176 0              CA       UPBUFF +2         UPBUFF AND
 0418     REF 257  LAST 1392    04,3652  54 001 1              TS       L                 SAVE IT IN L
 0419     REF 838  LAST 1393    04,3653  3 0154 1              CA       MPAC              CALCULATE NEXT
 0420     REF  12  LAST 1393    04,3654  6 1167 0              AD       UPTEMP            RECEIVING ADDRESS
 0421     REF 463  LAST 1394    04,3655  50 000 1              INDEX    A
 0422                           E3,1400                        EBANK=   1400
 0423                           04,3656  23'400 1              LXCH     1400              UPDATE THE REGISTER  BY CONTENTS OF L
 0424     REF   6  LAST 1392    E3,1706                        EBANK=   TEPHEM
 0425     REF 839  LAST 1394    04,3657  10 154 0              CCS      MPAC              ARE THERE ANY WORDS LEFT TO BE STORED
 0426     REF   2  LAST 1393    04,3660  1 3647 0              TCF      STORLP71          YES
 0427     REF   4  LAST 1392    04,3661  1 3711 1              TCF      UPOUT             NO- THEN EXIT UPDATE PROGRAM
 0428     REF  17  LAST 1394    04,3662   01173 0    ADUPBFM1  ADRES    UPBUFF -1         SAME AS ADUPBUFF BUT LESS 1 (DON'T MOVE)
 0429     REF   5  LAST 1394    04,3663  1 3711 1              TCF      UPOUT             NO- EXIT UPDATE(HERE WHEN COMPNUMB = 3)


R0430               VERB 72 BRANCH

 0431     REF  57  LAST 1391    04,3664  3 4753 1    UPEND72   CAF      BIT1              HAVE AN ODD NO. OF COMPONENTS
 0432     REF   9  LAST 1393    04,3665  7 1170 1              MASK     COMPNUMB          BEEN SENT FOR A V72 UPDATE...
 0433     REF 464  LAST 1394    04,3666  10 000 0              CCS      A
 0434                           04,3667  1 3671 0              TCF      +2                YES
 0435     REF   3  LAST 1393    04,3670  1 3760 1              TCF      UPERROUT          ERROR- SHOULD BE ODD NO. OF COMPONENTS
 0451     REF  51  LAST 1390    04,3671  4 4752 1              CS       BIT2
 0452     REF  10  LAST 1394    04,3672  6 1170 0              AD       COMPNUMB
 0453     REF 840  LAST 1394    04,3673  54 154 0    LDLOOP72  TS       MPAC              NOW PERFORM THE UPDATE
 0454     REF 465  LAST 1394    04,3674  50 000 1              INDEX    A
 0455     REF  18  LAST 1394    04,3675  31'175 0              CAE      UPBUFF +1         PICK UP NEXT UPDATE WORD
 0456     REF 466  LAST 1394    04,3676  22 000 1              LXCH     A
 0457     REF 841  LAST 1394    04,3677  10 154 0              CCS      MPAC              SET POINTER TO ECADR(MUST BE CCS)
 0458     REF 842  LAST 1394    04,3700  54 154 0              TS       MPAC
 0459     REF 467  LAST 1394    04,3701  50 000 1              INDEX    A
 0460     REF  19  LAST 1394    04,3702  31'175 0              CAE      UPBUFF +1         PICK UP NEXT ECADR OF REG TO BE UPDATED
 0461     REF  80  LAST 1393    04,3703  54 003 0              TS       EBANK             SET EBANK
 0462     REF  21  LAST 1393    04,3704  7 4357 0              MASK     LOW8              ISOLATE RELATIVE ADDRESS
 0463     REF 468  LAST 1394    04,3705  50 000 1              INDEX    A
 0464                           E3,1400                        EBANK=   1400
 0465                           04,3706  23'400 1              LXCH     1400              UPDATE THE REGISTER BY CONTENTS OF L
 0466     REF   7  LAST 1394    E3,1706                        EBANK=   TEPHEM
 0467     REF 843  LAST 1394    04,3707  10 154 0              CCS      MPAC              ARE WE THROUGH THE V72 UPDATE...
 0468     REF   1                04,3710  1 3673 1              TCF      LDLOOP72          NO


R0469               NORMAL FINISH OF P27

 0470                           04,3711              UPOUT     EQUALS
 0471     REF   1               04,3711  0 3165 0              TC       INTWAKEU          RELEASE  GRAB  OF ORBITAL  INTEGRATION
 0472     REF   3  LAST 1388    04,3712  31'171 1     +1       CAE      UPOLDMOD          RESTORE PRIOR P27 MODE
 0473     REF   7  LAST 1339    04,3713  0 5314 1              TC       NEWMODEX +3
 0474     REF 265  LAST 1393    04,3714  3 4755 1              CAF      ZERO
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L        UPDATE PROGRAM                                                             USER'S PAGE NO.  10      E3 S4

 0475   REF  10  LAST 1389   04,3715  54 332 1             TS      DNLSTCOD
 0476   REF   1              04,3716  0 3765 0             TC      UPACTOFF         TURN OFF 'UPLINK ACTIVITY' LIGHT

 0477                        04,3717  0 0006 1             EXTEND                   KILL GROUP 6.
 0478   REF  29  LAST 1313   04,3720  3 4755 1             DCA     NEGO
 0479   REF   6  LAST 1392   04,3721  52 765 1             DXCH    -PHASE6

 0480   REF  43  LAST  718   04,3722  0 5472 0             TC      ENDEXT           EXTENDED VERB EXIT

R0481            VERB 70 BRANCH

 0482                        04,3723  0 0006 1  UPEND70    EXTEND                   V70 DOES THE FOLLOWING WITH DP DELTA
 0483   REF  20  LAST 1394   04,3724  4 1175 1             DCS     UPBUFF           TIME IN UPBUFF
 0484   REF  21  LAST 1395   04,3725  53'205 0             DXCH    UPBUFF +3D
 0485   REF   2  LAST 1392   04,3726  0 3567 0             TC      TIMEDIDL         DECREMENT AGC CLOCK

 0486   REF   4  LAST 1394   04,3727  0 3760 0             TC      UPERROUT         ERROR WHILE DECREMENTING CLOCK -- EXIT

 0487   REF      LAST 1394   E3,1706                       EBANK=  TEPHEM
 0488                        04,3730  0 0006 1             EXTEND
 0489   REF  22  LAST 1395   04,3731  4 1175 1             DCS     UPBUFF           COPY DECREMENTERS FOR
 0490   REF  23  LAST 1395   04,3732  53'207 1             DXCH    UPBUFF +10D      RESTART PROTECTION
 0491                        04,3733  0 0006 1             EXTEND
 0492   REF  24  LAST 1395   04,3734  4 1175 1             DCS     UPBUFF
 0493   REF  25  LAST 1395   04,3735  53'211 0             DXCH    UPBUFF +12D

 0494   REF 119  LAST 1393   04,3736  0 5353 1             TC      PHASCHNG         RESTART PROTECT(GROUP 6)
 0495                        04,3737   04026 1             OCT     04026

 0496   REF 266  LAST 1394   04,3740  3 4755 1             CAF     ZERO
 0497                        04,3741  22 007 0             ZL
 0498   REF  26  LAST 1395   04,3742  53'207 1             DXCH    UPBUFF +10D      DECREMENT CSM STATE VECTOR TIME
 0499   REF   5  LAST  500   04,3743  21'571 1             DAS     TETCSM

 0500   REF 267  LAST 1395   04,3744  3 4755 1             CAF     ZERO
 0501                        04,3745  22 007 0             ZL
 0502   REF  27  LAST 1395   04,3746  53'211 0             DXCH    UPBUFF +12D      DECREMENT LEM STATE VECTOR TIME
 0503   REF   4  LAST  622   04,3747  21'643 0             DAS     TETLEM

 0504   REF 268  LAST 1395   04,3750  3 4755 1             CAF     ZERO
 0505                        04,3751  22 007 0             ZL
 0506   REF  28  LAST 1395   04,3752  53'175 1             DXCH    UPBUFF
 0507   REF   9  LAST 1395   04,3753  21'710 1             DAS     TEPHEM +1        INCREMENT TP TEPHEM
 0508   REF  10  LAST 1395   04,3754  27'706 0             ADS     TEPHEM

 0509   REF 120  LAST 1395   04,3755  0 5353 1             TC      PHASCHNG         RESTART PROTECT(GROUP 6)
 0510                        04,3756   04026 1             OCT     04026

 0511   REF  29  LAST 1395      1174                       EBANK=  UPBUFF
 0512    REF    6  LAST 1394    04,3757  0 3711 0             TC       UPOUT              GO TO STANDARD UPDATE PROGRAM EXIT

R0513              ERROR SEQUENCE

 0514    REF   10  LAST 1392    04,3760  0 4364 1  UPERROUT TC       FALTON             TURN ON *OPERATOR ERROR* LIGHT
 0515    REF    7  LAST 1396    04,3761  1 3711 1             TCF      UPOUT              GO TO COMMON UPDATE PROGRAM EXIT

 0516    REF   11  LAST 1396    04,3762  0 4364 1    +2       TC       FALTON             TURN ON 'OPERATOR ERROR' LIGHT
 0517    REF    2  LAST 1395    04,3763  0 3765 0             TC       UPACTOFF           TURN OFF'UPLINK ACTIVITY'LIGHT
 0518    REF   44  LAST 1395    04,3764  0 5472 0             TC       ENDEXT             EXTENDED VERB EXIT
A0519                                                                                     (THE PURPOSE OF UPERROUT +2 EXIT IS
A0520                                                                                     TO PROVIDE AN ERROR EXIT WHICH DOES NOT
A0521                                                                                     RESET ANY RESTART GROUPS)
A0522

R0523              :UPACTOFF: IS A ROUTINE TO TURN OFF UPLINK ACTIVITY LIGHT ON ALL EXITS FROM UPDATE PROGRAM(P27).

 0525    REF   33  LAST 1369    04,3765  4 4751 1  UPACTOFF CS       BIT3
 0527                           04,3766  0 0006 1             EXTEND                      TURN OFF UPLINK ACTIVITY LIGHT
 0528    REF   36  LAST 1347    04,3767  03 011 1             WAND     DSALMOUT           (BIT 3 OF CHANNEL 11)
 0530    REF  384  LAST 1391    04,3770  0 0002 0             TC       Q
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1        RTB OP CODES                                                                        USER'S PAGE NO.   1      E0 S4

 0001                        22,3773                       BANK    22
 0002    REF    1            10,2000                       SETLOC  RTBCODES
 0003                        10,3573                       BANK

 0004    REF   12  LAST 1265   E5,1664                     EBANK=  XNB
 0005    REF    1                                          COUNT*  $$/RTB

R0006              LOAD TIME2, TIME1 INTO MPAC:

 0007                        10,3573  0 0006 1  LOADTIME EXTEND
 0008    REF   39  LAST 1393  10,3574  3 0025 0           DCA     TIME2
 0009    REF    2  LAST 1019  10,3575  1 6055 0           TCF     SLOAD2

R0010              CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0012    DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

 0016    REF 844   LAST 1394  10,3576  10 154 0  CDULOGIC CCS     MPAC
 0017    REF 269   LAST 1395  10,3577  3 4755 1           CAF     ZERO
 0018                        10,3600  1 3603 0            TCF     +3
 0019                        10,3601  13 602 1            NOOP
 0020    REF  26   LAST 1102  10,3602  4 4736 0           CS      HALF

 0021    REF 845   LAST 1397  10,3603  54 155 1           TS      MPAC +1
 0022    REF 270   LAST 1397  10,3604  3 4755 1           CAF     ZERO
 0023    REF 846   LAST 1397  10,3605  56 154 1           XCH     MPAC
 0024                        10,3606  0 0006 1            EXTEND
 0025    REF  27   LAST 1397  10,3607  7 4736 0           MP      HALF
 0026    REF 847   LAST 1397  10,3610  20 155 1           DAS     MPAC
 0027    REF  61   LAST 1282  10,3611  1 6061 1           TCF     DANZIG          MODE IS ALREADY AT DOUBLE-PRECISION

R0054              FORCE TP SIGN AGREEMENT IN MPAC:

 0055    REF  19   LAST 1393  10,3612  0 7257 0  SGNAGREE TC      TPAGREE
 0056    REF  62   LAST 1397  10,3613  1 6061 1           TCF     DANZIG

R0057              CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0059    SCALED IN HALF-REVOLUTIONS.

 0060    REF   1              10,3614  0 3644 1  1STO2S   TC      1TO2SUB
 0061    REF 271   LAST 1397  10,3615  3 4755 1           CAF     ZERO
 0062    REF 848   LAST 1397  10,3616  54 155 1           TS      MPAC +1
 0063    REF   5   LAST 1047  10,3617  1 6060 0           TCF     NEWMODE

R0064              DO 1STO2S ON A VECTOR OF ANGLES:

 0065    REF   2   LAST 1397  10,3620  0 3644 1  V1STO2S  TC      1TO2SUB         ANSWER ARRIVES IN A AND MPAC.

 0066    REF 849   LAST 1397  10,3621  52 162 0           DXCH    MPAC +5
 0067    REF 850   LAST 1397  10,3622  52 155 1           DXCH    MPAC
 0068    REF   3   LAST 1397  10,3623  0 3644 1           TC      1TO2SUB
 0069   REF 851  LAST 1397   10,3624  54 156 1             TS      MPAC +2

 0070   REF 852  LAST 1398   10,3625  52 160 1             DXCH    MPAC +3
 0071   REF 853  LAST 1398   10,3626  52 155 1             DXCH    MPAC
 0072   REF   4  LAST 1397   10,3627  0 3644 1             TC      1TO2SUB
 0073   REF 854  LAST 1398   10,3630  54 155 1             TS      MPAC +1

 0074   REF 855  LAST 1398   10,3631  3 0161 1             CA      MPAC +5
 0075   REF 856  LAST 1398   10,3632  54 154 0             TS      MPAC

 0076   REF 1[illegible]  LAST 1389   10,3633  3 4753 1  TPMODE     CAF     ONE                  MODE IS TP.
 0077   REF   6  LAST 1397   10,3634  1 6060 0             TCF     NEWMODE

R0078             V1STO2S FOR 2 COMPONENT VECTOR. USED BY RR.

 0079   REF   5  LAST 1398   10,3635  0 3644 1  2V1STO2S TC      1TO2SUB
 0080   REF 857  LAST 1398   10,3636  52 160 1             DXCH    MPAC +3
 0081   REF 858  LAST 1398   10,3637  52 155 1             DXCH    MPAC
 0082   REF   6  LAST 1398   10,3640  0 3644 1             TC      1TO2SUB
 0083   REF 258  LAST 1394   10,3641  54 001 1             TS      L
 0084   REF 859  LAST 1398   10,3642  3 0157 1             CA      MPAC +3
 0085   REF   3  LAST 1397   10,3643  1 6055 0             TCF     SLOAD2

R0086             SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

 0087   REF 860  LAST 13[illegible]   10,3644  52 155 1  1TO2SUB  DXCH    MPAC               . FINAL MPAC +1 UNSPECIFIED.
 0088                        10,3645  20 001 1             DDOUBL
 0089   REF 469  LAST 1394   10,3646  10 000 0             CCS     A
 0090   REF 150  LAST 1398   10,3647  6 4753 1             AD      ONE
 0091                        10,3650  1 3652 1             TCF     +2
 0092                        10,3651  4 0000 0             COM                          THIS WAS REVERSE OF MSU.

 0093   REF 861  LAST 1398   10,3652  54 154 0             TS      MPAC                 AND SKIP ON OVERFLOW.
 0094   REF 385  LAST 1396   10,3653  0 0002 0             TC      Q

 0095   REF 470  LAST 1398   10,3654  50 000 1             INDEX   A                    OVERFLOW UNCORRECT AND IN MSU.
 0096   REF   5  LAST 1102   10,3655  3 4734 0             CAF     LIMITS
 0097   REF 862  LAST 1398   10,3656  26 154 0             ADS     MPAC
 0098   REF 386  LAST 1398   10,3657  0 0002 0             TC      Q

R0114             THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL.
R0116   QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL.
R0118   (+0 UNEQUAL TO -0) QUANTITY. MAY BE CALLED BY BANKCALL/SWCALL.

 0119   REF  31  LAST 1267   10,3660  54 142 1  CDUINC     TS      TEM2                 1S COMPL.QUANT. ARRIVES IN ACC. STORE IT
 0120   REF 168  LAST 1267   10,3661  50 130 0             INDEX   BUF
 0121                        10,3662  10 000 0             CCS     0                    CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
 0122   REF 151  LAST 1398   10,3663  6 4753 1             AD      ONE
 0123                        10,3664  1 3670 1             TCF     +4
 0124   REF 152  LAST 13[illegible]   10,3665  6 4753 1             AD      ONE
 0125    REF 153  LAST 1398    10,3666  6 4753 1          AD       ONE            OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
 0126                          10,3667  4 0000 0          COM

 0127    REF  32  LAST 1398    10,3670  6 0142 0          AD       TEM2           SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
 0129    REF 471  LAST 1398    10,3671  10 000 0          CCS      A              BACK TO 2S COMPL.
 0130    REF 154  LAST 1399    10,3672  6 4753 1          AD       ONE
 0131                          10,3673  1 3675 1          TCF      +2
 0132                          10,3674  4 0000 0          COM
 0133    REF  33  LAST 1399    10,3675  54 142 1          TS       TEM2           STORE 14BIT QUANTITY WITH PRESENT SIGN
 0134                          10,3676  1 3702 0          TCF      +4
 0135    REF 472  LAST 1399    10,3677  50 000 1          INDEX    A               SIGN.
 0137    REF   6  LAST 1398    10,3700  3 4734 0          CAF      LIMITS         FIX IT,BY ADDING IN 37777 OR 40000
 0138    REF  34  LAST 1399    10,3701  6 0142 0          AD       TEM2

 0139    REF 169  LAST 1398    10,3702  50 130 0          INDEX    BUF
 0140                          10,3703  54 000 0          TS       0              STORE NEW ANGLE IN 2S COMPLEMENT.
 0141    REF 387  LAST 1398    10,3704  0 0002 0          TC       Q
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P0142             RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

 0144    REF  61  LAST 1220    10,3705  50 120 1  PULSEIMU INDEX   FIXLOC            ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
 0145    REF  70  LAST 1271    10,3706  3 0046 0           CA      X1
 0146    REF 320  LAST 1390    10,3707  0 4616 1           TC      BANKCALL
 0147    REF   7  LAST  969    10,3710   17323 0           CADR    IMUPULSE
 0148    REF  63  LAST 1397    10,3711  1 6061 1           TCF     DANZIG
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P0192             THE SUBROUTINE  SIGNMPAC  SETS C(MPAC, MPAC +1) TO SIGN(MPAC).
R0193    FOR THIS, ONLY THE CONTENTS OF MPAC ARE EXAMINED.    ALSO +0 YIELDS POSMAX AND -0 YIELDS NEGMAX.

R0195    ENTRY MAY BE BY EITHER OF THE FOLLOWING:

R0196    1.         LIMIT THE SIZE OF MPAC ON INTERPRETIVE OVERFLOW:
R0197    ENTRY:              BOVB
R0198                                SIGNMPAC

R0199    2.         GENERATE IN MPAC THE SIGNUM FUNCTION OF MPAC:
R0200    ENTRY:              RTB
R0201                                SIGNMPAC

R0202    IN EITHER CASE, RETURN IS TO  THE NEXT INTERPRETIVE INSTRUCTION IN THE CALLING SEQUENCE.

 0204                          10,3712  0 0006 1  SIGNMPAC EXTEND
 0205    REF   2  LAST  441    10,3713  3 4733 1           DCA     DPOSMAX
 0206    REF 9[illegible]  LAST 1398    10,3714 52 155 1            DXCH    MPAC
 0207    REF 473  LAST 1399    10,3715 10 000 0            CCS     A
 0208    REF 272  LAST 13 7    10,3716  3 4755 1  DPMODE   CAF     ZERO            SETS MPAC +2 TO ZERO IN THE PROCESS
 0209    REF   4  LAST 1398    10,3717  1 6057 1           TCF     SLOAD2 +2
 0210                          10,3720  1 3721 1           TCF     +1
 0211                          10,3721  0 0006 1           EXTEND
 0212    REF   3  LAST 1401    10,3722  4 4733 0           DCS     DPOSMAX
 0213    REF   5  LAST 1401    10,3723  1 6055 0           TCF     SLOAD2

R0214        RTB OP CODE NORMUNIT IS LIKE INTERPRETIVE INSTRUCTION UNIT, EXCEPT THAT IT CAN BE DEPENDED ON NOT TO BLOW
R0216    UP WHEN THE VECTOR BEING UNITIZED IS VERY SMALL -- IT WILL BLOW UP WHEN ALL COMPONENTS ARE ZERO.   IF NORMUNIT
R0218    IS USED AND THE UPPER ORDER HALVES OF ALL COMPONENTS ARE ZERO, THE MAGNITUDE RETURNED IN 36D WILL BE TOO LARGE
R0220    BY A FACTOR OF 2(13) AND THE SQUARED MAGNITUDE RETURNED AT 34D WILL BE TOO BIG BY A FACTOR OF 2(26).

 0222    REF 155  LAST 1399    10,3724  3 4753 1  NORMUNX1 CAF     ONE
 02221   REF  11  LAST  912    10,3725  1 3727 1           TCF     NORMUNIT +1
 02222   REF 273  LAST 1401    10,3726  3 4755 1  NORMUNIT CAF     ZERO
 02223   REF  62  LAST 1400    10,3727  6 0120 1           AD      FIXLOC
 02224   REF 864  LAST 1401    10,3730 54 156 1            TS      MPAC  +2
 02225   REF 321  LAST 1400    10,3731  0 4616 1           TC      BANKCALL        GET SIGN AGREEMENT IN ALL COMPONENTS
 0223    REF   3  LAST 1070    10,3732   01010 1           CADR    VECAGREE
 0224    REF 865  LAST 1401    10,3733 10 154 0            CCS     MPAC
 0225    REF   1               10,3734  1 3770 0           TCF     NOSHIFT
 0226                          10,3735  1 3737 0           TCF     +2
 0227    REF   2  LAST 1401    10,3736  1 3770 0           TCF     NOSHIFT
 0228    REF 866  LAST 1401    10,3737 10 157 0            CCS     MPAC  +3
 0229    REF   3  LAST 1401    10,3740  1 3770 0           TCF     NOSHIFT
 0230                          10,3741  1 3743 0           TCF     +2
 0231    REF   4  LAST 1401    10,3742  1 3770 0           TCF     NOSHIFT
 0232    REF 867  LAST 1401    10,3743 10 161 0            CCS     MPAC  +5
 0233    REF   5  LAST 1401    10,3744  1 3770 0           TCF     NOSHIFT
 0234                          10,3745  1 3747 1           TCF     +2
 0235    REF   6  LAST 1401    10,3746  1 3770 0           TCF     NOSHIFT
 0236    REF 868  LAST 1401    10,3747  3 0155 0             CA      MPAC   +1        SHIFT ALL COMPONENTS LEFT 13
 0237                          10,3750  0 0006 1             EXTEND
 0238    REF  79  LAST 1370    10,3751  7 4736 0             MP      BIT14
 0239    REF 869  LAST 1402    10,3752  20 155 1             DAS     MPAC             DAS GAINS A LITTLE ACCURACY
 0240    REF 870  LAST 1402    10,3753  3 0160 0             CA      MPAC   +4
 0241                          10,3754  0 0006 1             EXTEND
 02411   REF  80  LAST 1402    10,3755  7 4736 0             MP      BIT14
 02412   REF 871  LAST 1402    10,3756  20 160 1             DAS     MPAC   +3
 02413   REF 872  LAST 1402    10,3757  3 0162 1             CA      MPAC   +6
 02414                         10,3760  0 0006 1             EXTEND
 02415   REF  81  LAST 1402    10,3761  7 4736 0             MP      BIT14
 02416   REF 873  LAST 1402    10,3762  20 162 0             DAS     MPAC   +5
 02417   REF   2  LAST 1070    10,3763  3 4761 0             CAF     THIRTEEN
 02418   REF 874  LAST 1402    10,3764  50 156 0             INDEX   MPAC   +2
 02419                         10,3765  54 045 1             TS      37D
 0242    REF  61  LAST 1399    10,3766  0 4635 0    OFFTUNIT TC      POSTJUMP
 0243    REF   3  LAST 1013    10,3767   01024 0             CADR    UNIT   +1        SKIP THE "TC VECAGREE" DONE AT UNIT


 02431   REF 274  LAST 1401    10,3770  3 4755 1    NOSHIFT  CAF     ZERO
 02432   REF   1               10,3771  1 3764 0             TCF     OFFTUNIT -2


R0300     RTB   VECSGNAG    ...FORCES SIGN AGREEMENT OF VECTOR IN MPAC.

 0301    REF 322  LAST 1401    10,3772  0 4616 1    VECSGNAG TC      BANKCALL
 0302    REF   4  LAST 1401    10,3773   01010 1             CADR    VECAGREE
 0303    REF  64  LAST 1400    10,3774  0 6061 0             TC      DANZIG



*** END OF SKIPPER .087 ***
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R0001    PROGRAM NAMES:  (1) T6JOBCHK       MOD. NO. 5     OCTOBER 2, 1967
R0002                    (2) DOT6RUPT

R0003    MODIFICATION BY: LOWELL G HULL (A.C.ELECTRONICS)
R0004    THESE PROGRAMS ENABLE THE LM DAP TO CONTROL THE THRUST TIMES OF THE REACTION CONTROL SYSTEM JETS BY USING TIME6.
R0006    SINCE THE LM DAP MAINTAINS EXCLUSIVE CONTROL OVER TIME6 AND ITS INTERRUPTS, THE FOLLOWING CONVENTIONS HAVE BEEN
R0008    ESTABLISHED AND MUST NOT BE TAMPERED WITH:
R0009                 1. NO NUMBER IS EVER PLACED INTO TIME6 EXCEPT BY LM DAP.
R0010                 2. NO PROGRAM OTHER THAN LM DAP ENABLES THE TIME6 COUNTER.
R0011                 3. TO USE TIME6, THE FOLLOWING SEQUENCE IS ALWAYS EMPLOYED:
R0012                      A. A POSITIVE (NON-ZERO) NUMBER IS STORED IN TIME6.
R0013                      B. THE TIME6 CLOCK IS ENABLED.
R0014                      C. TIME6 IS INTERROGATED AND IS:
R0015                           I. NEVER FOUND NEGATIVE(NON-ZERO) OR +0.
R0016                          II. SOMETIMES FOUND POSITIVE(BETWEEN 1 AND 240D) INDICATING THAT IT IS ACTIVE.
R0018                         III. SOMETIMES FOUND POSMAX INDICATING THAT IT IS INACTIVE AND NOT ENABLED.
R0020                          IV. SOMETIMES FOUND NEGATIVE ZERO INDICATING THAT:
R0021                                A. A T6RUPT IS ABOUT TO OCCUR AT THE NEXT DINC, OR
R0023                                B. A T6RUPT IS WAITING IN THE PRIORITY CHAIN, OR
R0025                                C. A T6RUPT IS IN PROCESS NOW.
R0026                 4) ALL PROGRAMS WHICH OPERATE IN EITHER INTERRUPT MODE OR WITH INTERRUPT INHIBITED MUST CALL T6JOBCHK
R0028                    EVERY 5 MILLISECONDS TO PROCESS A POSSIBLE WAITING T6RUPT BEFORE IT CAN BE HONORED BY THE HARDWARE.

R0030               (5. PROGRAM JTLST, IN Q,R-AXES, HANDLES THE INPUT LIST.)
R0031    T6JOBCHK CALLING SEQUENCE:

A0032                                                 L          TC      T6JOBCHK
A0033                                                 L +1      (RETURN)

R0034    DOT6RUPT CALLING SEQUENCE:

A0035                                                            DXCH    ARUPT           T6RUPT LEAD IN AT LOCATION 4004.
A0036                                                            EXTEND
A0037                                                            DCA     T6ADR
A0038                                                            DTCB

R0039    SUBROUTINES CALLED: DOT6RUPT CALLS T6JOBCHK.

R0040    NORMAL EXIT MODES: T6JOBCHK RETURNS TO L +1.
R0041                       DOT6RUPT TRANSFERS CONTROL TO RESUME.

R0042    ALARM/ABORT MODES: NONE.

R0043    INPUT: TIME6    NXT6ADR       OUTPUT: TIME6    NXT6ADR      CHANNEL 5
R0044           T6NEXT   T6NEXT +1             T6NEXT   T6NEXT +1    CHANNEL 6
R0045           T6FURTHA T6FURTHA +1           T6FURTHA T6FURTHA +1 BIT15/CH13
R0046    DEBRIS: T6JOBCHK CLOBBERS A.  DOT6RUPT CLOBBERS NOTHING.

0047                          5753                   BLOCK  02
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 0055                         17,2027                            BANK     17
 0056   REF    1              17,2000                            SETLOC DAPS2
 0057                         17,2027                            BANK
 0058   REF    2  LAST  219   E6,1466                            EBANK= T6NEXT
 0059   REF    1                                                 COUNT* $$/DAPT6

 0060   REF    1              17,2027  10 031 1  T6JOBCHK CCS    TIME6           CHECK TIME6 FOR WAITING T6RUPT:
 0061   REF  388  LAST 1399   17,2030  0 0002 0           TC     Q               NONE: CLOCK COUTING DOWN.
 0062   REF   20  LAST 1115   17,2031  0 5705 0           TC     CCSHOLE
 0063   REF    1              17,2032  0 2032 1           TC     T6JOBCHK +3
R0064   CONTROL PASSES TO T6JOB ONLY WHEN C(TIME6) = -0 (I.E. WHEN A T6RUPT MUST BE PROCESSED).

 0066   REF   33  LAST 1381   17,2033  3 4733 1  T6JOB    CAF    POSMAX          DISABLE CLOCK: NEEDED SINCE RUPT OCCURS
 0067                         17,2034  0 0006 1           EXTEND                 1 DINC AFTER T6 = 77777.  FOR 625 MUSECS
 0068   REF   22  LAST 1336   17,2035  03 013 0           WAND   CHAN13          MUST NOT HAVE T6 = +0 WITH ENABLE SET

 0069   REF   34  LAST 1404   17,2036  3 4733 1           CA     POSMAX
 0070                         17,2037  22 007 0           ZL
 0071   REF    1              17,2040  53'471 0           DXCH   T6FURTHA
 0072   REF    3  LAST 1404   17,2041  53'467 1           DXCH   T6NEXT
 0073   REF    2  LAST  219   17,2042  23'465 1           LXCH   NXT6ADR
 0074   REF    2  LAST 1404   17,2043  54 031 1           TS     TIME6

 0075   REF    7  LAST 1369   17,2044  6 7725 0           AD     PRIO37
 0076   REF  474  LAST 1401   17,2045  54 000 0           TS     A
 0077   REF    1              17,2046  1 2052 0           TCF    ENABLET6
 0078   REF   35  LAST 1404   17,2047  3 4733 1           CA     POSMAX
 0079   REF    3  LAST 1404   17,2050  54 031 1           TS     TIME6
 0080   REF    1              17,2051  1 2063 1           TCF    GOCH56
 0081   REF   47  LAST 1382   17,2052  3 4735 1  ENABLET6 CA     BIT15
 0082                         17,2053  0 0006 1           EXTEND
 0083   REF   23  LAST 1404   17,2054  05 013 0           WOR    CHAN13
 0084   REF    4  LAST 1404   17,2055  3 1466 1           CA     T6NEXT
 0085   REF    8  LAST 1404   17,2056  6 7725 0           AD     PRIO37
 0086   REF  475  LAST 1404   17,2057  54 000 0           TS     A
 0087   REF    2  LAST 1404   17,2060  1 2063 1           TCF    GOCH56
 0088   REF   36  LAST 1404   17,2061  3 4733 1           CA     POSMAX
 0089   REF    5  LAST 1404   17,2062  55'466 0           TS     T6NEXT
 0090   REF  259  LAST 1398   17,2063  50 001 0  GOCH56   INDEX  L
 0091   REF    1              17,2064  1 5753 1           TCF    WRITEP -1

 0092                            5753                     BLOCK  02
 0093   REF    1                 4000                     SETLOC FFTAG9
 0094                            5753                     BANK
 0095   REF   15  LAST  914   E6,1635                     EBANK= CDUXD
 0096   REF    1                                          COUNT* $$/DAPT6

 0097   REF    4  LAST  219      5753  3 1472 1           CA     NEXTP
 0098                            5754  0 0006 1  WRITEP   EXTEND
 0099   REF    2  LAST  212      5755  01 006 0           WRITE  CHAN6
 0100   REF 389  LAST 1404       5756  0 0002 0             TC      Q

 0101   REF   1                  5757  3 1473 0             CA      NEXTU
 0102   REF 260  LAST 1404       5760  54 001 1  WRITEU     TS      L
 0103   REF   1                  5761  4 5774 1             CS      00314OCT
 0104                            5762  0 0006 1             EXTEND
 0105   REF   3  LAST 1026       5763  02 005 0             RAND    CHAN5
 0106   REF 261  LAST 1405       5764  6 0001 0             AD      L
 0107                            5765  0 0006 1             EXTEND
 0108   REF   4  LAST 1405       5766  01 005 0             WRITE   CHAN5
 0109   REF 390  LAST 1405       5767  0 0002 0             TC      Q

 0110   REF   1                  5770  3 1474 1             CA      NEXTV
 0111   REF 262  LAST 1405       5771  54 001 1  WRITEV     TS      L
 0112   REF   2  LAST 1405       5772  3 5774 0             CA      00314OCT
 0113                            5773  1 5762 0             TCF     -9D
 0114                            5774   00314 1  00314OCT   OCT     00314

 0115                        17,2065                        BANK    17
 0116   REF   2  LAST 1404   17,2000                        SETLOC  DAPS2
 0117                        17,2065                        BANK

 0118   REF   6  LAST 1404   E6,1466                        EBANK=  T6NEXT
 0119   REF   2 LAST 1404 TO 1404:     30     30*           COUNT*  $$/DAPT6

 0120   REF  11  LAST 1339   17,2065  22 016 0  DOT6RUPT    LXCH    BANKRUPT         (INTERRUPT LEAD INS CONTINUED)
 0121                        17,2066  0 0006 1              EXTEND
 0122   REF  10  LAST 1339   17,2067  22 012 1              QXCH    QRUPT

 0123   REF   2  LAST 1404   17,2070  0 2027 0              TC      T6JOBCHK         CALL T6JOBCHK.

 0124   REF  25  LAST 1339   17,2071  1 5270 0              TCF     RESUME           END TIME6 INTERRUPT PROCESSOR.
 0001                           20,2123                     BANK    20
 0002  REF   3  LAST   43       20,2000                     SETLOC DAPS3
 0003                           20,2123                     BANK

 0004  REF  16  LAST 1404       E6,1635                     EBANK= CDUXD
 0005  REF   1                                              COUNT* $$/DAPIF

R0006  MOD 0               DATE  11/15/66          BY  GEORGE W. CHERRY

R0007  MOD 1                     1/23/67               MODIFICATION BY PETER ADLER

R0008  FUNCTIONAL DESCRIPTION

R0009            HEREIN ARE A COLLECTION OF SUBROUTINES WHICH ALLOW MISSION CONTROL PROGRAMS TO CONTROL THE MODE
R0011            AND INTERFACE WITH THE DAP.

R0012  CALLING SEQUENCES

R0013  IN INTERRUPT OR WITH INTERRUPT INHIBITED
R0014            TC      IBNKCALL
R0015            FCADR   ROUTINE

R0016  IN A JOB WITHOUT INTERRUPT INHIBITED
R0017            INHINT
R0018            TC      IBNKCALL
R0019            FCADR   ROUTINE
R0020            RELINT

R0021  OUTPUT

R0022            SEE INDIVIDUAL ROUTINES BELOW

R0023  DEBRIS

R0024            A,L, AND SOMETIMES MDUETEMP                               ODE      NOT IN PULSES MODE
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R0087   SUBROUTINE NAMES:
R0088             SETMAXDB, SETMINDB, RESTORDB, PFLITEDB

R0089   MODIFIED: 30 JANUARY 1968 BY P S WEISSMAN TO CREATE RESTORDB.

R0090   MODIFIED: 1 MARCH 1968 BY P S WEISSMAN TO SAVE EBANK AND CREATE PFLITEDB

R0091   FUNCTIONAL DESCRIPTION:
R0092             SETMAXDB - SET DEADBAND TO 5.0 DEGREES
R0093             SETMINDB - SET DEADBAND TO 0.3 DEGREE
R0094             RESTORDB - SET DEADBAND TO MAX OR MIN ACCORDING TO SETTING OF DBSELECT BIT OF DAPBOOLS
R0096             PFLITEDB - SET DEADBAND TO 1.0 DEGREE AND ZERO THE COMMANDED ATTITUDE CHANGE AND COMMANDED RATE
R0098             ALL ENTRIES SET UP A NOVAC JOB TO DO 1/ACCS SO THAT THE TJETLAW SWITCH CURVES ARE POSITIONED TO
R0100   REFLECT THE NEW DEADBAND.  IT SHOULD BE NOTED THAT THE DEADBAND REFERS TO THE ATTITUDE IN THE P-,U-,AND V-AXES.

R0102   SUBROUTINE CALLED:  NOVAC

R0103   CALLING SEQUENCE: SAME AS ABOVE
A0104                                         OR          TC       RESTORDB +1       FROM ALLCOAST
R0105   DEBRIS:  A, L, Q, RUPTREG1, (ITEMPS IN NOVAC)

 0106   REF  35  LAST  910   20,2123  30 111 0  RESTORDB CAE      DAPBOOLS          DETERMINE CREW-SELECTED DEADBAND.
 0107   REF   1              20,2124   7 4750 0           MASK     DBSELECT
 0108                        20,2125   0 0006 1           EXTEND
 0109   REF   6  LAST  853   20,2126   1 2140 1           BZF      SETMINDB

 0110   REF   1              20,2127   3 2151 0  SETMAXDB CAF      WIDEDB            SET 5 DEGREE DEADBAND.
 0111   REF   2  LAST  212   20,2130  55'346 0   +1       TS       DB

 0112                        20,2131   0 0006 1           EXTEND                     SET UP JOB TO RE-POSITION SWITCH CURVES.
 0113   REF  60  LAST 1377   20,2132  22 070 0            QXCH     RUPTREG1
 0114   REF   4  LAST  744   20,2133   3 7715 0  CALLACCS CAF      PRIO27
 0115   REF  31  LAST 1371   20,2134   0 5072 1           TC       NOVAC
 0116   REF   9  LAST  740   E6,1537                      EBANK=   AOSQ
 0117   REF   2  LAST  192   20,2135    02454 0           2CADR    1/ACCJOB
 0117                        20,2136    40106 1

 0118   REF  61  LAST 1407   20,2137   0 0070 0           TC       RUPTREG1          RETURN TO CALLER.

 0119   REF   1              20,2140   3 2150 1  SETMINDB CAF      NARROWDB          SET 0.3 DEGREE DEADBAND.
 0120   REF   2  LAST  791   20,2141   1 2130 0           TCF      SETMAXDB +1


 0121                        20,2142   0 0006 1  PFLITEDB EXTEND                     THE RETURN FROM CALLACCS IS TO RUPTREG1.
 0122   REF  62  LAST 1407   20,2143  22 070 0            QXCH     RUPTREG1
 0123   REF   9  LAST  853   20,2144   0 2153 1           TC       ZATTEROR          ZERO THE ERRORS AND COMMANDED RATES.
 0124   REF   1              20,2145   3 2152 0           CAF      POWERDB           SET DB TO 1.0 DEG.
 0125   REF   3  LAST 1407   20,2146  55'346 0            TS       DB
 0126   REF   1              20,2147   1 2133 0           TCF      CALLACCS          SET UP 1/ACCS AND RETURN TO CALLER.
 01261                       20,2150    00155 0  NARROWDB OCTAL    00155             0.3 DEGREE SCALED AT 45.
 0126                         20,2151   03434 1  WIDEDB   OCTAL   03434          5.0 DEGREES SCALED AT 45.
 0127                         20,2152   00554 0  POWERDB  DEC     .02222         1.0 DEGREE SCALED AT 45.


 0128   REF   8  LAST  903    20,2153  3 5015 0  ZATTEROR CAF     EBANK6
 0129   REF  81  LAST 1394    20,2154  56 003 1           XCH     EBANK
 0130   REF 263  LAST 1405    20,2155  54 001 1           TS      L              SAVE CALLERS EBANK IN L.
 0131   REF  21  LAST 1313    20,2156  30 032 0           CAE     CDUX
 0132   REF  17  LAST 1406    20,2157  55'635 1           TS      CDUXD
 0133   REF  10  LAST 1309    20,2160  30 033 1           CAE     CDUY
 0134   REF   4  LAST  911    20,2161  55'636 1           TS      CDUYD
 0135   REF  13  LAST 1309    20,2162  30 034 0           CAE     CDUZ
 0136   REF   4  LAST  911    20,2163  55'637 0           TS      CDUZD
 0137   REF   8  LAST  924    20,2164  1 2170 1           TCF     STOPRATE +3


 0138   REF   9  LAST 1408    20,2165  3 5015 0  STOPRATE CAF     EBANK6
 0139   REF  82  LAST 1408    20,2166  56 003 1           XCH     EBANK
 0140   REF 264  LAST 1408    20,2167  54 001 1           TS      L              SAVE CALLERS EBANK IN L.
 0141   REF 275  LAST 1402    20,2170  3 4755 1   +3      CAF     ZERO
 0142   REF  11  LAST  918    20,2171  55'643 0           TS      OMEGAPD
 0143   REF   6  LAST  917    20,2172  55'644 1           TS      OMEGAQD
 0144   REF   6  LAST  917    20,2173  55'645 0           TS      OMEGARD
 0145   REF   5  LAST  918    20,2174  55'640 0           TS      DELCDUX
 0146   REF   2  LAST  136    20,2175  55'641 1           TS      DELCDUY
 0147   REF   2  LAST  136    20,2176  55'642 1           TS      DELCDUZ
 0148   REF   4  LAST  918    20,2177  55'277 0           TS      DELPEROR
 0149   REF   2  LAST  369    20,2200  55'300 1           TS      DELQEROR
 0150   REF   2  LAST  369    20,2201  55'301 0           TS      DELREROR
 0151   REF  83  LAST 1408    20,2202  22 003 1           LXCH    EBANK          RESTORE CALLERS EBANK.
 0152   REF 391  LAST 1405    20,2203  0 0002 0           TC      Q

R0153   SUBROUTINE NAME:  ALLCOAST

R0154   WILL BE CALLED BY FRESH STARTS AND ENGINE OFF ROUTINES.                   .

R0156   CALLING SEQUENCE: (SAME AS ABOVE)

R0157   EXIT:  RETURN TO Q.

R0158   SUBROUTINES CALLED:  STOPRATE, RESTORDB, NOVAC

R0159   ZERO:  (FOR ALL AXES) AOS, ALPHA, AOSTERM, OMEGAD, DELCDU, DELEROR

R0160   OUTPUT:  DRIFTBIT/DAPBOOLS, DB, JOB TO DO 1/ACCS

R0161   DEBRIS:  A, L, Q, RUPTREG1, RUPTREG2, (ITEMPS IN NOVAC)

 0162                         20,2204  0 0006 1  ALLCOAST EXTEND                 SAVE Q FOR RETURN
 0163   REF  23  LAST 1330    20,2205  22 071 1           QXCH    RUPTREG2
 0164   REF   9  LAST 1408    20,2206   0 2165 1             TC       STOPRATE         CLEAR RATE INTERFACE.  RETURN WITH A=0
 0165   REF  84  LAST 1408    20,2207  22 003 1              LXCH     EBANK              AND L=EBANK6.  SAVE CALLERS EBANK.
 0166   REF  10  LAST 1407    20,2210  55'537 0              TS       AOSQ
 0167   REF  11  LAST 1409    20,2211  55'540 0              TS       AOSQ +1
 0168   REF   2  LAST  740    20,2212  55'541 1              TS       AOSR
 0169   REF   3  LAST 1409    20,2213  55'542 1              TS       AOSR +1
 0170   REF   2  LAST  195    20,2214  55'424 0              TS       ALPHAQ           FOR DOWNLIST.
 0171   REF   1               20,2215  55'425 1              TS       ALPHAR
 0172   REF   2  LAST  133    20,2216  55'545 0              TS       AOSQTERM
 0173   REF   1               20,2217  55'546 0              TS       AOSRTERM
 0174   REF  85  LAST 1409    20,2220  22 003 1              LXCH     EBANK            RESTORE EBANK  (EBANK6 NO LONGER NEEDED)

 0175   REF  36  LAST 1407    20,2221   4 0111 1             CS       DAPBOOLS         SET UP DRIFTBIT
 0176   REF   2  LAST  740    20,2222   7 4744 0             MASK     DRIFTBIT
 0177   REF  37  LAST 1409    20,2223  26 111 1              ADS      DAPBOOLS
 0178   REF   8  LAST  854    20,2224   0 2124 1             TC       RESTORDB +1      RESTORE DEADBANK TO CREW-SELECTED VALUE.

 0179   REF  24  LAST 1408    20,2225   0 0071 1             TC       RUPTREG2         RETURN.
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L       DAPIDLER PROGRAM                                                            USER'S PAGE NO.   1       EO S4

R0001   THE DAPIDLER PROGRAM IS STARTED BY FRESH START AND RESTART.             THE DAPIDLER PROGRAM IS DONE 10 TIMES
R0003   PER SECOND UNTIL THE ASTRONAUT DESIRES THE DAP TO WAKE UP, AND THE IMU AND CDUS ARE READY FOR USE BY THE DAP.
R0005   THE NECESSARY INITIALIZATION OF THE DAP IS DONE BY THE DAPIDLER PROGRAM.
 0006                       16,2000                          BANK    16
 0007   REF    1            16,2000                          SETLOC  DAPS1
 0008                       16,2000                          BANK

 0009   REF   12  LAST 1409 E6,1537                          EBANK=  AOSQ

 0010   REF    1                                             COUNT*  $$/DAPID

 0011                       16,2000  0 0006 1  CHEKBITS EXTEND
 0012   REF    8  LAST  911 16,2001  00 031 0           READ    CHAN31          IF BOTH BIT13 AND BIT14 ARE ONE, THEN
 0013                       16,2002  4 0000 0           COM                     THE MODE SELECT SWITCH IS IN THE OFF
 0014   REF    6  LAST  497 16,2003  7 4355 1           MASK    BIT13-14        POSITION, AND SO THE DAP SHOULD BE OFF,
 0015                       16,2004  0 0006 1           EXTEND                  WITH NO ATTITUDE ERROR DISPLAY.
 0016   REF    1            16,2005  1 2157 1           BZF     MOREIDLE

 0017   REF   51  LAST 1317 16,2006  4 1303 1           CS      IMODES33
 0018   REF   59  LAST 1391 16,2007  7 4746 1           MASK    BIT6
 0019   REF  476  LAST 1404 16,2010  10 000 0           CCS     A
 0020   REF    1            16,2011  1 2206 0           TCF     JUMPDSP
 0021   REF    4  LAST  219 16,2012  4 1273 1           CS      RCSFLAGS        IMU NOT USABLE.  SET UP INITIALIZATION
 0022   REF   39  LAST 1396 16,2013  7 4751 1           MASK    BIT3            FLAG FOR ATT ERROR DISPLAY ROUTINE.
 0023   REF    5  LAST 1410 16,2014  27'273 1           ADS     RCSFLAGS
 0024   REF    1            16,2015  1 2163 0           TCF     SHUTDOWN

 0025   REF   50  LAST 1339 16,2016  3 4742 1  CHEKMORE CAF     BIT10           BIT 10 OF 30 IS PGNCS CONTROL OF S/C
 0026                       16,2017  0 0006 1           EXTEND
 0027   REF    9  LAST  911 16,2020  02 030 0           RAND    CHAN30          BITS IN 30 ARE INVERTED
 0028   REF  477  LAST 1410 16,2021  10 000 0           CCS     A
 0029   REF    2  LAST 1410 16,2022  1 2157 1           TCF     MOREIDLE

 0030                       16,2023  0 0002 0           RETURN
```

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P0031   DAPIDLER ENTRY.

 0032   REF  12  LAST 1405   16,2024  22 016 0  DAPIDLER LXCH    BANKRUPT        INTERRUPT LEAD INS (CONTINUED)
 0033                        16,2025  0 0006 1           EXTEND
 0034   REF  11  LAST 1405   16,2026  22 012 1           QXCH    QRUPT

 0035   REF   6  LAST 1410   16,2027  3 1273 0           CA      RCSFLAGS
 0036   REF  49  LAST 1366   16,2030  7 4737 1           MASK    BIT13
 0037   REF 478  LAST 1410   16,2031  10 000 0           CCS     A               CHECK IF 1/ACCJOB HAS BEEN SET UP SINCE
 0038   REF   1              16,2032  1 2041 1           TCF     CHECKUP         THE LAST FRESH START OR RESTART.
 00381  REF  50  LAST 1411   16,2033  3 4737 0           CA      BIT13
 00382  REF   7  LAST 1411   16,2034  27'273 1           ADS     RCSFLAGS        BIT 13 IS 1.
 00383  REF   5  LAST 1407   16,2035  3 7715 0           CAF     PRIO27
 0039   REF  32  LAST 1407   16,2036  0 5072 1           TC      NOVAC           SET UP JOB TO DO A LITTLE INITIALIZATION
 0040   REF  13  LAST 1410   E6,1537                     EBANK=  AOSQ              AND EXECUTE 1/ACCS.
 0041   REF   1              16,2037   02447 1           2CADR   1/ACCSET        (WILL BRANCH TO MOREIDLE ON ACCSOKAY)
 0041   REF   1              16,2040   40106 1

 0042   REF   1              16,2041  0 2000 0  CHECKUP  TC      CHEKBITS        CHECK TO SEE IF LM DAP IS TO GO ON AND
A0043                                                                              DO ERROR DISPLAY.

 0044   REF  38  LAST 1409   16,2042  30 111 0           CAE     DAPBOOLS        IF 1/ACCS HAS NOT BEEN COMPLETED, IDLE.
 0045   REF   2  LAST  219   16,2043  7 4751 1           MASK    ACCSOKAY          NOTE: ONLY FRESH START AND RESTART
 0046                        16,2044  0 0006 1           EXTEND                          KNOCK THIS BIT DOWN.
 0047   REF   3  LAST 1410   16,2045  1 2157 1           BZF     MOREIDLE

 0048   REF  50  LAST 1318   16,2046  0 4674 0  STARTDAP TC      IBNKCALL        ZERO ATTITUDE ERROR AND DESIRED RATES.
 0049   REF  10  LAST 1407   16,2047   40153 1           FCADR   ZATTEROR
 0050   REF 276  LAST 1408   16,2050  3 4755 1           CAF     ZERO            ********** INITIALIZE: **********
 0051   REF   3  LAST  133   16,2051  55'524 1           TS      TJP
 0052   REF   2  LAST  134   16,2052  55'525 0           TS      TJU
 0053   REF   1              16,2053  55'526 0           TS      TJV
 0054   REF   7  LAST  195   16,2054  55'421 0           TS      OMEGAP          RATES IN BODY (PILOT) COORDINATES.
 0055   REF   6  LAST  711   16,2055  55'422 0           TS      OMEGAQ
 0056   REF   1              16,2056  55'423 1           TS      OMEGAR
 0057   REF   6  LAST  130   16,2057  55'430 0           TS      TRAPEDP
 0058   REF   1              16,2060  55'431 1           TS      TRAPEDQ
 0059   REF   1              16,2061  55'432 1           TS      TRAPEDR
 0060   REF  14  LAST 1411   16,2062  55'537 0           TS      AOSQ            OFFSET ACCELERATION ESTIMATES.
 0061   REF  15  LAST 1411   16,2063  55'540 0           TS      AOSQ +1
 0062   REF   4  LAST 1409   16,2064  55'541 1           TS      AOSR
 0063   REF   5  LAST 1411   16,2065  55'542 1           TS      AOSR +1
 0064   REF   3  LAST 1409   16,2066  55'424 0           TS      ALPHAQ          COPIES OF OFFSET ESTIMATES FOR DOWNLIST.
 0065   REF   2  LAST 1409   16,2067  55'425 1           TS      ALPHAR
 0066   REF   3  LAST  134   16,2070  55'501 0           TS      NEGUQ
 0067   REF   1              16,2071  55'503 1           TS      NEGUR
 0068   REF   3  LAST 1409   16,2072  55'545 0           TS      AOSQTERM        QRAXIS RATE DERIVATION TERMS AND KALMAN
 0069   REF   2  LAST 1409   16,2073  55'546 0           TS      AOSRTERM        FILTER INITIALIZATION TERMS.
 0070   REF   1              16,2074  55'510 0           TS      QACCDOT         DESCENT ACCELERATION DERIVATIVE EST.
 0071   REF   1              16,2075  55'512 1           TS      RACCDOT
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L         DAPIDLER PROGRAM                                                                       USER'S PAGE NO.   3      E6 S4

 0072     REF    1              16,2076  55'502 0              TS       ALLOWGTS          AOSTASK FLAG FOR QRAXIS RCS CONTROL USE.
 0073     REF    1              16,2077  55'631 0              TS       COTROLER          DO TRYGTS ON FIRST PASS (WILL GO TO RCS)
 0074     REF    1              16,2100  55'633 1              TS       INGTS             RECOGNIZE FIRST GTS PASS AS SUCH.
 0075     REF    3  LAST  134   16,2101  55'632 0              TS       QGIMTIMR          STOP GIMBAL DRIVES.  (PROBABLY WOULD BE
 0076     REF    1              16,2102  55'634 0              TS       RGIMTIMR            GOOD ENOUGH JUST TO INACTIVATE TIMERS)
 0077     REF    1              16,2103  55'460 0              TS       OLDPMIN           MINIMUM IMPULSE MODE ERASABLES
 0078     REF    1              16,2104  55'461 1              TS       OLDQRMIN
 00781   *REF    3  LAST  137   16,2105  55'767 1              TS       PJETCTR           INITIALIZE DOCKED JET INHIBITION
 00782   *REF    1              16,2106  55'770 1              TS       UJETCTR           COUNTERS
 00783   *REF    2  LAST  137   16,2107  55'771 0              TS       VJETCTR
 0079     REF   47  LAST 1380      4747             CALLGMBL EQUALS BIT5              RCSFLAGS INITIALIZATION.
 0080     REF    1              16,2110   4 2202 1              CS       MANFLAG
 0081     REF    8  LAST 1411   16,2111   7 1273 1              MASK     RCSFLAGS          NEGUQ(R) HAVE BEEN GENERATED.
 0082     REF    9  LAST 1412   16,2112  55'273 1              TS       RCSFLAGS

R0083     SET UP "OLD" MEASURED CDU ANGLES:

 0084                           16,2113   0 0006 1              EXTEND
 0085     REF   22  LAST 1408   16,2114   3 0033 1              DCA      CDUX              OLDXFORP AND OLDYFORP
 0086     REF    3  LAST  130   16,2115  53'441 0              DXCH     OLDXFORP
 0087     REF   14  LAST 1408   16,2116   3 0034 0              CA       CDUZ
 0088     REF    1              16,2117  55'442 0              TS       OLDZFORQ
 0089     REF   10  LAST 1412   16,2120   4 1273 1              CS       RCSFLAGS
 0090     REF   37  LAST 1367   16,2121   7 4740 1              MASK     BIT12
 00901    REF   11  LAST 1412   16,2122  27'273 1              ADS      RCSFLAGS          BIT 12 SET TO 1.
 0091     REF   31  LAST 1364   16,2123   3 4751 0              CA       FOUR
 0092     REF    2  LAST  133   16,2124  55'535 1              TS       SKIPU
 0093     REF    1              16,2125  55'536 1              TS       SKIPV
 0094     REF   37  LAST 1404   16,2126   3 4733 1              CA       POSMAX
 0095     REF    4  LAST 1404   16,2127  54 031 1              TS       TIME6
 0096     REF    7  LAST 1405   16,2130  55'466 0              TS       T6NEXT
 0097     REF    2  LAST 1404   16,2131  55'470 1              TS       T6FURTHA
 0098     REF  277  LAST 1411   16,2132   3 4755 1              CA       ZERO
 0099     REF    8  LAST 1412   16,2133  55'467 1              TS       T6NEXT +1
 0100     REF    3  LAST 1412   16,2134  55'471 0              TS       T6FURTHA +1
 0101     REF    3  LAST 1404   16,2135  55'465 0              TS       NXT6ADR
 0102     REF    5  LAST 1404   16,2136  55'472 0              TS       NEXTP
 0103     REF    2  LAST 1405   16,2137  55'473 1              TS       NEXTU
 0104     REF    2  LAST 1405   16,2140  55'474 0              TS       NEXTV
 0105     REF    8  LAST 1038   16,2141   4 4363 1              CS       TEN
 0106     REF    1              16,2142  55'757 1              TS       DAPZRUPT          JASK NOT IN PROGRESS, INITIALIZE NEG.
 0107     REF   92  LAST 1391   16,2143   3 4752 0              CA       TWO
 0108     REF    1              16,2144  55'433 0              TS       NPTRAPS
 0109     REF    1              16,2145  55'434 1              TS       NQTRAPS
 0110     REF    1              16,2146  55'435 0              TS       NRTRAPS
 0111                           16,2147   0 0006 1              EXTEND
 0112     REF    1              16,2150   3 2205 1              DCA      PAXADIDL
 0113     REF    3  LAST  219   16,2151  53'275 1              DXCH     T5ADR
 0114     REF    1              16,2152   3 7727 1    SETTIME5  CAF      MS100
 0115     REF    5  LAST  858   16,2153  54 030 0              TS       TIME5
 0116   REF  26  LAST 1405   16,2154  1 5270 0            TCF     RESUME
 0117   REF  16  LAST 1411   E6,1537                      EBANK=  AOSQ
 0118   REF   2  LAST  222   16,2155   02024 0  IDLERADR  2CADR   DAPIDLER
 0118                        16,2156   34106 1
 0119   REF  51  LAST 1411   16,2157  0 4674 0  MOREIDLE  TC      IBNKCALL          CALCULATE Q,R-AXES ATTITUDE ERRORS.
 0120   REF   1              16,2160   36626 0            CADR    QERRCALC

 0121   REF  52  LAST 1413   16,2161  0 4674 0            TC      IBNKCALL
 0122   REF   1              16,2162   35446 1            CADR    CALCPERR          CALCULATE P AXIS ATTITUDE ERRORS.

 0123                        16,2163  0 0006 1  SHUTDOWN  EXTEND
 0124   REF   1              16,2164  3 2156 1            DCA     IDLERADR
 0125   REF   4  LAST 1412   16,2165  53'275 1            DXCH    T5ADR

 0126   REF 278  LAST 1412   16,2166  3 4755 1            CAF     ZERO              KILL ANY POSSIBLE JET REQUESTS
 0127   REF   6  LAST 1412   16,2167  55'472 0            TS      NEXTP
 0128   REF   3  LAST 1412   16,2170  55'473 1            TS      NEXTU
 0129   REF   3  LAST 1412   16,2171  55'474 0            TS      NEXTV
 0130                        16,2172  0 0006 1            EXTEND                    COMMAND JETS OFF.
 0131   REF   5  LAST 1405   16,2173  01 005 0            WRITE   CHAN5
 0132                        16,2174  0 0006 1            EXTEND
 0133   REF   3  LAST 1404   16,2175  01 006 0            WRITE   CHAN6
 0134   REF   1              16,2176  4 2203 0            CS      BGIM23            TURN TRIM GIMBAL OFF
 0135                        16,2177  0 0006 1            EXTEND
 0136   REF  65  LAST 1324   16,2200  03 012 1            WAND    CHAN12
 0137   REF   1              16,2201  1 2152 1            TCF     SETTIME5          RETURN IN 100 MSEC.

01371                        16,2202   03021 1  MANFLAG   OCT     03021
 0138                        16,2203   07400 1  BGIM23    OCTAL   07400
 0139   REF   8  LAST 1411   E6,1421                      EBANK=  OMEGAP
 0140   REF   1              16,2204   02213 0  PAXADIDL  2CADR   PAXIS
 0140   REF   1              16,2205   34106 1
 0141   REF   2  LAST  155      7727            MS100     =       OCT37766
 0142   REF  69  LAST 1384      0061            COSMG     =       ITEMP1
01431                        16,2206  0 0006 1  JUMPDSP   EXTEND                    TRANSFER TO BANK 20
01432   REF   1              16,2207  3 2212 1            DCA     DSPCADR           FOR ATTITUDE ERROR DISPLAYS
01433                        16,2210  52 006 0            DTCB

01434   REF   3  LAST  137   E6,1761                      EBANK=  AK
01435   REF   1              16,2211   02226 0  DSPCADR   2CADR   ALTDSPLY
01435   REF   1              16,2212   40106 1
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 01436                           20,2226                                BANK    20
 01437  REF    4  LAST 1406      20,2000                                SETLOC  DAPS3
 01438                           20,2226                                BANK
 01439  REF    1                                                        COUNT*  $$/NEEDL

R0144   PROGRAM: ALTDSPLY

R0145   MOD 0.  6 DEC 1967

R0146   AUTHOR:  CRAIG WORK, DON KEENE, MIT IL

R0147   MOD 3 BY DON KEENE AUG 1, 1968 MOVED PROGRAM TO BANK 20

R0148   PROGRAM DESCRIPTION:

R0149   ALTDSPLY REVERSES THE DSPLYALT BIT OF RCSFLAGS EACH TIME IT IS CALLED, WHICH IS PRESUMABLY EVERY 100 MS.
R0151   IF THE REVERSED BIT IS ONE, NEEDLER IS CALLED TO DISPLAY ATTITUDE ERRORS.  IF THE BIT IS ZERO, THE ATTITUDE ERR-
R0153   ORS ARE CALCULATED AS 1) DAP FOLLOWING ERRORS, IF NEEDLFLG = 0, AND 2) TOTAL ATTITUDE ERRORS FOR NEEDLFLG = 1.

R0155   WARNING:  ALTDSPLY MAY ONLY BE CALLED WITH INTERRUPT INHIBITED.

R0156   WARNING:  EBANK MUST BE SET TO 6 WHEN USING THIS ROUTINE.

R0157   INPUT:  RCSFLAGS AND 1) IF NEEDLFLG=0, INPUT PERROR,QERROR,RERROR.
R0158                        2) IF NEEDLFLG=1, INPUT CPHI,CTHETA,CPSI,CDUX,CDUY,CDUZ,M11,M21,M31,M22,M32. (GPMATRIX)

R0160   OUTPUTS:  RCSFLAGS WITH DSPLYALT REVERSED,AK,AK1,AK2,+ NEEDLER OUTPUTS.

R0161   ENTRY:    TCF     ALTDSPLY

R0162   EXIT:     TCF     CHEKMORE

R0163   ALARM OR ABORT EXITS:  NONE

R0164   SUBPROGRAMS CALLED: NEEDLER, OVERSUB2

R0165   DEBRIS:  A,L,AND NEEDLER DEBRIS.

 0166   REF   12  LAST 1412     20,2226   3 1273 0   ALTDSPLY CA      RCSFLAGS         INVERT THE DISPLAY ALTERNATION BIT.
 0167   REF  265  LAST 1408     20,2227  54 001 1             TS      L
 0168   REF    1                20,2230   3 4750 1             CA      DSPLYALT
 0169                           20,2231   0 0006 1             EXTEND
 0170   REF   18  LAST 1391     20,2232  06 001 0             RXOR    LCHAN
 0171   REF   13  LAST 1414     20,2233  55'273 1             TS      RCSFLAGS

 0172   REF    2  LAST 1414     20,2234   7 4750 0             MASK    DSPLYALT
 0173   REF  479  LAST 1411     20,2235  10 000 0             CCS     A                IS ALTERNATION FLAG ZERO?
 0174   REF    1                20,2236   1 2322 1             TCF     NEEDLER

 0175   REF   33  LAST 1376     20,2237  30 074 1             CAE     FLAGWRD0         NEEDLFLG WILL INDICATE TOTAL OR DAP AT-
 0176   REF    1                20,2240  7 4750 0             MASK     NEEDLBIT         TITUDE ERROR DISPLAY REQUEST.
 0177   REF  480  LAST 1414     20,2241  10 000 0             CCS      A
 0178   REF    1                20,2242  1 2252 1             TCF      DSPLYTOT         TOTAL ERROR IS NEEDED IN AK,AK +1,AK +2

 0179   REF    2  LAST  132     20,2243  4 1450 0             CS       QERROR           YES. DISPLAY ATT ERRORS ON THE ,-BALL.
 0180   REF    6  LAST 1413     20,2244  55'762 1             TS       AK +1            ERROR COMPLEMENTS ARE INPUT TO NEEDLER.
 0181   REF    2  LAST  132     20,2245  4 1452 1             CS       RERROR
 01815  REF    5  LAST 1415     20,2246  55'763 0             TS       AK  +2
 0182   REF    2  LAST  154     20,2247  4 1464 1             CS       PERROR
 0183   REF    6  LAST 1415     20,2250  57'761 0             XCH      AK

 0184   REF    1                20,2251  1 2442 0             TCF      RETNMORE         DISPLAY THESE THE NEXT TIME THROUGH

F0185   CALCULATE GIMBAL ANGLE TOTAL ERRORS, RESOLVE INTO PILOT AXES, STORE TOTAL ERRORS FOR NEEDLER.  Q-AXIS FIRST.

 0187                           20,2252  0 0006 1   DSPLYTOT EXTEND
 0188   REF   70  LAST 1413     20,2253  22 061 0             QXCH     ITEMP1           SAVE Q FOR CHEKBITS RETURN.

 0189   REF    3  LAST  478     20,2254  3 0322 1             CA       CTHETA           DESIRED ATTITUDE, Y-AXIS, 2'S COMP.
 0190                           20,2255  0 0006 1             EXTEND                    SUBTRACT CURRENT ATTITUDE.
 0191   REF   11  LAST 1408     20,2256  20 033 0             MSU      CDUY             DIFFERENCE SCALED AT PI, 1'S COMP.
 0192   REF    7  LAST 1415     20,2257  55'761 1             TS       AK               SAVE FOR R-ERROR CALCULATION.
 0193                           20,2260  0 0006 1             EXTEND
 0194   REF    2  LAST  189     20,2261  7 1415 1             MP       M21              (CHTETA-CDUY)*M21 SCALED AT PI RADIANS.
 0195   REF    8  LAST 1415     20,2262  57'762 0             XCH      AK +1            STORE FIRST TERM OF Q ERROR.
 0196   REF    5  LAST  518     20,2263  3 0323 0             CA       CPSI             DESIRED ATTITUDE,Z-AXIS, 2'S COMP.
 0197                           20,2264  0 0006 1             EXTEND                    SUBTRACT CURRENT ATTITUDE.
 0198   REF   15  LAST 1412     20,2265  20 034 1             MSU      CDUZ             DIFFERENCE SCALED AT PI, 1'S COMP.
 0199   REF    9  LAST 1415     20,2266  55'763 0             TS       AK +2            SAVE Z-AXIS TERM FOR R ERROR CALCULATION
 0200                           20,2267  0 0006 1             EXTEND
 0201   REF    5  LAST  903     20,2270  7 1417 0             MP       M22              (CPSI-CDUZ)*M22, SCALED AT PI RADIANS.
 0202   REF   10  LAST 1415     20,2271  6 1762 0             AD       AK +1            Q ERROR COMPLETE           , AT PI RAD.
 0203   REF    1                20,2272  0 2435 1             TC       OVERSUB2         PIN NEEDLES IN CASE OF OVERFLOW.
 0204   REF   11  LAST 1415     20,2273  55'762 1             TS       AK +1

R0205   R ERROR CALCULATION NEXT.

 0206   REF   12  LAST 1415     20,2274  3 1761 0             CA       AK               Y-AXIS DIFFERENCE STORED BY Q-AXIS CALC.
 0207                           20,2275  0 0006 1             EXTEND
 0208   REF    2  LAST  189     20,2276  7 1416 1             MP       M31              (CTHETA-CDUY)*M31, SCALED AT PI RADIANS.
 0209   REF   13  LAST 1415     20,2277  57'763 1             XCH      AK +2            FIRST TERM OF R ERROR.
A0210                                                                                   Z-AXIS DIFFERENCE, STORED BY A CALC. IS
 0211                           20,2300  0 0006 1             EXTEND                    RECOVERED BY THE EXCHANGE.
 0212   REF    3  LAST  903     20,2301  7 1420 1             MP       M32              (CPSI-CDUZ)*M32, SCALED AT PI RADIANS.
 0213   REF   14  LAST 1415     20,2302  6 1763 1             AD       AK +2            R ERROR COMPLETE           , AT PI RAD.
 0214   REF    2  LAST 1415     20,2303  0 2435 1             TC       OVERSUB2         PIN NEEDLES IN CASE OF OVERFLOW.
 0215   REF   15  LAST 1415     20,2304  55'763 0             TS       AK +2

R0216   NOW CALCULATE P ERROR.  (NOTE THAT M13 = 1, SCALED AT 1, SO THE MULTIPLICATION IS BY-PASSED.)
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 0218   REF  16  LAST 1415   20,2305  3 1761 0         CA      AK                Y-AXIS DIFFERENCE STORED BY Q AXIS CALC.
 0219                        20,2306  0 0006 1         EXTEND
 0220   REF   7  LAST  183   20,2307  7 1414 0         MP      M11               (CTHETA-CDUY)*M11 SCALED AT PI RADIANS.
 0221   REF  17  LAST 1416   20,2310  57'761 0         XCH     AK                FIRST TERM OF P ERROR IN AK, AT PI RAD.
 0222   REF  11  LAST  914   20,2311  30 321 1         CAE     CPHI              DESIRED ATTITUDE, X-AXIS, 2'S COMP.
 0223                        20,2312  0 0006 1         EXTEND                    SUBTRACT CURRENT X ATTITUDE.
 0224   REF  23  LAST 1412   20,2313  20 032 1         MSU     CDUX              X-AXIS DIFFERENCE, 1'S COMP, AT PI RAD.

R0225   M13 = 1, SO BYPASS THE MULTIPLICATION.
R0226             EXTEND
R0227             MP       M13                  (CPHI-CDUX)*M13 SCALED AT PI RADIANS.

 0228   REF  18  LAST 1416   20,2314  6 1761 0         AD      AK                P ERROR COMPLETE       , SCALED AT PI RAD
 0229   REF   3  LAST 1415   20,2315  0 2435 1         TC      OVERSUB2          PIN NEEDLES IN CASE OF OVERFLOW.
 0230   REF  19  LAST 1416   20,2316  55'761 1         TS      AK

 0231                        20,2317  0 0006 1         EXTEND
 0232   REF  71  LAST 1415   20,2320  22 061 0         QXCH    ITEMP1            RESTORE Q FOR CHEKBITS RETURN.

 0233   REF   2  LAST 1415   20,2321  1 2442 0         TCF     RETNMORE          DISPLAY THESE THE NEXT TIME THROUGH
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R0234   FDAI ATTITUDE ERROR DISPLAY SUBROUTINE

R0235   PROGRAM DESCRIPTION:    D. KEENE    5/24/67

R0236   MOD 1 BY CRAIG WORK, 12 DEC 67

R0237   MOD 2 BY CRAIG WORK, 6 APRIL 68 CONVERTS ATTITUDE ERROR DISPLAY SCALING FROM 16 7/8 DEG. TO 42 3/16 DEGREES.

R0239       THIS SUBROUTINE IS USED TO DISPLAY ATTITUDE ERRORS ON THE FDAI VIA THE DIGITAL TO ANALOG CONVERTERS (DACS)
R0241   IN THE CDUS.  CARE IS TAKEN TO METER OUT THE APPROPRIATE NUMBER OF PULSES TO THE IMU ERROR COUNTERS AND PREVENT
R0243   OVERFLOW, TO CONTROL THE RELAY SEQUENCING, AND TO AVOID INTERFERENCE WITH THE COARSE ALIGN LOOP WHICH ALSO USES
R0245   THE DACS.


R0246   CALLING SEQUENCE:

R0247       DURING THE INITIALIZATION SECTION OF THE USER'S PROGRAM, BIT3 OF RCSFLAGS SHOULD BE SET TO INITIATE THE
R0249   TURN-ON SEQUENCE WITHIN THE NEEDLES PROGRAM:

R0250             CS      RCSFLAGS          IN EBANK6
R0251             MASK    BIT3
R0252             ADS     RCSFLAGS

R0253   THEREAFTER, THE ATTITUDE ERRORS GENERATED BY THE USER SHOULD BE TRANSFERED TO THE FOLLOWING LOCATIONS IN EBANK6:

R0255             AK      SCALED 180 DEGREES  NOTE: THESE LOCATIONS ARE SUBJECT
R0256             AK1     SCALED 180 DEGREES        TO CHANGE
R0257             AK2     SCALED 180 DEGREES

R0258   FULL SCALED DEFLECTION OF THE NEEDLES CORRESPONDS TO 5 1/16 DEGREES, WHILE 384 BITS IN THE IMU ERROR COUNTER
R0260   CORRESPONDS TO 42 3/16 DEGREES.  (DAC MAXIMUM CAPACITY IS 384 BITS.) 46 BITS EFFECTIVELY PIN THE NEEDLES.

R0262   A CALL TO NEEDLER WILL THEN UPDATE THE DISPLAY:

R0263             INHINT
R0264             TC      IBNKCALL         NOTE: EBANK SHOULD BE SET TO E6
R0265             CADR    NEEDLER
R0266             RELINT

R0267       THIS PROCESS SHOULD BE REPEATED EACH TIME THE ERRORS ARE UPDATED.  AT LEAST 3 PASSES THRU THE PROGRAM ARE
R0268   REQUIRED BEFORE ANYTHING IS ACTUALLY DISPLAYED ON THE ERROR METERS.
R0270   NOTE: EACH CALL TO NEEDLER MUST BE SEPARATED BY AT LEAST 50MS TO ASSURE PROPER RELAY SEQUENCING.

R0272   ERASABLE USED:
R0273                           AK          CDUXCMD
R0274                           AK1         CDUYCMD
R0275                           AK2         CDUZCMD
R0276                           EDRIVEX     A,L,Q
R0277                           EDRIVEY     T5TEMP
R0278                           EDRIVEZ     DINDX
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R0279   SWITCHES:                RCSFLAGS    BITS 3,2

R0280   I/O CHANNELS:            CHAN12      BIT 4 (COARSE ALIGN - READ ONLY)
R0281                            CHAN12      BIT 6 (IMU ERROR COUNTER ENABLE)
R0282                            CHAN14      BIT 13,14,15 (DAC ACTIVITY)


R0283   SIGN CONVENTIONS<    AK = THETAC - THETA
R0284              WHERE     THETAC = COMMAND ANGLE
R0285                        THETA  = PRESENT ANGLE


 0286   REF  14  LAST 1414   20,2322   3 1273 0   NEEDLER   CA       RCSFLAGS
 0287   REF  27  LAST 1370   20,2323   7 6242 1             MASK     SIX
 0288                        20,2324   0 0006 1             EXTEND
 0289   REF   1              20,2325   1 2362 0             BZF      NEEDLES3
 0290   REF  40  LAST 1410   20,2326   7 4751 1             MASK     BIT3
 0291                        20,2327   0 0006 1             EXTEND
 0292   REF   1              20,2330   1 2353 1             BZF      NEEDLER2             BIT3 = 0, BIT2 = 1

 0293   REF  60  LAST 1410   20,2331   4 4746 1             CS       BIT6                 FIRST PASS BIT3 = 1
 0294                        20,2332   0 0006 1             EXTEND                        DISABLE IMU ERROR COUNTER TO ZERO DACS
 0295   REF  66  LAST 1413   20,2333   03 012 1             WAND     CHAN12               MUST WAIT AT LEAST 60 MS BEFORE
 0296   REF 279  LAST 1413   20,2334   4 4755 0   NEEDLE11  CS       ZERO                 ENABLING COUNTERS.
 0297   REF  20  LAST 1416   20,2335   55'761 1             TS       AK                   ZERO THE INPUTS ON FIRST PASS
 0298   REF   1              20,2336   55'762 1             TS       AK1
 0299   REF   1              20,2337   55'763 0             TS       AK2
 0300   REF   3  LAST  137   20,2340   55'764 1             TS       EDRIVEX              ZERO THE DISPLAY REGISTERS
 0301   REF   1              20,2341   55'765 0             TS       EDRIVEY
 0302   REF   1              20,2342   55'766 0             TS       EDRIVEZ
 0303   REF   4  LAST 1313   20,2343   54 050 0             TS       CDUXCMD              ZERO THE OUT COUNTERS
 0304   REF   2  LAST  174   20,2344   54 051 1             TS       CDUYCMD
 0305   REF   2  LAST  175   20,2345   54 052 1             TS       CDUZCMD
 0306   REF  28  LAST 1418   20,2346   4 6242 1             CS       SIX                  RESET RCSFLAGS FOR PASS2
 0307   REF  15  LAST 1418   20,2347   7 1273 1             MASK     RCSFLAGS
 0308   REF  52  LAST 1394   20,2350   6 4752 0             AD       BIT2
 0309   REF  16  LAST 1418   20,2351   55'273 1             TS       RCSFLAGS
 0310   REF   3  LAST 1416   20,2352   1 2442 0             TCF      RETNMORE

 0311   REF  61  LAST 1418   20,2353   3 4746 0   NEEDLER2  CAF      BIT6                 ENABLE IMU ERROR COUNTERS
 0312                        20,2354   0 0006 1             EXTEND
 0313   REF  67  LAST 1418   20,2355   05 012 1             WOR      CHAN12
 0314   REF  29  LAST 1418   20,2356   4 6242 1             CS       SIX                  RESET RCSFLAGS TO DISPLAY ATTITUDE
 0315   REF  17  LAST 1418   20,2357   7 1273 1             MASK     RCSFLAGS             ERRORS    WAIT ATLEAST 4 MS FOR
 0316   REF  18  LAST 1418   20,2360   55'273 1             TS       RCSFLAGS             RELAY CLOSURE
 0317   REF   4  LAST 1418   20,2361   1 2442 0             TCF      RETNMORE

 0318   REF  62  LAST 1418   20,2362   3 4746 0   NEEDLES3  CAF      BIT4                 CHECK TO SEE IF IMU ERROR COUNTER
 0319                        20,2363   0 0006 1             EXTEND                        IS ENABLED
 0320   REF  68  LAST 1418   20,2364   02 012 0             RAND     CHAN12
 0321   REF 481  LAST 1415   20,2365  10 000 0             CCS     A           IF NOT, RE-INITIALIZE NEEDLER.
 0322   REF   1              20,2366  1 2373 0             TCF     NEEDLES

 0323   REF  19  LAST 1418   20,2367  4 1273 1             CS      RCSFLAGS    SET UP INITIALIZATION FLAG IN RCSFLAGS.
 0324   REF  41  LAST 1418   20,2370  7 4751 1             MASK    BIT3
 0325   REF  20  LAST 1419   20,2371  27'273 1             ADS     RCSFLAGS
 0326   REF   5  LAST 1418   20,2372  1 2442 0             TCF     RETNMORE

 0327   REF  93  LAST 1412   20,2373  3 4752 0  NEEDLES    CAF     TWO
 0328   REF   1              20,2374  54 063 0  DACLOOP    TS      DINDX
 0329   REF   1              20,2375  4 2434 1             CS      ONETENTH    RESCALE INPUTS TO + OR - 1800 DEGREES.
 0330                        20,2376  0 0006 1             EXTEND
 0331   REF   2  LAST 1419   20,2377  5 0063 1             INDEX   DINDX
 0332   REF  21  LAST 1418   20,2400  7 1761 1             MP      AK
 0333   REF 266  LAST 1414   20,2401  54 001 1             TS      L
 0334   REF 482  LAST 1419   20,2402  10 000 0             CCS     A
 0335   REF   1              20,2403  3 2432 0             CA      DACLIMIT
 0336                        20,2404  1 2406 0             TCF     +2
 0337   REF   2  LAST 1419   20,2405  4 2432 1             CS      DACLIMIT
 0338   REF 267  LAST 1419   20,2406  6 0001 0             AD      L
 0339   REF   1              20,2407  54 061 1             TS      T5TEMP      OVFLO CHK
 0340                        20,2410  1 2414 0             TCF     +4
 0341   REF 483  LAST 1419   20,2411  50 000 1             INDEX   A           ON OVERFLOW LIMIT OUTPUT TO +-384
 0342   REF   3  LAST 1419   20,2412  3 2432 0             CAF     DACLIMIT
 0343   REF 268  LAST 1419   20,2413  54 001 1             TS      L
 0344   REF   3  LAST 1419   20,2414  50 063 1             INDEX   DINDX
 0345   REF   4  LAST 1418   20,2415  4 1764 1             CS      EDRIVEX     CURRENT VALUE OF DAC
 0346   REF 269  LAST 1419   20,2416  6 0001 0             AD      L
 0347   REF   4  LAST 1419   20,2417  50 063 1             INDEX   DINDX
 0348   REF   5  LAST 1418   20,2420  26 050 0             ADS     CDUXCMD
 0349   REF   5  LAST 1419   20,2421  50 063 1             INDEX   DINDX
 0350   REF   5  LAST 1419   20,2422  23'764 0             LXCH    EDRIVEX
 0351   REF   6  LAST 1419   20,2423  10 063 0             CCS     DINDX
 0352   REF   1              20,2424  1 2374 1             TCF     DACLOOP
 0353   REF   5  LAST 1372   20,2425  3 7740 0             CAF     13,14,15
 0354                        20,2426  0 0006 1             EXTEND
 0355   REF  23  LAST 1326   20,2427  05 014 1             WOR     CHAN14      SET DAC ACTIVITY BITS
 0356   REF   6  LAST 1419   20,2430  1 2442 0             TCF     RETNMORE

 0357                        20,2431   77177 0             DEC     -384
 0358                        20,2432   37200 1  DACLIMIT   DEC     16000
 0359                        20,2433   00600 1             DEC     384

 0360                        20,2434   03146 1  ONETENTH   OCT     03146       DECIMAL  +0.1, SCALED AT 1.
 0361   REF  55  LAST 1366      4750            DSPLYALT   EQUALS  BIT4        100 MS ALTERNATION BIT IN RCSFLAGS


 0362                        20,2435  54 007 1  OVERSUB2   TS      7           RETURNS  A  UNCHANGED  OR LIMITED TO
 0363   REF 392  LAST 1408   20,2436  0 0002 0             TC      Q           POSMAX OR NEGMAX IF A HAS OVERFLOW
 0364   REF 484  LAST 1419   20,2437  50 000 1             INDEX   A
 0365    REF   7  LAST 1399    20,2440  4 4734 1            CS       LIMITS            DUPLICATE CODING IN  BANK 16
 0366    REF 393  LAST 1419    20,2441  0 0002 0            TC       Q


 0367                          20,2442  0 0006 1  RETNMORE EXTEND                     RETURN TO CHEKMORE
 0368    REF   1               20,2443  3 2446 0           DCA      MORECADR
 0369                          20,2444  52 006 0           DTCB

 0370    REF  17  LAST 1413    E6,1537                     EBANK=  AOSQ
 0371    REF   1               20,2445   02016 1  MORECADR 2CADR   CHEKMORE
 0371    REF   1               20,2446   34106 1
 0001                           16,2213                                   BANK    16
 0002    REF    2  LAST 1410    16,2000                                   SETLOC  DAPS1
 0003                           16,2213                                   BANK

 0004    REF    3  LAST 1415    E6,1464                                   EBANK=  PERROR
 0005    REF    1                                                         COUNT*  $$/DAPP

R0006    THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH CONTROLS THE P-AXIS ACTION OF THE LEM USING THE RCS JETS.
R0008    THE NOMINAL TIME BETWEEN THE P-AXIS RUPTS IS 100 MS IN ALL NON-IDLING MODES OF THE DAP.

 0010    REF    2  LAST 1412    16,2213  3 7727 1   PAXIS         CA      MS100
 0011    REF    6  LAST 1412    16,2214  26 030 0                 ADS     TIME5               *** NECESSARY IN ORDER TO ALLOW SYN-
A00115                                                                                        CHRONIZATION WITH OTHER INTERRUPTS ***

 0012    REF   13  LAST 1411    16,2215  22 016 0                 LXCH    BANKRUPT            INTERRUPT LEAD IN (CONTINUED)
 0013                           16,2216  0 0006 1                 EXTEND
 0014    REF   12  LAST 1411    16,2217  22 012 1                 QXCH    QRUPT

R0015    CHECK IF DAP PASS IS PERMISSIBLE

 0016    REF    2  LAST 1412    16,2220  11'757 1                 CCS     DAPZRUPT            IF DAPZRUPT POSITIVE, DAP (JASK) IS
 0017    REF    1               16,2221  0 5634 0                 TC      BAILOUT                STILL IN PROGRESS AND A RESTART IS
 0018                           16,2222   02000 0                 OCT     02000                CALLED FOR.  IT IS NEVER ZERO.

 0019    REF    2  LAST 1411    16,2223  0 2000 0                 TC      CHEKBITS            RETURN IS TO I+1 IF DAP SHOULD STAY ON.

 00191   REF   24  LAST 1415    16,2224  3 0032 0                 CA      CDUX                READ AND STORE CDU'S
 00192   REF    2  LAST  131    16,2225  55'750 0                 TS      DAPTREG4
 00193   REF   12  LAST 1415    16,2226  3 0033 1                 CA      CDUY
 00194   REF    2  LAST  131    16,2227  55'751 1                 TS      DAPTREG5
 00195   REF   16  LAST 1415    16,2230  3 0034 0                 CA      CDUZ
 00196   REF    2  LAST  133    16,2231  55'752 1                 TS      DAPTREG6
R0020    ***** KALCMANU-DAP AND "RATE-HOLD"-DAP INTERFACE *****

R0021    THE FOLLOWING SECTION IS EXECUTED EVERY 100 MS (10 TIMES A SECOND) WITHIN THE P-AXIS REACTION CONTROL SYSTEM
R0023    AUTOPILOT (WHENEVER THE DAP IS IN OPERATION).

 0024    REF   18  LAST 1408    16,2232  3 1635 0                 CA      CDUXD
 0025                           16,2233  0 0006 1                 EXTEND
 0026    REF    6  LAST 1408    16,2234  21'640 0                 MSU     DELCDUX
 0027    REF    1               16,2235  0 2256 1                 TC      1STOTWOS
 0028    REF   19  LAST 1421    16,2236  55'635 1                 TS      CDUXD
 0029    REF    5  LAST 1408    16,2237  3 1636 0                 CA      CDUYD
 0030                           16,2240  0 0006 1                 EXTEND
 0031    REF    3  LAST 1408    16,2241  21'641 1                 MSU     DELCDUY
 0032    REF    2  LAST 1421    16,2242  0 2256 1                 TC      1STOTWOS
 0033    REF    6  LAST 1421    16,2243  55'636 1                 TS      CDUYD
 0034    REF    5  LAST 1408    16,2244  3 1637 1                 CA      CDUZD
 0035                           16,2245  0 0006 1                 EXTEND
 0036    REF    3  LAST 1408    16,2246  21'642 1                 MSU     DELCDUZ
 0037    REF    3  LAST 1421     16,2247  0 2256 1             TC       1STOTWOS
 0038    REF    6  LAST 1421     16,2250  55'637 0             TS       CDUZD
 00381                           16,2251  0 0006 1             EXTEND                  DIMINISH MANUAL CONTROL DIRECT RATE
 00382   REF    1                16,2252  27'445 1             DIM      TCP            TIME COUNTERS.
 00383                           16,2253  0 0006 1             EXTEND
 00384   REF    1                16,2254  27'457 1             DIM      TCQR
A0039                                                   RATELOOP COMPUTES JETRATEQ, JETRATER, AND 1JACC*NO. PJETS IN ITEMP1.
A0040                                                     RETURNS TO BACKP.

A0041                                                     JETRATE = 1JACC*NO.PJETS*TJP  (NOTE TJ IS THE TIME FIRED DURING CSP)

A0042                                                     JETRATEQ= 1JACCQ(TJU*NO.UJETS - TJV*NO.VJETS)

A0043                                                     JETRATER= 1JACCR(TJU*NO.UJETS + TJV*NO.VJETS)

 0044    REF    1                16,2255  1 2647 1             TCF      PAXFILT        PROCEEDS TO RATELOOP AFTER SUPERJOB
 0045    REF  485  LAST 1419     16,2256  10 000 0   1STOTWOS CCS      A
 0046    REF  156  LAST 1401     16,2257  6 4753 1             AD       ONE
 0047    REF  394  LAST 1420     16,2260  0 0002 0             TC       Q
 0048    REF  486  LAST 1422     16,2261  4 0000 0             CS       A
 0049    REF  395  LAST 1422     16,2262  0 0002 0             TC       Q
 0050                            16,2263  0 0006 1   SUBDIVDE EXTEND                  OVERFLOW PROTECTION ROUTINE TO GIVE
 0051    REF    3  LAST  133     16,2264  7 1741 0             MP       DAPTEMP3         POSMAX OR NEGMAX IF THE DIVIDE WOULD
 0052    REF    3  LAST  130     16,2265  21'427 0             DAS      OMEGAU           OVERFLOW

 0053                            16,2266  0 0006 1   +3        EXTEND
 00531   REF    4  LAST 1422     16,2267  3 1427 1             DCA      OMEGAU
 00532   REF    2  LAST  131     16,2270  53'744 0             DXCH     DAPTEMP5
 00533   REF    5  LAST 1422     16,2271  11'426 1             CCS      OMEGAU
 0054                            16,2272  1 2274 0             TCF      +2
 0055    REF    1                16,2273  1 2304 0             TCF      DIVIDER
 0056    REF    1                16,2274  6 2315 1             AD       -OCT630
 0057                            16,2275  0 0006 1             EXTEND
 0058    REF    2  LAST 1422     16,2276  6 2304 1             BZMF     DIVIDER

 0059    REF    6  LAST 1422     16,2277  11'426 1             CCS      OMEGAU
 0060    REF   38  LAST 1412     16,2300  3 4733 1             CA       POSMAX           45 DEG/SEC
 0061    REF  396  LAST 1422     16,2301  0 0002 0             TC       Q
 0062    REF   39  LAST 1422     16,2302  4 4733 0             CS       POSMAX
 0063    REF  397  LAST 1422     16,2303  0 0002 0             TC       Q

 0064    REF    7  LAST 1422     16,2304  53'427 0   DIVIDER  DXCH     OMEGAU
 0065                            16,2305  0 0006 1             EXTEND
 0066    REF    3  LAST 1421     16,2306  11'750 0             DV       DAPTREG4
 0067    REF  398  LAST 1422     16,2307  0 0002 0             TC       Q

 0068                            16,2310  54 007 1   OVERSUB  TS       7              RETURNS A UNCHANGED OR LIMITED TO
 0069    REF  399  LAST 1422     16,2311  0 0002 0             TC       Q                POSMAX OR NEGMAX IF A HAS OVERFLOW
 0070    REF  487  LAST 1422     16,2312  50 000 1             INDEX    A
 0071    REF   48  LAST 1404     16,2313  4 4734 1             CS       BIT15 -1
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L          P-AXIS RCS AUTOPILOT                                                                      USER'S PAGE NO.   3       E6 S4

 0072   REF 400  LAST 1422   16,2314  0 0002 0              TC       Q

 0073                        16,2315   77147 0  -OCT630   OCT      77147

 0074   REF  19  LAST  137   16,2316  3 1737 0  BACKP     CA       DAPTEMP1
 0075                        16,2317  0 0006 1            EXTEND
 0076   REF   7  LAST  918   16,2320  7 1530 1            MP       1JACC
 0077   REF   3  LAST  132   16,2321  55'745 1            TS       JETRATE
A0078                                           BEGINNING OF THE RATE DERIVATION
A0079                                           OMEGAP,Q,R         BODY RATES SCALED AT PI/4
A0080                                           TRAPER,Q,R         BODY ANGLE ERRORS FROM PREDICTED ANGLE (PI/40)
A0081                                           NP(QR)TRAPS        NUMBER OF TIMES ANGLE ERROR HAS BEEN ACCUMULATED
A0082                                           AOSQ(R)TERM        CHANGE IN RATE DUE TO OFFSET ACCELLERATION. (PI/4)
A0083                                           JETRATE,Q,R        CHANGE IN RATE DUE TO  JET   ACCELLERATION. (PI/4)
A0084                                           TRAPSIZE           NEGATIVE LIMIT OF MAGNITUDE OF TRAPEDP,ECT.
A0086                                           OMEGAU             DP-TEMPORARY STORAGE

A0087                                               OMEGA = OMEGA + JETRATE + AOSTERM (+TRAPED/NTRAPS IF TRAPED BIG)

 0088   REF   4  LAST 1422   16,2322  31'750 1            CAE      DAPTREG4           CDUX IS STORED HERE
 0089   REF 270  LAST 1419   16,2323  54 001 1            TS       L
 0090                        16,2324  0 0006 1            EXTEND
 0091   REF   4  LAST 1412   16,2325  21'440 1            MSU      OLDXFORP           SCALED AT PI
 0092   REF   5  LAST 1423   16,2326  23'440 0            LXCH     OLDXFORP
 0093   REF  20  LAST 1423   16,2327  55'737 1            TS       DAPTEMP1
 0094   REF   1              16,2330  3 3620 0            CA       1/40
 0095   REF   5  LAST 1423   16,2331  55'750 0            TS       DAPTREG4
 0096   REF   4  LAST 1423   16,2332  4 1745 1            CS       JETRATE
 0097                        16,2333  0 0006 1            EXTEND
 0098   REF  82  LAST 1402   16,2334  7 4736 0            MP       BIT14
 0099   REF   7  LAST 1411   16,2335  27'430 0            ADS      TRAPEDP
 0100   REF   1              16,2336  3 1746 0            CA       JETRATEQ
 0101   REF   4  LAST 1411   16,2337  6 1545 1            AD       AOSQTERM
 0102                        16,2340  0 0006 1            EXTEND
 0103   REF   1              16,2341  7 7736 0            MP       -BIT14
 0104   REF   2  LAST 1411   16,2342  27'431 1            ADS      TRAPEDQ
 0105   REF   1              16,2343  3 1747 1            CA       JETRATER
 0106   REF   3  LAST 1411   16,2344  6 1546 1            AD       AOSRTERM
 0107                        16,2345  0 0006 1            EXTEND
 0108   REF   2  LAST 1423   16,2346  7 7736 0            MP       -BIT14
 0109   REF   2  LAST 1411   16,2347  27'432 1            ADS      TRAPEDR

 0110   REF   3  LAST 1421   16,2350  3 1751 0            CA       DAPTREG5           CDUY IS STORED HERE
 0111   REF 271  LAST 1423   16,2351  54 001 1            TS       L
 0112                        16,2352  0 0006 1            EXTEND
 0113   REF   1              16,2353  21'441 0            MSU      OLDYFORP           SCALED AT PI
 0114   REF   2  LAST 1423   16,2354  23'441 1            LXCH     OLDYFORP
 0115   REF   3  LAST  133   16,2355  55'740 1            TS       DAPTEMP2
 0116                        16,2356  0 0006 1            EXTEND
 0117   REF   8  LAST 1416   16,2357  7 1414 0            MP       M11                M11 SCALED AT 1
 0118    REF  21  LAST 1423   16,2360  6 1737 0           AD      DAPTEMP1
 0119    REF   8  LAST 1422   16,2361  53'427 0           DXCH    OMEGAU

 0120    REF   1              16,2362  0 2266 1           TC      SUBDIVDE +3      RETURNS WITH CDU-RATE AT PI/4

 0121                         16,2363  0 0006 1           EXTEND
 0122    REF   9  LAST 1413   16,2364  61'421 1           SU      OMEGAP
 0123    REF   8  LAST 1423   16,2365  27'430 0           ADS     TRAPEDP
 0124    REF   1              16,2366  0 2310 1           TC      OVERSUB
 0125    REF   9  LAST 1424   16,2367  55'430 0           TS      TRAPEDP
 012501                       16,2370  0 0006 1           EXTEND
 012502 REF    3  LAST 1422   16,2371  3 1744 1           DCA     DAPTEMP5
 012503 REF    3  LAST  130   16,2372  21'447 0           DAS     DXERROR
 012504 REF    1              16,2373  4 1454 1           CS      PLAST
 012505                       16,2374  0 0006 1           EXTEND
 012506 REF    2  LAST 1423   16,2375  7 3620 1           MP      1/40
 012507 REF    4  LAST 1424   16,2376  21'447 0           DAS     DXERROR          MANUAL MODE X-ATTITUDE ERROR (DP)
 0126    REF   3  LAST 1421   16,2377  3 1752 0           CA      DAPTREG6         CDUZ IS STORED HERE
 0127    REF 272  LAST 1423   16,2400  54 001 1           TS      L
 0128                         16,2401  0 0006 1           EXTEND
 0129    REF   2  LAST 1412   16,2402  21'442 0           MSU     OLDZFORQ
 0130    REF   4  LAST 1422   16,2403  55'741 0           TS      DAPTEMP3
 0131    REF   3  LAST 1424   16,2404  23'442 1           LXCH    OLDZFORQ
 0132    REF   3  LAST 1415   16,2405  3 1415 0           CA      M21
 0133                         16,2406  0 0006 1           EXTEND
 0134    REF   4  LAST 1423   16,2407  7 1740 1           MP      DAPTEMP2
 0135    REF   9  LAST 1424   16,2410  53'427 0           DXCH    OMEGAU
 0136    REF   6  LAST 1415   16,2411  3 1417 1           CA      M22
 0137    REF   2  LAST 1424   16,2412  0 2263 1           TC      SUBDIVDE

 0138                         16,2413  0 0006 1           EXTEND
 0139    REF   7  LAST 1411   16,2414  61'422 1           SU      OMEGAQ
 0140    REF   3  LAST 1423   16,2415  27'431 1           ADS     TRAPEDQ
 0141    REF   2  LAST 1424   16,2416  0 2310 1           TC      OVERSUB
 0142    REF   4  LAST 1424   16,2417  55'431 1           TS      TRAPEDQ
 014201                       16,2420  0 0006 1           EXTEND
 014202 REF    4  LAST 1424   16,2421  3 1744 1           DCA     DAPTEMP5
 014203 REF    2  LAST  130   16,2422  21'451 1           DAS     DYERROR
 014204 REF    1              16,2423  4 1455 0           CS      QLAST
 014205                       16,2424  0 0006 1           EXTEND
 014206 REF    3  LAST 1424   16,2425  7 3620 1           MP      1/40
 014207 REF    3  LAST 1424   16,2426  21'451 1           DAS     DYERROR          MANUAL MODE Y-ATTITUDE ERROR (DP)
 0143    REF   3  LAST 1415   16,2427  3 1416 0           CA      M31
 0144                         16,2430  0 0006 1           EXTEND
 0145    REF   5  LAST 1424   16,2431  7 1740 1           MP      DAPTEMP2
 0146    REF  10  LAST 1424   16,2432  53'427 0           DXCH    OMEGAU
 0147    REF   4  LAST 1415   16,2433  3 1420 0           CA      M32

 0148    REF   3  LAST 1424   16,2434  0 2263 1           TC      SUBDIVDE
 0149                          16,2435  0 0006 1              EXTEND
 0150    REF    2  LAST 1411   16,2436  61'423 0              SU       OMEGAR
 0151    REF    3  LAST 1423   16,2437  27'432 1              ADS      TRAPEDR
 0152    REF    3  LAST 1424   16,2440  0 2310 1              TC       OVERSUB
 0153    REF    4  LAST 1425   16,2441  55'432 1              TS       TRAPEDR          TRAPEDS HAVE ALL BEEN COMPUTED

 015301                        16,2442  0 0006 1              EXTEND
 015302  REF    5  LAST 1424   16,2443  3 1744 1              DCA      DAPTEMP5
 015303  REF    2  LAST  130   16,2444  21'453 0              DAS      DZERROR
 015304  REF    1              16,2445  4 1456 0              CS       RLAST
 015305                        16,2446  0 0006 1              EXTEND
 015306  REF    4  LAST 1424   16,2447  7 3620 1              MP       1/40
 015307  REF    3  LAST 1425   16,2450  21'453 0              DAS      DZERROR          MANUAL MODE Z-ATTITUDE ERROR (DP)
 01531   REF   39  LAST 1411   16,2451  3 0111 0              CA       DAPBOOLS         PICK UP PAD LOADED STATE ESTIMATOR GAINS
 01532   REF    7  LAST  910   16,2452  7 4737 1              MASK     CSMDOCKD
 01533                         16,2453  0 0006 1              EXTEND
 01534   REF    1              16,2454  1 2462 1              BZF      LMONLY
 01535                         16,2455  0 0006 1              EXTEND                        DOCKED
 01536   REF    2  LAST  213   16,2456  3 1405 1              DCA      DKOMEGAN
 01537   REF    6  LAST 1423   16,2457  53'751 1              DXCH     DAPTREG4
 01538   REF    2  LAST  213   16,2460  3 1403 1              CA       DKTRAP
 015382                        16,2461  1 2466 0              TCF      +5
 015384                        16,2462  0 0006 1   LMONLY     EXTEND                        UNDOCKED
 015386  REF    2  LAST  213   16,2463  3 1410 0              DCA      LMOMEGAN
 015388  REF    7  LAST 1425   16,2464  53'751 1              DXCH     DAPTREG4
 01539   REF    2  LAST  213   16,2465  3 1406 1              CA       LMTRAP
 015392  REF    4  LAST 1424   16,2466  55'752 1   +5         TS       DAPTREG6
 0154    REF   10  LAST 1424   16,2467  11'430 0              CCS      TRAPEDP
 0155                          16,2470  1 2472 0              TCF      +2
 0156    REF    1              16,2471  1 2507 0              TCF      SMALPDIF
 0157    REF    5  LAST 1425   16,2472  6 1752 0              AD       DAPTREG6         TRAPSIZE > ABOUT 77001 %-1.4DEG/SEC"
 0158                          16,2473  0 0006 1              EXTEND
 0159    REF    2  LAST 1425   16,2474  6 2507 1              BZMF     SMALPDIF
 0160                          16,2475  22 007 0              ZL
 0161    REF   11  LAST 1425   16,2476  23'430 1              LXCH     TRAPEDP
 0162    REF  280  LAST 1418   16,2477  3 4755 1              CA       ZERO
 0163                          16,2500  0 0006 1              EXTEND
 0164    REF    2  LAST 1412   16,2501  11'433 0              DV       NPTRAPS
 0165    REF   10  LAST 1424   16,2502  27'421 0              ADS      OMEGAP
 0166    REF    4  LAST 1425   16,2503  0 2310 1              TC       OVERSUB
 0167    REF   11  LAST 1425   16,2504  55'421 0              TS       OMEGAP
 0168    REF    8  LAST 1425   16,2505  3 1750 1              CA       DAPTREG4         ABOUT 10 OR 0 FOR DOCKED OR UNDOCKED
 0169    REF    3  LAST 1425   16,2506  55'433 0              TS       NPTRAPS
 0170    REF    4  LAST 1425   16,2507  25'433 1   SMALPDIF   INCR     NPTRAPS
 0171    REF    5  LAST 1423   16,2510  3 1745 0   P-RATE     CA       JETRATE
 0172    REF   12  LAST 1425   16,2511  27'421 0              ADS      OMEGAP
 0173    REF    5  LAST 1425   16,2512  0 2310 1              TC       OVERSUB
 0174    REF   13  LAST 1425   16,2513  55'421 0              TS       OMEGAP

 0175    REF    5  LAST 1424   16,2514  11'431 1              CCS      TRAPEDQ
 0176                            16,2515   1 2517 1                TCF      +2
 0177    REF    1                16,2516   1 2544 1                TCF      Q-RATE
 0178    REF    6  LAST 1425     16,2517   6 1752 0                AD       DAPTREG6          TRAPSIZE > ABOUT 77001 %-1.4DEG/SEC"
 0179                            16,2520   0 0006 1                EXTEND
 0180    REF    2  LAST 1426     16,2521   6 2544 0                BZMF     Q-RATE
 0181                            16,2522  22 007  0                ZL
 0182    REF    6  LAST 1425     16,2523  23'431 0                LXCH     TRAPEDQ
 0183    REF  281  LAST 1425     16,2524   3 4755 1                CA       ZERO
 0184                            16,2525   0 0006 1                EXTEND
 0185    REF    2  LAST 1412     16,2526  11'434 1                DV       NQTRAPS
 0186    REF   22  LAST 1424     16,2527  55'737 1                TS       DAPTEMP1          SAVE FOR OFFSET ESTIMATE
 0189    REF    8  LAST 1424     16,2530  27'422 0                ADS      OMEGAQ
 0190    REF    6  LAST 1425     16,2531   0 2310 1                TC       OVERSUB
 0191    REF    9  LAST 1426     16,2532  55'422 0                TS       OMEGAQ
 0192    REF    9  LAST 1425     16,2533   3 1750 1                CA       DAPTREG4          ABOUT 10 OR 0 FOR DOCKED OR UNDOCKED
 0193    REF    3  LAST 1426     16,2534  57'434 0                XCH      NQTRAPS
 0194    REF    4  LAST 1423     16,2535   6 1751 0                AD       DAPTREG5          KAOS > ABOUT 60D %N/N_60"
 0195    REF   23  LAST 1426     16,2536  57'737 0                XCH      DAPTEMP1
 0196                            16,2537   0 0006 1                EXTEND
 0197    REF   24  LAST 1391     16,2540   7 4756 0                MP       FIVE
 0198                            16,2541   0 0006 1                EXTEND
 0199    REF   24  LAST 1426     16,2542  11'737 1                DV       DAPTEMP1
 0200    REF   18  LAST 1420     16,2543  27'537 0                ADS      AOSQ
 0201    REF    4  LAST 1426     16,2544  25'434 0   Q-RATE       INCR     NQTRAPS
 0202    REF    2  LAST 1423     16,2545   3 1746 0                CA       JETRATEQ
 0203    REF    5  LAST 1423     16,2546   6 1545 1                AD       AOSQTERM
 0204    REF   10  LAST 1426     16,2547  27'422 0                ADS      OMEGAQ
 0205    REF    7  LAST 1426     16,2550   0 2310 1                TC       OVERSUB
 0206    REF   11  LAST 1426     16,2551  55'422 0                TS       OMEGAQ

 0207    REF    5  LAST 1425     16,2552  11'432 1                CCS      TRAPEDP
 0208                            16,2553   1 2555 1                TCF      +2
 0209    REF    1                16,2554   1 2602 0                TCF      R-RATE
 0210    REF    7  LAST 1426     16,2555   6 1752 0                AD       DAPTREG6          TRAPSIZE > ABOUT 77001 %-1.4DEG/SEC"
 0211                            16,2556   0 0006 1                EXTEND
 0212    REF    2  LAST 1426     16,2557   6 2602 1                BZMF     R-RATE
 0213                            16,2560  22 007  0                ZL
 0214    REF    6  LAST 1426     16,2561  23'432 0                LXCH     TRAPEDP
 0215    REF  282  LAST 1426     16,2562   3 4755 1                CA       ZERO
 0216                            16,2563   0 0006 1                EXTEND
 0217    REF    2  LAST 1412     16,2564  11'435 0                DV       NRTRAPS
 0218    REF    6  LAST 1424     16,2565  55'740 1                TS       DAPTEMP2          SAVE FOR OFFSET ESTIMATE
 0221    REF    3  LAST 1425     16,2566  27'423 1                ADS      OMEGAR
 0222    REF    8  LAST 1426     16,2567   0 2310 1                TC       OVERSUB
 0223    REF    4  LAST 1426     16,2570  55'423 1                TS       OMEGAR
 0224    REF   10  LAST 1426     16,2571   3 1750 1                CA       DAPTREG4          ABOUT 10 OR 0 FOR DOCKED OR UNDOCKED
 0225    REF    3  LAST 1426     16,2572  57'435 1                XCH      NRTRAPS
 0226    REF    5  LAST 1426     16,2573   6 1751 0                AD       DAPTREG5          KAOS > ABOUT 60D %N/N_60"
 0227    REF    7  LAST 1426     16,2574  57'740 0                XCH      DAPTEMP2
 0228                            16,2575   0 0006 1                EXTEND
 0229   REF  25  LAST 1426   16,2576  7 4756 0               MP      FIVE
 0230                        16,2577  0 0006 1               EXTEND
 0231   REF   8  LAST 1426   16,2600  11'740 1               DV      DAPTEMP2
 0232   REF   6  LAST 1411   16,2601  27'541 1               ADS     AOSR
 0233   REF   4  LAST 1426   16,2602  25'435 1  P-RATE       INCR    NRTRAPS
 0234   REF   2  LAST 1423   16,2603  3 1747 1               CA      JETRATER
 0235   REF   4  LAST 1423   16,2604  6 1546 1               AD      AOSRTERM
 0236   REF   5  LAST 1426   16,2605  27'423 1               ADS     OMEGAR
 0237   REF   1  LAST 1427   16,2606  0 2310 1               TC      OVERSUB
 0238   REF   6  LAST 1427   16,2607  55'423 1               TS      OMEGAR

A0239                                                  END OF RATE DERIVATION

A0240                                                   BEGIN OFFSET ESTIMATER

A0241                                                    IN POWERED FLIGHT, AOSTASK WILL BE CALLED EVERY 2 SECONDS.

A0242                                                    AOS = AOS + K*SUMRATE

 0243   REF  40  LAST 1425   16,2610  4 0111 1               CS      DAPBOOLS
 0244   REF   3  LAST 1409   16,2611  7 4744 0               MASK    DRIFTBIT
 0245   REF 488  LAST 1422   16,2612  10 000 0               CCS     A
 0246   REF   1              16,2613  1 2624 1               TCF     WORKTIME
 0247   REF   4  LAST 1411   16,2614  55'424 0               TS      ALPHAQ              ZERO THE OFFSET ACCELERATION VALUES.
 0248   REF   3  LAST 1411   16,2615  55'425 1               TS      ALPHAR
 0249   REF   6  LAST 1426   16,2616  55'545 0               TS      AOSQTERM
 0250   REF   5  LAST 1427   16,2617  55'546 0               TS      AOSRTERM
 0251   REF  19  LAST 1426   16,2620  55'537 0               TS      AOSQ
 0252   REF   7  LAST 1427   16,2621  55'541 1               TS      AOSR
 0253   REF   1              16,2622  1 2667 0               TCF     PRETIMCK
 0254                        16,2623   00074 1  KAOS         DEC     60
 0255   REF   2  LAST 1411   16,2624  3 1510 1  WORKTIME     CA      QACCDOT
 0256                        16,2625  0 0006 1               EXTEND
 0257   REF   3  LAST 1015   16,2626  7 4766 0               MP      CALLCODE            OCTAL 00032 IS DECIMAL .1 AT 2(6).
 0258   REF  20  LAST 1427   16,2627  21'540 0               DAS     AOSQ
 0259   REF  21  LAST 1427   16,2630  3 1537 1               CA      AOSQ
 0260   REF   5  LAST 1427   16,2631  55'424 0               TS      ALPHAQ
 0261                        16,2632  0 0006 1               EXTEND
 0262   REF   1              16,2633  7 3616 1               MP      200MS                .2 AT 1
 0263   REF   7  LAST 1427   16,2634  55'545 0               TS      AOSQTERM
 0264   REF   2  LAST 1411   16,2635  3 1512 0               CA      RACCDOT
 0265                        16,2636  0 0006 1               EXTEND
 0266   REF   4  LAST 1427   16,2637  7 4766 0               MP      CALLCODE            OCTAL 00032 IS DECIMAL .1 AT 2(6).
 0267   REF   8  LAST 1427   16,2640  21'542 1               DAS     AOSR
 0268   REF   9  LAST 1427   16,2641  3 1541 0               CA      AOSR
 0269   REF   4  LAST 1427   16,2642  55'425 1               TS      ALPHAR
 0270                        16,2643  0 0006 1               EXTEND
 0271   REF   2  LAST 1427   16,2644  7 3616 1               MP      200MS                .2 AT 1
 0272   REF   4  LAST 1427   16,2645  55'546 0               TS      AOSRTERM
 02721  REF   2  LAST 1427   16,2646  1 2667 0               TCF     PRETIMCK
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R0273

 0274    REF    1                16,2647   3 4747 1   PAXFILT  CA       CALLGMBL          EXECUTE ACDT+C12, IF NEEDED.
 02742   REF   21   LAST 1419    16,2650   7 1273 1            MASK     RCSFLAGS
 02744   REF  489   LAST 1427    16,2651  10 000  0            CCS      A                 CALLGMBL IS NOT BIT15, SO THIS TEST IS
 02746   REF    1                16,2652   0 3736 0            TC       ACDT+C12          VALID.

 0275    REF   12   LAST 1129    16,2653  52 011  0            DXCH     ARUPT
 0276    REF    4   LAST  137    16,2654  53'754  1            DXCH     DAPARUPT
 0277    REF    1                16,2655   3 2666 0            CA       SUPERJOB          SETTING UP THE SUPERJOB
 0278    REF    3   LAST 1333    16,2656  56 017  1            XCH      BRUPT
 0279    REF   13   LAST 1421    16,2657  22 012  1            LXCH     QRUPT
 0280    REF    1                16,2660  53'756  0            DXCH     DAPBQRPT
 0281    REF    1                16,2661   3 2665 0            CA       SUPERADR
 0282    REF    1                16,2662  52 016  1            DXCH     ZRUPT
 0283    REF    3   LAST 1421    16,2663  53'760  0            DXCH     DAPZRUPT
 0284    REF    1                16,2664   1 5275 0            TCF      NOQBRSM +1        RELINT (JUST IN CASE) AND RESUME, IN THE
A0285                                                                                       FORM OF A JASK, AT SUPERJOB.

 0286    REF    2   LAST 1428    16,2665    02667 1   SUPERADR GENADR   SUPERJOB +1
R0287    COUNT DOWN GIMBAL DRIVE TIMERS AND TURN OFF DRIVES IF REQUIRED.

 0288    REF    1                16,2666   1 3641 0   SUPERJOB TCF      RATELOOP
 02881   REF    4   LAST 1412    16,2667  11'632  0   PRETIMCK CCS      QGIMTIMR
 0289    REF    1                16,2670   1 2710 1            TCF      DECQTIMR            POSITIVE- COUNTING DOWN
 0290    REF    1                16,2671   1 2714 0            TCF      TURNOFFQ            NEGATIVE- DRIVE SHOULD BE ENDED
 0291    REF    2   LAST 1412    16,2672  11'634  0   CHKRTIMR CCS      RGIMTIMR            NEGATIVE- INACTIVE
 0292    REF    1                16,2673   1 2712 0            TCF      DECRTIMR           (NEG ZERO- IMPOSSIBLE)
 0293   *REF    1                16,2674   1 2724 0            TCF      TURNOFFR          REPEATED (ABOVE) FOR R AXIS.

 0294   *                        16,2675   0 0006 1            EXTEND                     DECREMENT LOCKED JET INHIBITION COUNTERS
 0295   *REF    4   LAST 1412    16,2676  27'767  1            DIM      PJETCTR
 0296   *                        16,2677   0 0006 1            EXTEND
 0297   *REF    2   LAST 1412    16,2700  27'770  1            DIM      UJETCTR
 0298   *                        16,2701   0 0006 1            EXTEND
 0299   *REF    3   LAST 1412    16,2702  27'771  0            DIM      VJETCTR
 0300    REF   38   LAST 1412    16,2703   3 4740 0            CA       BIT12
 0301    REF   22   LAST 1428    16,2704   7 1273 1            MASK     RCSFLAGS
 0302                            16,2705   0 0006 1            EXTEND
 0303    REF    1                16,2706   1 2734 1            BZF      SKIPPAXS
 0304    REF    1                16,2707   0 2740 0            TC       CHKVISFZ
 0305    REF    5   LAST 1428    16,2710  55'632  0   DECQTIMR TS       QGIMTIMR          COUNT TIMERS DOWN TO POS ZERO.
 0306    REF    1                16,2711   1 2672 1            TCF      CHKRTIMR
 0307    REF    3   LAST 1428    16,2712  55'634  0   DECRTIMR TS       RGIMTIMR
 0308    REF    2   LAST 1428    16,2713   1 2675 0            TCF      CHKRTIMR +3

 0309    REF    4   LAST 1411    16,2714  55'501  0   TURNOFFQ TS       NEGUQ             HALT DRIVES.
 0310    REF    3   LAST 1427    16,2715  55'510  0            TS       QACCDOT
 0311    REF    1                16,2716   4 5007 1            CS       QGIMBITS
 0312                            16,2717   0 0006 1            EXTEND
 0313   REF  69  LAST 1418   16,2720  03 012 1           WAND    CHAN12
 0314   REF   8  LAST 1122   16,2721  3 4735 1           CAF     NEGMAX
 0315   REF   6  LAST 1428   16,2722  55'632 0           TS      QGIMTIMR
 0316   REF   3  LAST 1428   16,2723  1 2672 1           TCF     CHKRTIMR
 0317   REF   2  LAST 1411   16,2724  55'503 1  TURNOFFF TS      NEGUR
 0318   REF   3  LAST 1427   16,2725  55'512 1           TS      RACCDOT
 0319   REF   1              16,2726  4 5020 1           CS      RGIMBITS
 0320                        16,2727  0 0006 1           EXTEND
 0321   REF  70  LAST 1429   16,2730  03 012 1           WAND    CHAN12
 0322   REF   9  LAST 1429   16,2731  3 4735 1           CAF     NEGMAX
 0323   REF   4  LAST 1428   16,2732  55'634 0           TS      RGIMTIMR
 0324   REF   4  LAST 1429   16,2733  1 2675 0           TCF     CHKRTIMR +3
 0325   REF  12  LAST 1303      5007            QGIMBITS EQUALS  OCT1400          BITS 9 AND 10 (OF CHANNEL 12).
 0326   REF   4  LAST 1286      5020            RGIMBITS EQUALS  PRIO6            BITS 11 AND 12 (OF CHANNEL 12).

 0327   REF  23  LAST 1428   16,2734  4 1273 1  SKIPPAXS CS      RCSFLAGS
 0328   REF  39  LAST 1428   16,2735  7 4740 1           MASK    BIT12
 0329   REF  24  LAST 1429   16,2736  27'273 1           ADS     RCSFLAGS         BIT 12 SET TO 1.
 0330   REF   1              16,2737  1 3624 0           TCF     QRAXIS           GO TO QRAXIS OR TO GTS.

A0331                                           Y-Z TRANSLATION

A0332                                           INPUT:  BITS 9-12 OF CH31 (FROM TRANSLATION CONTROLER)

A0333                                           OUTPUT: NEXTP

A0334                                             NEXTP IS THE CHANNEL 6 CODE OF JETS FOR THE DESIRED TRANSLATION.
A0335                                             IF THERE ARE FAILURES IN THE DESIRED POLICY, THEN

A0336                                                 (1) FOR DIAGONAL TRANS:  UNFAILED PAIR
A0337                                                                          ALARM (IF NO PAIR)

A0338                                                 (2) FOR PRINCIPAL TRANS: TRY TO TACK WITH DIAGONAL PAIRS
A0339                                                                          ALARM (IF DIAGONAL PAIRS ARE FAILED)
 0340                        16,2740  0 0006 1  CHKVISFZ EXTEND
 0341   REF   9  LAST 1410   16,2741  00 031 0           READ    CHAN31
 0342   REF 490  LAST 1428   16,2742  4 0000 0           CS      A
 0343   REF   1              16,2743  7 3613 1           MASK    07400OCT
 0344                        16,2744  0 0006 1           EXTEND
 0345   REF   1              16,2745  1 3014 0           BZF     TSNEXTP
 0346                        16,2746  0 0006 1           EXTEND
 0347   REF  43  LAST 1299   16,2747  7 4745 1           MP      BIT7
 0348   REF 491  LAST 1429   16,2750  50 000 1           INDEX   A
 0349   REF   1              16,2751  3 3572 1           CA      INDXYZ
 0350   REF   1              16,2752  55'744 0           TS      ROTINDEX
 0351   REF  30  LAST 1418   16,2753  3 6242 0  TRYUDRV  CA      SIX
 0352   REF   1              16,2754  0 3551 0           TC      SELECTYZ
 0353   REF  31  LAST 1429   16,2755  4 6242 1           CS      SIX
 0354   REF   1              16,2756  6 1743 0           AD      NUMBERT
 0355                        16,2757  0 0006 1           EXTEND
 0356   REF   2  LAST 1429   16,2760  1 3013 1            BZF     TSNEXTP -1
 0357   REF  26  LAST 1427   16,2761  4 4756 0            CS      FIVE
 0358   REF   2  LAST 1429   16,2762  6 1744 1            AD      ROTINDEX
 0359                        16,2763  0 0006 1            EXTEND
 0360   REF   1              16,2764  6 3002 0            BZMF    ALTERYZ
 0361   REF   2  LAST 1429   16,2765  4 1743 1            CS      NUMBERT
 0362   REF  32  LAST 1412   16,2766  6 4751 0            AD      FOUR
 0363                        16,2767  0 0006 1            EXTEND
 0364   REF   3  LAST 1430   16,2770  6 3013 0            BZMF    TSNEXTP -1
 0365   REF  48  LAST 1318   16,2771  0 5567 0  ABORTYZ   TC      ALARM
 0366                        16,2772   02001 1            OCT     02001
 0367   REF  58  LAST 1394   16,2773  3 4753 1            CA      BIT1             INVERT BIT 1 OF RCSFLAGS.
 0368   REF  25  LAST 1429   16,2774  23'273 0            LXCH    RCSFLAGS
 0369                        16,2775  0 0006 1            EXTEND
 0370                        16,2776  06 001 0            RXOR    1
 0371   REF  26  LAST 1430   16,2777  55'273 1            TS      RCSFLAGS
 0372   REF 283  LAST 1426   16,3000  3 4755 1            CA      ZERO
 0373   REF   4  LAST 1430   16,3001  1 3014 0            TCF     TSNEXTP
 0374   REF  59  LAST 1430   16,3002  3 4753 1  ALTERYZ   CA      BIT1             INVERT BIT 1 OF RCSFLAGS.
 0375   REF  27  LAST 1430   16,3003  23'273 0            LXCH    RCSFLAGS
 0376                        16,3004  0 0006 1            EXTEND
 0377                        16,3005  06 001 0            RXOR    1
 0378   REF  28  LAST 1430   16,3006  55'273 1            TS      RCSFLAGS
 0379   REF  60  LAST 1430   16,3007  7 4753 0            MASK    BIT1
 0380   REF  33  LAST 1430   16,3010  6 4751 0            AD      FOUR
 0381   REF   3  LAST 1430   16,3011  27'744 0            ADS     ROTINDEX
 0382   REF   1              16,3012  1 2753 0            TCF     TRYUORV
 0383   REF   1              16,3013  3 1741 1            CA      POLYTEMP
 0384   REF   7  LAST 1413   16,3014  55'472 0  TSNEXTP   TS      NEXTP
A0385                                           STATE LOGIC

A0386                                             CHECK IN ORDER:               IF ON
A0387                                               LPDPHASE                    GO TO PURGENCY
A0388                                               PULSES                      MINIMUM PULSE LOGIC
A0389                                               DETENT(BIT15 CH31)          RATE COMMAND
A0390                                               GO TO PURGENCY
 0391   REF  51  LAST 1411   16,3015  3 4737 0            CA      BIT13              CHECK STICK IF IN ATT. HOLD.
 0392                        16,3016  0 0006 1            EXTEND
 0393   REF  10  LAST 1429   16,3017  02 031 1            RAND    CHAN31
 0394                        16,3020  0 0006 1            EXTEND
 0395   REF   1              16,3021  1 3027 0            BZF     MANMODE

 0396   REF  41  LAST 1427   16,3022  3 0111 0            CA      DAPBOOLS
 0397   REF   2  LAST  910   16,3023  7 4743 1            MASK    XOVINHIB
 0398   REF 492  LAST 1429   16,3024  10 000 0            CCS     A
 0399   REF   1              16,3025  1 3463 1            TCF     PURGENCY           ATTITUDE STEER DURING VISIBILITY PHASE

 0400   REF   1              16,3026  1 3071 0            TCF     DETENTCK
 0401   REF   4  LAST  739   16,3027  3 4735 1  MANMODE   CA      PULSES             PULSES IS ONE FOR PULSE MODE
 0402   REF  42  LAST 1430   16,3030  7 0111 1            MASK    DAPBOOLS
 0403                           16,3031  0 0006 1            EXTEND
 0404   REF    2  LAST 1430     16,3032  1 3071 0            BZF      DETENTCK           BRANCH FOR RATE COMMAND

 0405   REF  284  LAST 1430     16,3033  3 4755 1            CA       ZERO
 0406   REF    4  LAST 1421     16,3034  55'464 1            TS       PERROR
R0407    MINIMUM IMPULSE MODE

 0408   REF   25  LAST 1421     16,3035  3 0032 0            CA       CDUX
 0409   REF   20  LAST 1421     16,3036  55'635 1            TS       CDUXD

 0410   REF    2  LAST 1412     16,3037  11'460 0            CCS      OLDPMIN
 0411   REF    1                16,3040  1 3054 1            TCF      CHECKP

 0412   REF   42  LAST 1419     16,3041  3 4751 0  FIREP     CA       BIT3
 0413                           16,3042  0 0006 1            EXTEND
 0414   REF   11  LAST 1430     16,3043  02 031 1            RAND     CHAN31
 0415                           16,3044  0 0006 1            EXTEND
 0416   REF    1                16,3045  1 3064 1            BZF      +XMIN

 0417   REF   56  LAST 1419     16,3046  3 4750 1            CA       BIT4
 0418                           16,3047  0 0006 1            EXTEND
 0419   REF   12  LAST 1431     16,3050  02 031 1            RAND     CHAN31
 0420                           16,3051  0 0006 1            EXTEND
 0421   REF    1                16,3052  1 3062 1            BZF      -XMIN

 0422   REF    1                16,3053  1 3442 1            TCF      JETSOFF

 0423                           16,3054  0 0006 1  CHECKP    EXTEND
 0424   REF   13  LAST 1431     16,3055  00 031 0            READ     CHAN31
 0425   REF  493  LAST 1430     16,3056  4 0000 0            CS       A
 0426   REF    5  LAST 1331     16,3057  7 5751 0            MASK     OCT14
 0427   REF    3  LAST 1431     16,3060  55'460 0            TS       OLDPMIN
 0428   REF    2  LAST 1431     16,3061  1 3442 1            TCF      JETSOFF

 0429   REF    9  LAST 1412     16,3062  4 4363 1  -XMIN     CS       TEN                ANYTHING LESS THAN 14MS.  CORRECTED
 0430                           16,3063  1 3065 0            TCF      +2                  IN JET SELECTION ROUTINE
 0431   REF   10  LAST 1431     16,3064  3 4363 0  +XMIN     CA       TEN
 0432   REF    4  LAST 1411     16,3065  55'524 1            TS       TJP
 0433   REF  157  LAST 1422     16,3066  3 4753 1            CA       ONE
 0434   REF    4  LAST 1431     16,3067  55'460 0            TS       OLDPMIN
 0435   REF    1                16,3070  1 3350 0            TCF      PJETSLEC -6

R0436                         MANUAL RATE COMMAND MODE
R0437                         ========================
R0438                           BY ROBERT F. STENGEL
R0439
R0440   THIS MODE PROVIDES RCAH MANUAL CONTROL THRU 2 CONTROL LAWS:                1) DIRECT RATE AND 2) PSEUDO-AUTO.
R0442   THE DIRECT RATE MODE AFFORDS IMMEDIATE CONTROL WITHOUT OVERSHOOT. THE PSEUDO-AUTO MODE PROVIDES PRECISE
R0444   RATE CONTROL AND ATTITUDE HOLD.
R0445
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R0446    IN DIRECT RATE, JETS ARE FIRED WHEN STICK POSITION CHANGES BY A FIXED NUMBER OF INCREMENTS IN ONE DAP CYCLE.
R0448    THE 'BREAKOUT LEVEL' IS .6 D/S FOR LM-ONLY AND .3 D/S FOR CSM-DOCKED. THIS LAW NULLS THE RATE ERROR TO WITHIN
R0450    THE 'TARGET DEADBAND', WHICH EQUALS THE BREAKOUT LEVEL.
R0451    IN PSEUDO-AUTO, BODY-FIXED RATE AND ATTITUDE ERRORS ARE SUPPLIED TO TJETLAW, WHICH EXERCISES CONTROL.
R0453    CONTROL SWITCHES FROM DIRECT RATE TO PSEUDO-AUTO IF THE TARGET DB IS ACHIEVED OR IF TIME IN (1) EXCEEDS 4 SEC.
R0455    IF THE INITIAL COMMAND DOES NOT EXCEED THE BREAKOUT LEVEL, CONTROL GOES TO PSEUDO-AUTO IMMEDIATELY.
R0457
R0458    SINCE P-AXIS CONTROL IS SEPARATE FROM Q,R AXES CONTROL, IT IS POSSIBLE TO USE (1) IN P-AXIS AND (2) IN Q,R AXES,
R0460    OR VICE VERSA.  THIS ALLOWS A DEGREE OF ATTITUDE HOLD IN UNCONTROLLED AXES.  DUE TO U,V CONTROL, HOWEVER, Q AND
R0462    R AXES ARE COUPLED AND MUST USE THE SAME CONTROL LAW.
R0463
R0464    HAND CONTROLLER COMMANDS ARE SCALED BY A LINEAR/QUADRATIC LAW. FOR THE LM-ALONE, MAXIMUM COMMANDED RATES ARE 20
R0466    AND 4 D/S IN NORMAL AND FINE SCALING; HOWEVER, STICK SENSITIVITY AT ZERO COUNTS (OBTAINED AT A STICK DEFLECTION
R0468    OF 2 DEGREES FROM THE CENTERED POSITION) IS .5 OR .1 D/S PER DEGREE. NORMAL AND FINE SCALINGS FOR THE CSM-DOCKED
R0470    CASE IS AUTOMATICALLY SET TO 1/10 THE ABOVE VALUES. SCALING IS DETERMINED IN ROUTINE 3.
A0472                                                      ZEROENBL        ENABLES COUNTERS SO THEY CAN BE READ NEXT TIME
A0473                                                      JUSTOUT         FIRST DETECTION OF OUT OF DETENT (BY OURRCBIT)
A0474
A0475
 0476                              16,3071  0 0006 1  DETENTCK EXTEND
 0477    REF  14  LAST 1431        16,3072  00 031 0           READ     CHAN31
 0478    REF   1                   16,3073  55'443 1           TS       CH31TEMP
 0479    REF  49  LAST 1422        16,3074  7 4735 0           MASK     BIT15               CHECK OUT-OF-DETENT BIT.
 0480                              16,3075  0 0006 1           EXTEND
 0481    REF   1                   16,3076  1 3223 0           BZF      RHCMOVED            BRANCH IF OUT OF DETENT.
 0482    REF   1                   16,3077  3 4740 0           CAF      OURRCBIT            IN DETENT. CHECK THE RATE COMMAND BIT.
 0483    REF  43  LAST 1430        16,3100  7 0111 1           MASK     DAPBOOLS
 0484                              16,3101  0 0006 1           EXTEND
 0485    REF   2  LAST 1430        16,3102  1 3463 1           BZF      PURGENCY            BRANCH IF NOT IN RATE COMMAND LAST PASS.
R0486    ..............................................................................................
 0487    REF  33  LAST 1393        16,3103  3 4743 0           CA       BIT9                JUST IN DETENT??
 0488    REF  29  LAST 1430        16,3104  7 1273 1           MASK     RCSFLAGS
 0489                              16,3105  0 0006 1           EXTEND
 0490    REF   1                   16,3106  1 3120 0           BZF      RUTH
 0491    REF  52  LAST 1430        16,3107  3 4737 0           CAF      BIT13               CHECK FOR ATTITUDE HOLD.
 0492                              16,3110  0 0006 1           EXTEND
 0493    REF  15  LAST 1432        16,3111  02 031 1           RAND     CHAN31
 0494                              16,3112  0 0006 1           EXTEND
 0495    REF   1                   16,3113  1 3220 0           BZF      RATEDAMP            BRANCH IF IN ATTITUDE HOLD.

 0496    REF   1                   16,3114  4 5014 0           CS       BITS9,11            IN AUTO.
 0497    REF  30  LAST 1432        16,3115  7 1273 1           MASK     RCSFLAGS            (X-AXIS OVERRIDE)
 0498    REF  31  LAST 1432        16,3116  55'273 1           TS       RCSFLAGS            ZERO OFBIT (BIT 11) AND JUST-IN BIT (9).
 0499    REF   2  LAST 1432        16,3117  1 3220 0           TCF      RATEDAMP

 0500    REF  32  LAST 1432        16,3120  3 1273 0  RUTH     CA       RCSFLAGS
 0501    REF   1                   16,3121  7 4742 0           MASK     PBIT                IN ATTITUDE HOLD.
 0502                              16,3122  0 0006 1           EXTEND
 0503                              16,3123  1 3125 0           BZF      +2                  BRANCH IF P-RATE DAMPING IS FINISHED.
 0504    REF   3  LAST 1432        16,3124  1 3220 0           TCF      RATEDAMP
 0505    REF   33  LAST 1432    16,3125  3 1273 0             CA       RCSFLAGS
 0506    REF    1               16,3126  7 4741 0             MASK     QRBIT
 0507                           16,3127  0 0006 1             EXTEND
 0508    REF    1               16,3130  1 3136 1             BZF      RATEDONE        BRANCH IF Q,R RATE DAMPING IS FINISHED.
 0509    REF    4  LAST 1432    16,3131  1 3220 0             TCF      RATEDAMP
R0510    ===============================
 0511                           16,3132   00001 0  1/10SEC    OCT      1
 0512                           16,3133   00050 1  40CYC      OCT      50
 0513                           16,3134   74777 0  PQRBIT     OCT      74777
 0514    REF   13  LAST  958       5014            BITS9,11   EQUALS   EBANK5
 0515                           16,3135   00056 1  LINRATP    DEC      46
R0516    ===============================
 0517    REF    2  LAST 1432    16,3136  4 4740 1  RATEDONE   CS       OURRCBIT        MANUAL COMMAND AND DAMPING COMPLETED IN
 0518                           16,3137  0 0004 0             INHINT                   ALL AXES.
 0519    REF   44  LAST 1432    16,3140  7 0111 1             MASK     DAPBOOLS
 0520    REF   45  LAST 1433    16,3141  54 111 1             TS       DAPBOOLS

R0521    READ CDUS INTO CDU DESIRED REGISTERS

 0522    REF   53  LAST 1432    16,3142  3 4737 0             CAF      BIT13
 0523                           16,3143  0 0006 1             EXTEND
 0524    REF   16  LAST 1432    16,3144  02 031 1             RAND     CHAN31
 0525                           16,3145  0 0006 1             EXTEND
 0526                           16,3146  1 3152 0             BZF      +4
 0527    REF   26  LAST 1431    16,3147  3 0032 0             CA       CDUX            (X-AXIS OVERRIDE)
 0528    REF   21  LAST 1431    16,3150  55'635 1             TS       CDUXD
 0529                           16,3151  0 3154 1             TC       +3
 0530    REF   53  LAST 1413    16,3152  0 4674 0             TC       IBNKCALL
 0531    REF   11  LAST 1411    16,3153   40153 1             FCADR    ZATTEROR
 0532                           16,3154  0 0003 1             RELINT
 0533    REF    3  LAST 1432    16,3155  1 3463 1             TCF      PURGENCY

 0534    REF    5  LAST 1431    16,3156  55'464 1             TS       PERROR
 0535    REF    3  LAST 1433    16,3157  3 4740 0  JUSTOUT    CA       OURRCBIT        INITIALIZATION - FIRST MANUAL PASS.
 0536    REF   46  LAST 1433    16,3160  26 111 1             ADS      DAPBOOLS
 0537    REF  285  LAST 1431    16,3161  3 4755 1             CA       ZERO
 0538    REF    5  LAST 1424    16,3162  55'446 1             TS       DXERROR
 0539    REF    6  LAST 1433    16,3163  55'447 0             TS       DXERROR  +1
 0540    REF    4  LAST 1424    16,3164  55'450 0             TS       DYERROR
 0541    REF    5  LAST 1433    16,3165  55'451 1             TS       DYERROR  +1
 0542    REF    4  LAST 1425    16,3166  55'452 1             TS       DZERROR
 0543    REF    5  LAST 1433    16,3167  55'453 0             TS       DZERROR  +1
 0544    REF    2  LAST 1424    16,3170  55'454 1             TS       PLAST
 0545    REF    2  LAST 1424    16,3171  55'455 0             TS       QLAST
 0546    REF    2  LAST 1425    16,3172  55'456 0             TS       RLAST
 0547    REF    1               16,3173  54 042 0             TS       Q-RHCCTR
 0548    REF    1               16,3174  54 044 0             TS       R-PHCCTR
 0549    REF    1               16,3175  3 3134 1             CA       PQRBIT
 0550    REF   34  LAST 1433    16,3176  7 1273 1             MASK     RCSFLAGS
 0551    REF   35  LAST 1433    16,3177  55'273 1             TS       RCSFLAGS        BITS 10 AND 11 OF RCSFLAGS ARE 0.
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L        P-AXIS RCS AUTOPILOT                                                             USER'S PAGE NO.  14        E6 S4

 0552   REF  36  LAST 1433    16,3200  4 1273 1              CS      RCSFLAGS          SET 'JUST-IN' BIT TO 1.
 0553   REF  34  LAST 1432    16,3201  7 4743 1              MASK    BIT9
 0554   REF  37  LAST 1434    16,3202  27'273 1              ADS     RCSFLAGS
 0555   REF   1               16,3203  0 3205 0              TC      ZEROENBL
 0556   REF   3  LAST 1431    16,3204  1 3442 1              TCF     JETSOFF
 0557   REF   2  LAST 1433    16,3205  22 044 1   ZEROENBL   LXCH    R-RHCCTR
 0558   REF   2  LAST 1433    16,3206  3 0042 1              CA      Q-RHCCTR
 0559   REF   1               16,3207  53'463 0              DXCH    SAVEHAND
 0560   REF 286  LAST 1433    16,3210  3 4755 1              CA      ZERO
 0561   REF   1               16,3211  54 043 1              TS      P-RHCCTR
 0562   REF   3  LAST 1434    16,3212  54 042 0              TS      Q-RHCCTR
 0563   REF   3  LAST 1434    16,3213  54 044 0              TS      R-RHCCTR
 0564   REF   1               16,3214  3 3617 1              CA      BITS8,9
 0565                         16,3215  0 0006 1              EXTEND
 0566   REF  24  LAST 1404    16,3216  05 013 0              WOR     CHAN13            COUNTERS ZEROED AND ENABLED
 0567   REF 401  LAST 1423    16,3217  0 0002 0              TC      Q
 0568   REF 287  LAST 1434    16,3220  3 4755 1   RATEDAMP   CA      ZERO
 0569   REF   2  LAST 1434    16,3221  54 043 1              TS      P-RHCCTR
 0570   REF   1               16,3222  1 3227 1              TCF     RATERROR

 0571   REF   4  LAST 1433    16,3223  3 4740 0   RHCMOVED   CA      OURRCBIT          P CONTROL
 0572   REF  47  LAST 1433    16,3224  7 0111 1              MASK    DAPBOOLS
 0573                         16,3225  0 0006 1              EXTEND
 0574   REF   1               16,3226  1 3155 1              BZF     JUSTOUT -1
 0575   REF  27  LAST 1433    16,3227  3 0032 0   RATERROR   CA      CDUX              FINDCDUW REQUIRES THAT CDUXD=CDUX DURING
 0576   REF  22  LAST 1433    16,3230  55'635 1              TS      CDUXD             X-AXIS OVERRIDE
 0577   REF   3  LAST 1434    16,3231  10 043 1              CCS     P-RHCCTR
 0578                         16,3232  1 3235 1              TCF     +3
 0579                         16,3233  1 3235 1              TCF     +2
 0580                         16,3234  1 3235 1              TCF     +1
 0581                         16,3235  6 0000 1              DOUBLE                    LINEAR/QUADRATIC CONTROLLER SCALING
 0582                         16,3236  6 0000 1              DOUBLE                    (SEE EXPLANATION IN Q,R-AXES RCS
 0583   REF   1               16,3237  6 3135 0              AD      LINRATP            AUTOPILOT)
 0584                         16,3240  0 0006 1              EXTEND
 0585   REF   4  LAST 1434    16,3241  7 0043 1              MP      P-RHCCTR
 0586   REF 273  LAST 1424    16,3242  3 0001 0              CA      L
 0587                         16,3243  0 0006 1              EXTEND
 0588   REF   6  LAST  294    16,3244  7 1444 0              MP      STIKSENS
 0589   REF   3  LAST 1433    16,3245  57'454 0              XCH     PLAST
 0590                         16,3246  4 0000 0              COM
 0591   REF   4  LAST 1434    16,3247  6 1454 0              AD      PLAST
 0592   REF  25  LAST 1426    16,3250  55'737 1              TS      DAPTEMP1
 0593   REF   2  LAST 1434    16,3251  0 3205 0              TC      ZEROENBL          INTERVAL.  ZERO AND ENABLE ACA COUNTERS.
 0594   REF   5  LAST 1434    16,3252  4 1454 1              CS      PLAST
 0595   REF  14  LAST 1425    16,3253  6 1421 1              AD      OMEGAP
 0596   REF   1               16,3254  55'427 0              TS      EDOTP
 0597   REF  26  LAST 1434    16,3255  11'737 1              CCS     DAPTEMP1          IF P COMMAND CHANGE EXCEEDS BREAKOUT
 0598                         16,3256  1 3261 0              TCF     +3                LEVEL, GO TO DIRECT RATE CONTROL. IF NOT
 0599                         16,3257  1 3267 0              TCF     +8                CHECK FOR DIRECT RATE CONTROL LAST TIME.
 0600                         16,3260  1 3261 0              TCF     +1
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0601  REF   5  LAST  294   16,3261  6 1476 0          AD      -RATEDB
0602                       16,3262  0 0006 1          EXTEND
0603                       16,3263  6 3267 1          BZMF    +4
0604  REF   1              16,3264  3 3133 0          CA      40CYC
0605  REF   2  LAST 1422   16,3265  55'445 1          TS      TCP
0606  REF   1              16,3266  0 3300 1          TC      PEGI
0607  REF  38  LAST 1434   16,3267  3 1273 0          CA      RCSFLAGS        CHECK FOR DIRECT RATE COMMAND LAST TIME.
0608  REF   2  LAST 1432   16,3270  7 4742 0          MASK    PBIT
0609                       16,3271  0 0006 1          EXTEND
0610                       16,3272  1 3274 1          BZF     +2
0611  REF   2  LAST 1435   16,3273  0 3300 1          TC      PEGI            TO PURE RATE COMMAND
0612  REF   7  LAST 1433   16,3274  3 1446 0          CA      DXERROR         PSEUDO-AUTO CONTROL.
0613  REF   1              16,3275  55'752 1          TS      E               X-ATTITUDE ERROR (SP)
0614  REF   6  LAST 1433   16,3276  55'464 1          TS      PERROR          LOAD P-AXIS ERROR FOR MODE1 FDAI DISPLAY
0615  REF   4  LAST 1433   16,3277  0 3467 1          TC      PURGENCY +4
0616  REF  28  LAST 1434   16,3300  3 0032 0  PEGI    CA      CDUX            DIRECT RATE CONTROL.
0617  REF  23  LAST 1434   16,3301  55'635 1          TS      CDUXD
0618  REF 288  LAST 1434   16,3302  3 4755 1          CA      ZERO
0619  REF   8  LAST 1435   16,3303  55'446 1          TS      DXERROR
0620  REF   9  LAST 1435   16,3304  55'447 0          TS      DXERROR +1
0621  REF   7  LAST 1435   16,3305  55'464 1          TS      PERROR          ZERO P-AXIS ERROR FOR MODE1 FDAI DISPLAY
0622  REF   2  LAST 1434   16,3306  11'427 0          CCS     EDOTP
0623                       16,3307  0 3312 1          TC      +3
0624                       16,3310  0 3312 1          TC      +2
0625                       16,3311  0 3312 1          TC      +1
0626  REF   1              16,3312  55'737 1          TS      ABSEDOTP
0627  REF   1              16,3313  6 1476 0          AD      TARGETDB
0628                       16,3314  0 0006 1          EXTEND                  IF RATE ERROR IS LESS THAN DEADBAND,
0629  REF   1              16,3315  6 3325 0          BZMF    LAST            FIRE, AND SWITCH TO PSEUDO-AUTO.
0630  REF   3  LAST 1435   16,3316  3 1445 0          CA      TCP
0631                       16,3317  0 0006 1          EXTEND                  IF TIME IN RATE COMMAND EXCEEDS 4 SEC.,
0632  REF   2  LAST 1435   16,3320  6 3325 0          BZMF    LAST
0633  REF  39  LAST 1435   16,3321  4 1273 1          CS      RCSFLAGS
0634  REF   3  LAST 1435   16,3322  7 4742 0          MASK    PBIT
0635  REF  40  LAST 1435   16,3323  27'273 1          ADS     RCSFLAGS        BIT 10 IS 1.
0636                       16,3324  1 3330 0          TCF     +4
0637  REF   4  LAST 1435   16,3325  4 4742 0  LAST    CS      PBIT
0638  REF  41  LAST 1435   16,3326  7 1273 1          MASK    RCSFLAGS
0639  REF  42  LAST 1435   16,3327  55'273 1          TS      RCSFLAGS        BIT 10 IS 0.
0640  REF   3  LAST 1435   16,3330  4 1427 0          CS      EDOTP
0641                       16,3331  0 0006 1          EXTEND
0642  REF   1              16,3332  7 1551 0          MP      1/ANETP         1/2JTACC SCALED AT 2EXP(7)/PI
0643  REF 494  LAST 1431   16,3333  20 001 1          DAS     A
0644  REF  10  LAST 1427   16,3334  0 2310 1          TC      OVERSUB
0645                       16,3335  0 0006 1          EXTEND
0646  REF   1              16,3336  7 7716 1          MP      25/32           A CONTAINS TJET SCALED AT 2EXP(4)(16/25)
0647  REF   5  LAST 1431   16,3337  55'524 1          TS      TJP             4.JET TIME
0648  REF   2  LAST 1435   16,3340  3 1737 0          CA      ABSEDOTP
0649  REF   2  LAST  130   16,3341  6 1475 0          AD      -2JETLIM        COMPARING DELTA RATE WITH 2 JET LIMIT
0650                       16,3342  0 0006 1          EXTEND
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 0651                           16,3343  6 3346 0            BZMF     +3

 0652   REF  32  LAST 1429      16,3344  3 6242 0            CA       SIX
 0653                           16,3345  1 3355 0            TCF      +8D
 0654   REF   6  LAST 1435      16,3346  3 1524 0            CA       TJP
 0655   REF   7  LAST 1436      16,3347  27'524 1            ADS      TJP
A0656                                                   GOES TO PJETSLEC FOR TWO JETS

A0657                                                  P-JET-SELECTION-ROUTINE (ROTATION)

A0658                                                  INPUT:   NUMBERT     4,5,6 FOR WHICH PAIR OR 4 JETS
A0659                                                           TJP         + FOR +P ROTATION

A0660                                                  OUTPUT:  CHANNEL 6
A0661                                                           PJUMPADR                FOR P-AXIS SKIP
A0662                                                           (JTLST CALL)            (SMALL TJP)

A0663                                                    ORDER OF POLICIES TRIED IN CASE OF FAILURE.
A0664                                                           +P                 -P
A0665                                                           7,15               8,16
A0666                                                           4,12               3,11
A0667                                                           4,7                8,11
A0668                                                           7,12               11,16
A0669                                                           12,15              3,16
A0670                                                           4,15               3,8
A0671                                                           ALARM              ALARM
 0672   REF   1                 16,3350  3 4747 1            CA       AORBSYST
 0673   REF  48  LAST 1434      16,3351  7 0111 1            MASK     DAPBOOLS
 0674   REF 495  LAST 1435      16,3352  10 000 0            CCS      A
 0675   REF 158  LAST 1431      16,3353  3 4753 1            CA       ONE
 0676   REF  34  LAST 1430      16,3354  6 4751 0            AD       FOUR
 0677   REF   3  LAST 1430      16,3355  55'743 1            TS       NUMBERT
 0678   REF 159  LAST 1436      16,3356  3 4753 1   PJETSLEC CA       ONE
 0679   REF 274  LAST 1434      16,3357  54 001 1            TS       L
 0680   REF   8  LAST 1436      16,3360  11'524 1            CCS      TJP
 0681                           16,3361  1 3366 0            TCF      +5
 0682   REF   4  LAST 1434      16,3362  1 3442 1            TCF      JETSOFF
 0683                           16,3363  1 3365 0            TCF      +2
 0684   REF   5  LAST 1436      16,3364  1 3442 1            TCF      JETSOFF
 0685                           16,3365  22 007 0            ZL
 0686   REF 160  LAST 1436      16,3366  6 4753 1            AD       ONE
 0687   REF   1                 16,3367  55'737 1            TS       ABSTJ
 0688   REF   4  LAST 1430      16,3370  23'744 1            LXCH     ROTINDEX
 0689   REF   1                 16,3371  0 3531 0            TC       SELECTP
 0690   REF  33  LAST 1436      16,3372  4 6242 1            CS       SIX
 0691   REF   4  LAST 1436      16,3373  6 1743 0            AD       NUMBERT
 0692                           16,3374  0 0006 1            EXTEND
 0693                           16,3375  1 3377 0            BZF      +2

 0694   REF  94  LAST 1419      16,3376  4 4752 1            CS       TWO
 0695  REF  35  LAST 1436   16,3377  6 4751 0            AD      FCUR
 0696  REF   2  LAST  133   16,3400  55'521 1            TS      NO.PJETS
 0697  REF   2  LAST 1430   16,3401  3 1741 1            CA      POLYTEMP
 0698  REF   2  LAST 1404   16,3402  0 5754 1            TC      WRITEP
 0699  REF   2  LAST 1436   16,3403  4 1737 1            CS      ABSTJ
 0700  REF   1              16,3404  6 3612 1            AD      +150MST6
 0701                       16,3405  0 0006 1            EXTEND
 0702  REF   2  LAST 1429   16,3406  6 3624 1            BZMF    QRAXIS             GO TO QRAXIS OR TO GTS.

 0703  REF   1              16,3407  6 3572 1            AD      -136MST6
 0704                       16,3410  0 0006 1            EXTEND
 0705                       16,3411  6 3416 1            BZMF    +5

 0706  REF   3  LAST 1437   16,3412  27'737 1            ADS     ABSTJ
 0707  REF   5  LAST 1436   16,3413  51'744 1            INDEX   ROTINDEX
 0708  REF   1              16,3414  3 3621 1            CA      MINTIMES
 0709  REF   9  LAST 1436   16,3415  55'524 1            TS      TJP

 0710  REF   4  LAST 1437   16,3416  3 1737 0            CA      ABSTJ
 0711                       16,3417  22 007 0            ZL
 0712                       16,3420  0 0004 0            INHINT
 0713  REF   4  LAST 1412   16,3421  53'471 0            DXCH    T6FURTHA
 0714  REF  54  LAST 1433   16,3422  0 4674 0            TC      IBNKCALL
 0715  REF   1              16,3423   37114 1            CADR    JTLST
 0716  REF  40  LAST 1429   16,3424  4 4740 1            CS      BIT12
 0717  REF  43  LAST 1435   16,3425  7 1273 1            MASK    RCSFLAGS
 0718  REF  44  LAST 1437   16,3426  55'273 1            TS      RCSFLAGS           BIT 12 SET TO 0.
 0719  REF   1              16,3427  0 3431 1            TC      ALTSYST
 0720  REF   3  LAST 1437   16,3430  1 3624 0            TCF     QRAXIS

 0721  REF  49  LAST 1436   16,3431  3 0111 0  ALTSYST   CA      DAPBOOLS           ALTERNATE P-AXIS JETS
 0722  REF 275  LAST 1436   16,3432  54 001 1            TS      L
 0723  REF   2  LAST 1436   16,3433  3 4747 1            CA      AORBSYST
 0724                       16,3434  0 0006 1            EXTEND
 0725  REF  19  LAST 1414   16,3435  06 001 0            RXOR    LCHAN
 0726  REF  50  LAST 1437   16,3436  54 111 1            TS      DAPBOOLS
 0727                       16,3437  0 0003 1            RELINT
 0728  REF 402  LAST 1434   16,3440  0 0002 0            TC      Q

 0729  REF   2  LAST 1437   16,3441  0 3431 1  DKALT     TC      ALTSYST

 0730  REF   3  LAST 1437   16,3442  0 5753 0  JETSOFF   TC      WRITEP -1
 0731  REF 289  LAST 1435   16,3443  3 4755 1            CA      ZERO
 0732  REF  10  LAST 1437   16,3444  55'524 1            TS      TJP
 0733  REF   4  LAST 1437   16,3445  1 3624 0            TCF     QRAXIS
R0734  (NOTE -- M13 = 1 IDENTICALLY IMPLIES NULL MULTIPLICATION.)

 0735  REF  13  LAST 1421   16,3446  3 0033 1  CALCPERR  CA      CDUY               P-ERROR CALCULATION.
 0736                       16,3447  0 0006 1            EXTEND
 0737  REF   7  LAST 1421   16,3450  21'636 1            MSU     CDUYD              CDU VALUE - ANGLE DESIRED (Y-AXIS)
 0738                              16,3451  0 0006 1            EXTEND
 0739   REF    9  LAST 1423        16,3452  7 1414 0            MP       M11          (CDUY-CDUYD)M11 SCALED AT PI RADIANS
 0740   REF    2  LAST 1435        16,3453  57'752 0            XCH      E            SAVE FIRST TERM (OF TWO)
 0741   REF   25  LAST 1435        16,3454  3 0032 0            CA       CDUX         THIRD COMPONENT
 0742                              16,3455  0 0006 1            EXTEND
 0743   REF   24  LAST 1435        16,3456  21'635 1            MSU      CDUXD        CDU VALUE - ANGLE DESIRED (X-AXIS)
R0744                                                           EXTEND
R0745                                                           MP       M13
 0746   REF    5  LAST 1408        16,3457  6 1277 1            AD       DELPEROR     KALCMANU INERFACE ERROR
 0747   REF    3  LAST 1438        16,3460  27'752 1            ADS      E            SAVE SUM OF TERMS.  COULD BE OVERFLOW.
 0748   REF    8  LAST 1435        16,3461  57'464 0            XCH      PERROR       SAVE P-ERROR FOR EIGHT-BALL DISPLAY.
 0749   REF  403  LAST 1437        16,3462  0 0002 0            TC       Q            RETURN TO CALLER

R0750   P-AXIS URGENCY FUNCTION CALCULATION.

 0751   REF    2  LAST 1413        16,3463  0 3446 1  PURGENCY  TC       CALCPERR     CALCULATE P-AXIS ERRORS.
 0752   REF   12  LAST 1408        16,3464  4 1643 0            CS       OMEGAPD      THIS CODING IS COMMON TO BOTH LM DAP AND
 0753   REF   15  LAST 1434        16,3465  6 1421 1            AD       OMEGAP       SPS-BACKUP MODE.
 0754   REF    4  LAST 1435        16,3466  55'427 0            TS       EDOTP        EDOTP = OMEGAP - OMEGAPD AT PI/4 RAD/SEC


 0755   REF  161  LAST 1436        16,3467  4 4753 0            CS       ONE
 0756   REF    2  LAST  132        16,3470  55'505 1            TS       AXISCTR
 0757   REF   51  LAST 1437        16,3471  3 0111 0            CA       DAPBOOLS
 0758   REF    8  LAST 1425        16,3472  7 4737 1            MASK     CSMDOCKD
 0759                              16,3473  0 0006 1            EXTEND
 0760   REF    1                   16,3474  1 3505 0            BZF      HEADTJET
 0761                              16,3475  0 0004 0            INHINT                IF CSMDOCKD = 1, GO TO DOCKED RCS LOGIC
 0762   REF   55  LAST 1437        16,3476  0 4674 0            TC       IBNKCALL
 0763   REF    1                   16,3477   43727 1            CADR     SPSRCS

 0764   REF   11  LAST 1437        16,3500  3 1524 0            CA       TJP
 0765                              16,3501  0 0006 1            EXTEND
 0766   REF    1                   16,3502  1 3441 1            BZF      DKALT        IF TJP = ZERO, CHANGE AORBSYST.
 0767                              16,3503  0 0003 1            RELINT
 0768   REF    2  LAST 1431        16,3504  1 3350 0            TCF      PJETSLEC -6     SELECT AORBSYST AND USE TWO JETS
 0769   REF  290  LAST 1437        16,3505  3 4755 1  HEADTJET  CA       ZERO
 0770   REF    1                   16,3506  55'500 1            TS       SENSETYP
 0771                              16,3507  0 0004 0            INHINT
 0772   REF   56  LAST 1438        16,3510  0 4674 0            TC       IBNKCALL
 0773   REF    1                   16,3511   37252 0            CADR     TJETLAW
 0774                              16,3512  0 0003 1            RELINT

 0775   REF    1                   16,3513  4 1741 0            CS       FIREFCT
 0776   REF    1                   16,3514  6 3530 1            AD       -FOURDEG
 0777                              16,3515  0 0006 1            EXTEND
 0778   REF    3  LAST 1438        16,3516  6 3350 1            BZMF     PJETSLEC -6
 0779   REF   12  LAST 1438        16,3517  11'524 1            CCS      TJP
 0780                              16,3520  1 3522 0            TCF      +2
 0781   REF    6  LAST 1436        16,3521  1 3442 1            TCF      JETSOFF
 0782   REF   1                16,3522  6 3527 1           AD      -160MST6
 0783                          16,3523  0 0006 1           EXTEND
 0784   REF   4  LAST 1438     16,3524  6 3350 1           BZMF    PJETSLEC -6
 0785   REF  34  LAST 1436     16,3525  3 6242 0           CA      SIX
 0786   REF   5  LAST 1439     16,3526  1 3355 0           TCF     PJETSLEC -1
 0787                          16,3527   77377 1  -160MST6 DEC     -256
 0788                          16,3530   75117 1  -FOURDEG DEC     -.08888
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P0789     JET POLICY CONSTRUCTION SUBROUTINE

A0790                                                         INPUT: ROTINDEX, NUMBERT

A0791                                                         OUTPUT: POLYTEMP (JET POLICY)

A0792                                                      THIS SUBROUTINE SELECT A SUBSET OF THE DESIRED JETS WHICH HAS NO FAILURE
 0793    REF  35  LAST 1439    16,3531   3 6242 0  SELECTP  CA      SIX
 0794    REF   1               16,3532  55'742 0            TS      TEMPNUM
 0795    REF   5  LAST 1436    16,3533  51'743 0            INDEX   NUMBERT
 0796    REF   1               16,3534   3 3563 1            CA      TYPEP
 0797    REF   6  LAST 1437    16,3535  51'744 1            INDEX   ROTINDEX
 0798    REF   1               16,3536   7 3554 1            MASK    JETSALL
 0799    REF   3  LAST 1437    16,3537  55'741 0            TS      POLYTEMP
 0800    REF   6  LAST  212    16,3540   7 1263 0            MASK    CH6MASK
 0801    REF 496  LAST 1436    16,3541  10 000 0            CCS     A
 0802                          16,3542   1 3544 0            TCF     +2
 0803    REF 404  LAST 1438    16,3543   0 0002 0            TC      Q
 0804    REF   2  LAST 1440    16,3544  11'742 0            CCS     TEMPNUM
 0805                          16,3545   1 3551 1            TCF     +4
 0806    REF  49  LAST 1430    16,3546   0 5567 0            TC      ALARM     1027
 0807                          16,3547   02003 0            OCT     02003
 0808    REF   7  LAST 1438    16,3550   1 3442 1            TCF     JETSOFF            *****TCF  ALARMJET ********************
 0809    REF   6  LAST 1440    16,3551  55'743 1  SELECTYZ TS      NUMBERT
 0810    REF   2  LAST 1436    16,3552   1 3532 1            TCF     SELECTP +1
 0811    REF   1               16,3553   1 2773 1  -1       TCF     ABORTYZ +2
 0812                          16,3554   00252 1  JETSALL  OCT     00252
 0813                          16,3555   00125 1            OCT     00125              +P
 0814                          16,3556   00140 1            OCT     00140              -Y
 0815                          16,3557   00006 1            OCT     00006              -Z
 0816                          16,3560   00220 1            OCT     00220              +Y
 0817                          16,3561   00011 1            OCT     00011              +Z
 0818                          16,3562   00151 1            OCT     00151              +V
 0819                          16,3563   00146 1  TYPEP    OCT     00146              -U
 0820                          16,3564   00226 1            OCT     00226              -V
 0821                          16,3565   00231 1            OCT     00231              +U
 0822                          16,3566   00151 1            OCT     00151              +V
 0823                          16,3567   00132 1            OCT     00132              1-3
 0824                          16,3570   00245 1            OCT     00245              2-4
 0825                          16,3571   00377 1            OCT     00377              ALL
 0826    REF   2  LAST 1437    16,3572             INDXYZ   =       -136MST6
 0827                          16,3572   77445 1  -136MST6 DEC     -218
 0828                          16,3573   00004 0            DEC     4
 0829                          16,3574   00002 0            DEC     2
 0830                          16,3575   07776 0            OCT     07776
 0831                          16,3576   00005 1            DEC     5
 0832                          16,3577   00011 1            DEC     9
 0833                          16,3600   00012 1            DEC     10
 0834                          16,3601   07776 0            OCT     07776
 0835                          16,3602   00003 1            DEC     3
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L       P-AXIS RCS AUTOPILOT                                                              USER'S PAGE NO.  21      E6 S4

 0836                          16,3603   00010 0             DEC     8
 0837                          16,3604   00007 0             DEC     7
 0838                          16,3605   07776 0             OCT     07776           THESE INDEXES OF  MASK JETSALL WILL
 0839                          16,3606   07776 0             OCT     07776           CHANGE THE INSTRUCTION AT  SELECTP +4
 0840                          16,3607   07776 0             OCT     07776           TO BE    TC  JETSALL -1
 0841                          16,3610   07776 0             OCT     07776           ONLY USED FOR TRANSLATION FAILURE
 0842                          16,3611   07776 0             OCT     07776
 0843                          16,3612   00360 1  +150MST6 DEC     240
 0844                          16,3613   07400 1  07400OCT OCT     07400
R0845   T-JET LAW FIXED CONSTANTS

 0846                          16,3614   00266 0  NORMSCL  OCT     266
 0847                          16,3615   74631 0  -100MS   DEC     -.1
 0848                          16,3616   06315 0  200MS    DEC     .2
 0849   REF   4  LAST  965        7716            25/32    =       PRIO31          (DEC .78125)
 0850                          16,3617   00600 1  BITS8,9  OCTAL   00600
 0851                          16,3620   00632 0  1/40     DEC     .02500
 0852                          16,3621   77751 1  MINTIMES DEC     -22
 0853                          16,3622   00026 0           DEC     22
 0854   REF   2  LAST 1428     16,3623   02734 0  PSKIPADR GENADR  SKIPPAXS

A0855                                             GOES TO Q,R-AXES RCS AUTOPILOT
 0856   REF   7  LAST 1408     16,3624  4 1645 0  QRAXIS   CS      OMEGARD
 0857   REF   7  LAST 1427     16,3625  6 1423 0           AD      OMEGAR
 0858   REF  11  LAST 1435     16,3626  0 2310 1           TC      OVERSUB
 0859   REF   2  LAST  130     16,3627  55'437 1           TS      EDOTR
 0860   REF   7  LAST 1408     16,3630  4 1644 1           CS      OMEGAQD
 0861   REF  12  LAST 1426     16,3631  6 1422 1           AD      OMEGAQ
 0862   REF  12  LAST 1441     16,3632  0 2310 1           TC      OVERSUB
 0863   REF   3  LAST  130     16,3633  55'436 0           TS      EDOTQ
 0864                          16,3634  0 0006 1           EXTEND
 0865   REF   1                16,3635  3 3640 0           DCA     QERRCALL
 0866                          16,3636  52 006 0           DTCB

 0867   REF  22  LAST 1427     E6,1537                     EBANK=  AOSQ
 0868   REF   1                16,3637   02072 0  QERRCALL 2CADR   CALLQERR
 0868   REF   1                16,3640   36106 0
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L        Q,R-AXES RCS AUTOPILOT                                                          USER'S PAGE NO.   1       EO S4

 0001                        17,2072                        BANK     17
 0002   REF    3  LAST 1405  17,2000                        SETLOC DAPS2
 0003                        17,2072                        BANK

 0004   REF   25  LAST 1438  E6,1635                        EBANK= CDUXD

 0005   REF    1                                            COUNT* $$/DAPQR

R0006
 00061  REF   54  LAST 1433  17,2072  3 4737 0  CALLQERR CA      BIT13          CALCULATE Q,R ERRORS UNLESS THESE AXES
 00062                       17,2073  0 0006 1           EXTEND                 ARE IN MANUAL RATE COMMAND.
 00063  REF   17  LAST 1433  17,2074  02 031 1           RAND    CHAN31
 00064  REF  497  LAST 1440  17,2075  10 000 0           CCS     A
 00065                       17,2076  1 2103 0           TCF     +5             IN AUTO COMPUTE Q,R ERRORS
 0007   REF   52  LAST 1438  17,2077  4 0111 1           CS      DAPBOOLS       IN MANUAL RATE COMMAND?
 00071  REF    5  LAST 1434  17,2100  7 4740 1           MASK    OURRCBIT
 00072                       17,2101  0 0006 1           EXTEND
 00073  REF    1             17,2102  1 2104 1           BZF     Q,RORGTS       IF SO BYPASS CALCULATION OF ERRORS.
 00074  REF    2  LAST 1413  17,2103  0 2626 1           TC      QERRCALC

R0008
 0009   REF    2  LAST 1412  17,2104  11'631 0  Q,RORGTS CCS     COTROLER       CHOOSE CONTROL SYSTEM FOR THIS DAP PASS:
 0010   REF    1             17,2105  1 2607 0           TCF     GOTOGTS          GTS (ALTERNATES WITH RCS WHEN DOCKED)
 0011   REF    1             17,2106  1 2574 1           TCF     TRYGTS           GTS IF ALLOWED, OTHERWISE RCS
 0012   REF  291  LAST 1438  17,2107  3 4755 1  RCS      CAF     ZERO             RCS (TRYGTS MAY BRANCH TO HERE)
 0013   REF    3  LAST 1442  17,2110  55'631 0           TS      COTROLER

 0014   REF    4  LAST 1441  17,2111  53'437 1           DXCH    EDOTQ
 0015   REF    1             17,2112  0 3146 1           TC      ROT-TOUV
 0016   REF   11  LAST 1424  17,2113  53'427 0           DXCH    OMEGAU

A0017                                           X - TRANSLATION:

A0018                                           INPUT:   BITS 7,8 OF CH31 (TRANSLATION CONTROLLER)
A0019                                                    ULLAGER
A0020                                                    APSFLAG, DRIFTBIT
A0021                                                    ACC4OR2X, AORBTRAN

A0022                                           OUTPUT:  NEXTU, NEXTV         CODES OF TRANSLATION FOR AFTER ROTATION
A0023                                                    SENSETYP             TELL ROTATION DIRECTION AND DESIRE

R0024   X-TRANS POLICIES ARE EITHER 4 JETS OR A DIAGONAL PAIR.  IN 2-JET TRANSLATION THE SYSTEM IS SPECIFIED.  A FAILURE
R0026   WILL OVERRIDE THIS SPECIFICATION.  AN ALARM RESULTS WHEN NO POLICY IS AVAILABLE BECAUSE OF FAILURES.

 0028   REF   44  LAST 1429  17,2114  3 4745 0  SENSEGET CA      BIT7           INPUT BITS OVERRIDE THE INTERNAL BITS
 0029                        17,2115  0 0006 1           EXTEND                 SENSETYP WILL NOT OPPOSE ANYTRANS
 0030   REF   18  LAST 1442  17,2116  02 031 1           RAND    CHAN31
 0031                        17,2117  0 0006 1           EXTEND
 0032   REF    1             17,2120  1 2146 1           BZF     +XORULGE
 0033  REF  42  LAST 1365   17,2121   3 4744 1              CA       BIT8
 0034                       17,2122   0 0006 1              EXTEND
 0035  REF  19  LAST 1442   17,2123  02 031  1              RAND     CHAN31
 0036                       17,2124   0 0006 1              EXTEND
 0037  REF   1              17,2125   1 2147 0              BZF      -XTRANS

 0038  REF   3  LAST  743   17,2126   3 4746 0              CA       ULLAGER
 0039  REF  53  LAST 1442   17,2127   7 0111 1              MASK     DAPBOOLS
 0040  REF 498  LAST 1442   17,2130  10 000  0              CCS      A
 0041  REF   2  LAST 1442   17,2131   1 2146 1              TCF      +XORULGE

 0042  REF   4  LAST 1413   17,2132  55'473  1              TS       NEXTU        STORE NULL TRANSLATION POLICIES
 0043  REF   4  LAST 1413   17,2133  55'474  0              TS       NEXTV
 0047  REF  54  LAST 1443   17,2134   4 0111 1              CS       DAPBOOLS     BURNING OR DRIFTING?
 0048  REF   4  LAST 1427   17,2135   7 4744 0              MASK     DRIFTBIT
 0049                       17,2136   0 0006 1              EXTEND
 0050  REF   1              17,2137   1 2144 0              BZF      TSENSE
 0051  REF  22  LAST 1385   17,2140   3 0106 0              CA       FLGWRD10     DPS (INCLUDING DOCKED) OR APS?
 0052  REF  14  LAST  862   17,2141   7 4737 1              MASK     APSFLBIT
 0053  REF 499  LAST 1443   17,2142  10 000  0              CCS      A
 0054  REF  95  LAST 1436   17,2143   3 4752 0              CAF      TWO          FAVOR +X JETS DURING AN APS BURN.
 0055  REF   2  LAST 1438   17,2144  55'500  1   TSENSE     TS       SENSETYP
 0056  REF   1              17,2145   1 2200 0              TCF      QRCONTRL

 0057  REF 162  LAST 1438   17,2146   3 4753 1   +XORULGE   CAF      ONE
 0058  REF  36  LAST 1437   17,2147   6 4751 0   -XTRANS    AD       FOUR
 0059  REF   7  LAST 1440   17,2150  55'744  0              TS       ROTINDEX
 0060  REF   7  LAST 1393   17,2151   6 7745 0              AD       NEG3
 00601 REF   3  LAST 1443   17,2152  55'500  1              TS       SENSETYP     FAVOR APPROPRIATE JETS DURING TRANS.
 0061  REF  55  LAST 1443   17,2153   3 0111 0              CA       DAPBOOLS
 0062  REF   2  LAST  293   17,2154   7 4741 0              MASK     ACC4OR2X
 0063  REF 500  LAST 1443   17,2155  10 000  0              CCS      A
 0064  REF   1              17,2156   1 2321 1              TCF      TRANS4

 0065  REF  56  LAST 1443   17,2157   3 0111 0              CA       DAPBOOLS
 0066  REF   1              17,2160   7 4742 0              MASK     AORBTRAN
 0067  REF 501  LAST 1443   17,2161  10 000  0              CCS      A
 0068  REF 163  LAST 1443   17,2162   3 4753 1              CA       ONE          THREE FOR B
 0069  REF  96  LAST 1443   17,2163   6 4752 0              AD       TWO          TWO FOR A SYSTEM 2 JET X TRANS
 0070  REF   7  LAST 1440   17,2164  55'743  1   TSNUMBRT   TS       NUMBERT

 0071  REF   1              17,2165   0 3173 1              TC       SELCTSUB

 0072  REF   4  LAST 1440   17,2166  11'741  0              CCS      POLYTEMP
 0073                       17,2167   1 2172 0              TCF      +3
 0074  REF  50  LAST 1440   17,2170   0 5567 0              TC       ALARM
 0075                       17,2171    02002 1              OCT      02002
 0076  REF   3  LAST 1405   17,2172   3 5774 0              CA       00314OCT
 0077  REF   5  LAST 1443   17,2173   7 1741 0              MASK     POLYTEMP
 0078  REF   5  LAST 1443   17,2174  55'473  1   TSNEXTS    TS       NEXTU
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1026

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 0079   REF   4  LAST 1443   17,2175  4 5774 1                CS      00314OCT
 0080   REF   6  LAST 1443   17,2176  7 1741 0                MASK    POLYTEMP
 0081   REF   5  LAST 1443   17,2177  55'474 0                TS      NEXTV

A0082                                                    Q,R-AXES RCS CONTROL MODE SELECTION

A0083                                                      SWITCHES              INDICATION WHEN SET

A0085                                                      BIT13/CHAN31          AUTO, GO TO ATTSTEER
A0086                                                      PULSES                MINIMUM IMPULSE MODE
A0087                                                      (OTHERWISE)           RATE COMMAND/ATTITUDE HOLD MODE

 0088   REF  55  LAST 1442   17,2200  3 4737 0  QRCONTPL CA      BIT13            CHECK MODE SELECT SWITCH.
 0089                        17,2201  0 0006 1           EXTEND
 0090   REF  20  LAST 1443   17,2202  02 031 1           RAND    CHAN31           BITS INVERTED
 0091   REF 502  LAST 1443   17,2203  10 000 0           CCS     A
 0092   REF   1              17,2204  1 2661 0           TCF     ATTSTEER
 0093   REF   5  LAST 1430   17,2205  3 4735 1  CHKBIT10 CAF     PULSES           PULSES = 1 FOR MIN IMP USE OF RHC
 0094   REF  57  LAST 1443   17,2206  7 0111 1           MASK    DAPBOOLS
 0095                        17,2207  0 0006 1           EXTEND
 0096   REF   1              17,2210  1 2323 0           BZF     CHEKSTIK         IN ATT-HOLD/RATE-COMMAND IF BIT10=0

R0097   MINIMUM IMPULSE MODE

 0098                        17,2211  0 0004 0           INHINT
 0099   REF  57  LAST 1438   17,2212  0 4674 0           TC      IBNKCALL
 0100   REF  12  LAST 1433   17,2213   40153 1           CADR    ZATTEROR
 0101   REF 292  LAST 1442   17,2214  3 4755 1           CA      ZERO
 0102   REF   3  LAST 1415   17,2215  55'450 0           TS      QERROR
 0103   REF   3  LAST 1415   17,2216  55'452 1           TS      RERROR           FOR DISPLAYS
 0104                        17,2217  0 0003 1           RELINT

 0105                        17,2220  0 0006 1           EXTEND
 0106   REF  21  LAST 1444   17,2221  00 031 0           READ    CHAN31
 0107   REF   1              17,2222  55'737 1           TS      TEMP31           IS EQUAL TO DAPTEMP1
 0108   REF   2  LAST 1412   17,2223  11'461 1           CCS     OLDQRMIN
 0109   REF   1              17,2224  1 2246 1           TCF     CHECKIN

 0110   REF   2  LAST 1444   17,2225  3 1737 0  FIREQR   CA      TEMP31
 0111   REF  61  LAST 1430   17,2226  7 4753 0           MASK    BIT1
 0112                        17,2227  0 0006 1           EXTEND
 0113   REF   1              17,2230  1 2252 1           BZF     +QMIN

 0114   REF   3  LAST 1444   17,2231  3 1737 0           CA      TEMP31
 0115   REF  53  LAST 1418   17,2232  7 4752 1           MASK    BIT2
 0116                        17,2233  0 0006 1           EXTEND
 0117   REF   1              17,2234  1 2256 0           BZF     -QMIN

 0118   REF   4  LAST 1444   17,2235  3 1737 0           CA      TEMP31
 0119   REF  48  LAST 1412   17,2236  7 4747 0           MASK    BIT5
 0120                              17,2237  0 0006 1             EXTEND
 0121    REF    1                  17,2240  1 2262 1             BZF      +RMIN

 0122    REF    5  LAST 1444       17,2241  3 1737 0             CA       TEMP31
 0123    REF   63  LAST 1418       17,2242  7 4746 1             MASK     BIT6
 0124                              17,2243  0 0006 1             EXTEND
 0125    REF    1                  17,2244  1 2264 1             BZF      -RMIN

 0126    REF    1                  17,2245  1 3063 0             TCF      XTRANS

 0127    REF    6  LAST 1445       17,2246  4 1737 1  CHECKIN    CS       TEMP31
 0128    REF    1                  17,2247  7 2320 0             MASK     OCT63
 0129    REF    3  LAST 1444       17,2250  55'461 1             TS       OLDQRMIN
 0130    REF    2  LAST 1445       17,2251  1 3063 0             TCF      XTRANS

 0131    REF    1                  17,2252  3 3107 1  +QMIN      CA       14MS
 0132    REF    3  LAST 1411       17,2253  55'525 0             TS       TJU
 0133    REF    2  LAST 1445       17,2254  4 3107 0             CS       14MS
 0134    REF    1                  17,2255  1 2266 0             TCF      MINQR
 0135    REF    3  LAST 1445       17,2256  4 3107 0  -QMIN      CS       14MS
 0136    REF    4  LAST 1445       17,2257  55'525 0             TS       TJU
 0137    REF    4  LAST 1445       17,2260  3 3107 1             CA       14MS
 0138    REF    2  LAST 1445       17,2261  1 2266 0             TCF      MINQR
 0139    REF    5  LAST 1445       17,2262  3 3107 1  +RMIN      CA       14MS
 0140                              17,2263  1 2265 0             TCF      +2
 0141    REF    6  LAST 1445       17,2264  4 3107 0  -RMIN      CS       14MS
 0142    REF    5  LAST 1445       17,2265  55'525 0             TS       TJU
 0143    REF    2  LAST 1411       17,2266  55'526 0  MINQR      TS       TJV
 0144    REF    1                  17,2267  3 2317 0             CA       MINADR
 0145    REF    1                  17,2270  55'477 0             TS       RETJADR
 0146    REF  164  LAST 1443       17,2271  3 4753 1             CA       ONE
 0147    REF    4  LAST 1445       17,2272  55'461 1             TS       OLDQRMIN
 0148    REF    3  LAST 1438       17,2273  55'505 1  MINRTN     TS       AXISCTR
 0149   *REF   58  LAST 1444       17,2274  3 0111 0             CA       DAPBOOLS
 0150   *REF    9  LAST 1438       17,2275  7 4737 1             MASK     CSMDOCKD
 0151   *                          17,2276  0 0006 1             EXTEND
 0152   *REF    1                  17,2277  1 2307 0             BZF      MIMRET
 0153   *REF    4  LAST 1445       17,2300  51'505 0             INDEX    AXISCTR        IF DOCKED,USE 60MS MINIMUM IMPULSE
 0154   *REF    6  LAST 1445       17,2301  11'525 0             CCS      TJU
 0155   *REF    1                  17,2302  3 2316 1             CA       60MS
 0156   *                          17,2303  1 2305 1             TCF      +2
 0157   *REF    2  LAST 1445       17,2304  4 2316 0             CS       60MS
 0158   *REF    5  LAST 1445       17,2305  51'505 0             INDEX    AXISCTR
 0159   *REF    7  LAST 1445       17,2306  55'525 0             TS       TJU
 0160   *REF   59  LAST 1445       17,2307  3 0111 0  MIMRET     CA       DAPBOOLS
 0161    REF    2  LAST 1443       17,2310  7 4742 0             MASK     AORBTRAN
 0162    REF  503  LAST 1444       17,2311  10 000 0             CCS      A
 0163    REF  165  LAST 1445       17,2312  3 4753 1             CA       ONE
 0164    REF   97  LAST 1443       17,2313  6 4752 0             AD       TWO
 0165    REF    8  LAST 1443       17,2314  55'743 1             TS       NUMBERT
 0166   REF   1                 17,2315  1 2727 0            TCF     AFTERTJ

 0167  *                        17,2316   00140 1  60MS      DEC     96.0
 0168   REF   1                 17,2317   02273 0  MINADR    GENADR  MINRTN
 0169                           17,2320   00063 1  OCT63     OCT     63
 0170   REF   1                 17,3107            14MS      =       +TJMINT6

 0171   REF  37   LAST 1443     17,2321  3 4751 0  TRANS4    CA      FOUR
 0172   REF   1                 17,2322  1 2164 1            TCF     TSNUMBRT

A0173                                              RATE COMMAND MODE:

A0174                                              DESCRIPTION (SAME AS P-AXIS)

 0175   REF   2   LAST 1412     17,2323  55'633 1  CHEKSTIK  TS      INGTS            NOT IN GTS WHEN IN ATT HOLD
 0176   REF 166   LAST 1445     17,2324  4 4753 0            CS      ONE              1/ACCS WILL DO THE NULLING DRIVES
 0177   REF   4   LAST 1442     17,2325  55'631 0            TS      COTROLER         COME BACK TO RCS NEXT TIME
 0178   REF  50   LAST 1432     17,2326  3 4735 1            CA      BIT15
 0179   REF   2   LAST 1432     17,2327  7 1443 1            MASK    CH31TEMP
 0180                           17,2330  0 0006 1            EXTEND
 0181   REF   1                 17,2331  1 2350 1            BZF     RHCACTIV         BRANCH IF OUT OF DETENT.
 0182   REF   6   LAST 1442     17,2332  3 4740 0            CA      OURRCBIT         ***********
 0183   REF  60   LAST 1445     17,2333  7 0111 1            MASK    DAPBOOLS         *IN DETENT*   CHECK FOR MANUAL CONTROL
 0184                           17,2334  0 0006 1            EXTEND                   ***********   LAST TIME.
 0185   REF   1                 17,2335  1 2661 0            BZF     STILLRCS
 0186   REF  35   LAST 1434     17,2336  4 4743 1            CS      BIT9
 0187   REF  45   LAST 1437     17,2337  7 1273 1            MASK    RCSFLAGS
 0188   REF  46   LAST 1446     17,2340  55'273 1            TS      RCSFLAGS         BIT 9 IS 0.
 0189   REF   1                 17,2341  1 2345 0            TCF     DAMPING
 0190                           17,2342   00050 1  40CYCL    OCT     50
 0191                           17,2343   00001 0  1/10S     OCT     1
 0192                           17,2344   00056 1  LINRAT    DEC     46
R0193   ===============================
 0194   REF 293   LAST 1444     17,2345  3 4755 1  DAMPING   CA      ZERO
 0195   REF   2   LAST 1434     17,2346  55'462 1            TS      SAVEHAND
 0196   REF   3   LAST 1446     17,2347  55'463 0            TS      SAVEHAND +1
 0197   REF   4   LAST 1446     17,2350  11'462 1  RHCACTIV  CCS     SAVEHAND         *******************
 0198                           17,2351  1 2354 0            TCF     +3                Q,R MANUAL CONTROL  WC = A*(B+|D|)*D
 0199                           17,2352  1 2354 0            TCF     +2               *******************
 0200                           17,2353  1 2354 0            TCF     +1
 0201                           17,2354  6 0000 1            DOUBLE                     WHERE
 0202                           17,2355  6 0000 1            DOUBLE
 0203   REF   1                 17,2356  6 2344 0            AD      LINRAT                   WC = COMMANDED ROTATIONAL RATE
 0204                           17,2357  0 0006 1            EXTEND                           A  = QUADRATIC SENSITIVITY FACTOR
 0205   REF   5   LAST 1446     17,2360  7 1462 1            MP      SAVEHAND                 B  = LINEAR/QUADRATIC SENSITIVITY
 0206   REF 276   LAST 1437     17,2361  3 0001 0            CA      L                        |D|= ABS. VALUE OF DEFLECTION
 0207                           17,2362  0 0006 1            EXTEND                           D  = HAND CONTROLLER DEFLECTION
 0208   REF   7   LAST 1434     17,2363  7 1444 0            MP      STIKSENS
 0209   REF   3   LAST 1433     17,2364  57'455 1            XCH     QLAST            COMMAND Q RATE     SCALED 45 DEG/SEC
 0210                           17,2365  4 0000 0            COM
 0211   REF   4  LAST 1446   17,2366  6 1455 1           AD      QLAST
 0212   REF   5  LAST 1424   17,2367  55'741 0           TS      DAPTEMP3
 0213   REF   6  LAST 1446   17,2370  11'463 0           CCS     SAVEHAND +1
 0214                        17,2371  1 2374 1           TCF     +3
 0215                        17,2372  1 2374 1           TCF     +2
 0216                        17,2373  1 2374 1           TCF     +1
 0217                        17,2374  6 0000 1           DOUBLE
 0218                        17,2375  6 0000 1           DOUBLE
 0219   REF   2  LAST 1446   17,2376  6 2344 0           AD      LINRAT
 0220                        17,2377  0 0006 1           EXTEND
 0221   REF   7  LAST 1447   17,2400  7 1463 0           MP      SAVEHAND +1
 0222   REF 277  LAST 1446   17,2401  3 0001 0           CA      L
 0223                        17,2402  0 0006 1           EXTEND
 0224   REF   8  LAST 1446   17,2403  7 1444 0           MP      STIKSENS
 0225   REF   3  LAST 1433   17,2404  57'456 1           XCH     RLAST
 0226                        17,2405  4 0000 0           COM
 0227   REF   4  LAST 1447   17,2406  6 1456 1           AD      RLAST
 0228   REF   3  LAST  133   17,2407  55'742 0           TS      DAPTEMP4
 0229   REF   5  LAST 1447   17,2410  4 1455 0           CS      QLAST              INTERVAL.
 0230   REF  13  LAST 1441   17,2411  6 1422 1           AD      OMEGAQ
 0231   REF   1              17,2412  55'436 0           TS      QRATEDIF
 0232   REF   5  LAST 1447   17,2413  4 1456 0           CS      RLAST
 0233   REF   8  LAST 1441   17,2414  6 1423 0           AD      OMEGAR
 0234   REF   1              17,2415  55'437 1           TS      RRATEDIF
 0235   REF   2  LAST 1447   17,2416  53'437 1  ENTERQR  DXCH    QRATEDIF           TRANSFORM RATES FROM Q,R TO U,V AXES
 0236   REF   2  LAST 1442   17,2417  0 3146 1           TC      ROT-TOUV
 0237   REF   1              17,2420  53'427 0           DXCH    URATEDIF
 0238   REF   6  LAST 1447   17,2421  11'741 0           CCS     DAPTEMP3           CHECK IF Q COMMAND CHANGE EXCEEDS
 0239                        17,2422  0 2425 0           TC      +3                 BREAKOUT LEVEL.  IF NOT, CHECK R.
 0240                        17,2423  0 2425 0           TC      +2
 0241                        17,2424  0 2425 0           TC      +1
 0242   REF   6  LAST 1435   17,2425  6 1476 0           AD      -RATEDB
 0243                        17,2426  0 0006 1           EXTEND
 0244                        17,2427  6 2431 0           BZMF    +2
 0245   REF   1              17,2430  1 2447 0           TCF     ENTERUV -2         BREAKOUT LEVEL EXCEEDED.  DIRECT RATE.
 0246   REF   4  LAST 1447   17,2431  11'742 0           CCS     DAPTEMP4           R COMMAND BREAKOUT CHECK.
 0247                        17,2432  0 2435 1           TC      +3
 0248                        17,2433  0 2435 1           TC      +2
 0249                        17,2434  0 2435 1           TC      +1
 0250   REF   7  LAST 1447   17,2435  6 1476 0           AD      -RATEDB
 0251                        17,2436  0 0006 1           EXTEND
 0252                        17,2437  6 2441 1           BZMF    +2
 0253   REF   2  LAST 1447   17,2440  1 2447 0           TCF     ENTERUV -2         BREAKOUT LEVEL EXCEEDED.  DIRECT RATE.
 0254   REF  47  LAST 1446   17,2441  3 1273 0           CA      RCSFLAGS           BREAKOUT LEVEL NOT EXCEEDED.  CHECK FOR
 0255   REF   2  LAST 1433   17,2442  7 4741 0           MASK    QRBIT              DIRECT RATE CONTROL LAST TIME.
 0256                        17,2443  0 0006 1           EXTEND
 0257                        17,2444  1 2446 1           BZF     +2
 0258   REF   3  LAST 1447   17,2445  1 2451 1           TCF     ENTERUV            CONTINUE DIRECT RATE CONTROL.
 0259   REF   2  LAST 1446   17,2446  1 2661 0           TCF     STILLRCS           PSEUDO-AUTO CONTROL.
 0260   REF   1              17,2447  3 2342 0           CA      40CYCL
 0261  REF   2  LAST 1422   17,2450  55'457 1                TS      TCQR
 0262                       17,2451   0 0004 0    ENTERUV    INHINT                       DIRECT RATE CONTROL.
 0263  REF  58  LAST 1444   17,2452   0 4674 0               TC      IBNKCALL
 0264  REF  13  LAST 1444   17,2453    40153 1               FCADR   ZATTEROR
 0265                       17,2454   0 0003 1               RELINT
 0266  REF 294  LAST 1446   17,2455   3 4755 1               CA      ZERO
 0267  REF   6  LAST 1433   17,2456  55'450 0                TS      DYERROR
 0268  REF   7  LAST 1448   17,2457  55'451 1                TS      DYERROR +1
 0269  REF   6  LAST 1433   17,2460  55'452 1                TS      DZERROR
 0270  REF   7  LAST 1448   17,2461  55'453 0                TS      DZERROR +1
 0271  REF   2  LAST 1447   17,2462  11'426 1                CCS     URATEDIF
 0272                       17,2463   1 2466 0               TCF     +3
 0273                       17,2464   1 2466 0               TCF     +2
 0274                       17,2465   1 2466 0               TCF     +1
 0275  REF   2  LAST 1435   17,2466   6 1476 0               AD      TARGETDB               IF TARGET DB IS EXCEEDED, CONTINUE
 0276                       17,2467   0 0006 1               EXTEND                         DIRECT RATE CONTROL.
 0277  REF   1              17,2470   6 2504 1               BZMF    VDB
 0278  REF   1              17,2471  11'427 0                CCS     VRATEDIF
 0279                       17,2472   1 2475 1               TCF     +3
 0280                       17,2473   1 2475 1               TCF     +2
 0281                       17,2474   1 2475 1               TCF     +1
 0282  REF   3  LAST 1449   17,2475   6 1476 0               AD      TARGETDB
 0283                       17,2476   0 0006 1               EXTEND
 0284                       17,2477   6 2501 1               BZMF    +2
 0285  REF   1              17,2500   1 2515 0               TCF     QRTIME
 0286  REF 295  LAST 1448   17,2501   3 4755 1               CA      ZERO
 0287  REF   2  LAST 1448   17,2502  55'427 0                TS      VRATEDIF
 0288  REF   2  LAST 1448   17,2503   1 2515 0               TCF     QRTIME
 0289  REF   3  LAST 1448   17,2504  11'427 0     VDB        CCS     VRATEDIF
 0290                       17,2505   0 2510 1               TC      +3
 0291                       17,2506   0 2510 1               TC      +2
 0292                       17,2507   0 2510 1               TC      +1
 0293  REF   4  LAST 1448   17,2510   6 1476 0               AD      TARGETDB               IF TARGET DB IS EXCEEDED, CONTINUE
 0294                       17,2511   0 0006 1               EXTEND                         DIRECT RATE CONTROL.  IF NOT, FIRE AND
 0295  REF   1              17,2512   6 2524 0               BZMF    TOPSEUDO               SWITCH TO PSEUDO-AUTO CONTROL ON NEXT
 0296  REF 296  LAST 1448   17,2513   3 4755 1               CA      ZERO                   PASS.
 0297  REF   3  LAST 1448   17,2514  55'426 1                TS      URATEDIF
 0298  REF   3  LAST 1448   17,2515   3 1457 0    QRTIME     CA      TCQR                   DIRECT RATE TIME CHECK.
 0299                       17,2516   0 0006 1               EXTEND
 0300                       17,2517   6 2524 0               BZMF    +5                     BRANCH IF TIME EXCEEDS 4 SEC.
 0301  REF  48  LAST 1447   17,2520   4 1273 1               CS      RCSFLAGS
 0302  REF   3  LAST 1447   17,2521   7 4741 0               MASK    QRBIT
 0303  REF  49  LAST 1448   17,2522  27'273 1                ADS     RCSFLAGS               BIT 11 IS 1.
 0304                       17,2523   0 2527 0               TC      +4
 0305  REF   4  LAST 1448   17,2524   4 4741 0    TOPSEUDO   CS      QRBIT
 0306  REF  50  LAST 1448   17,2525   7 1273 1               MASK    RCSFLAGS
 0307  REF  51  LAST 1448   17,2526  55'273 1                TS      RCSFLAGS               BIT 11 IS 0.
 0308  REF   1              17,2527   3 2573 1               CA      HANDADR
 0309  REF   2  LAST 1445   17,2530  55'477 0                TS      RETJADR
 0310  REF 167  LAST 1446   17,2531   3 4753 1               CA      ONE
 0311   REF   6  LAST 1445   17,2532  55'505 1  BACKHAND TS      AXISCTR

 0312   REF  38  LAST 1446   17,2533  3 4751 0           CA      FOUR
 0313   REF   9  LAST 1445   17,2534  55'743 1           TS      NUMBERT

 0314   REF   7  LAST 1449   17,2535  51'505 0           INDEX   AXISCTR
 0315   REF   3  LAST 1412   17,2536  51'535 0           INDEX   SKIPU
 0316                        17,2537  1 2540 0           TCF     +1
 0317   REF  39  LAST 1449   17,2540  3 4751 0           CA      FOUR
 0318   REF   8  LAST 1449   17,2541  51'505 0           INDEX   AXISCTR
 0319   REF   4  LAST 1449   17,2542  55'535 1           TS      SKIPU
 0320   REF   1              17,2543  1 3005 0           TCF     LOOPER

 0321   REF   9  LAST 1449   17,2544  51'505 0           INDEX   AXISCTR
 0322   REF   4  LAST 1448   17,2545  11'426 1           CCS     URATEDIF         INDEX  AXIS    QUANITY
 0323   REF 297  LAST 1448   17,2546  3 4755 1           CA      ZERO               0     -U     1/JETACC-AOSU
 0324                        17,2547  1 2551 0           TCF     +2                 1     +U     1/JETACC+AOSU
 0325   REF 168  LAST 1448   17,2550  3 4753 1           CA      ONE               16     -V     1/JETACC-AOSV
 0326   REF  10  LAST 1449   17,2551  51'505 0           INDEX   AXISCTR           17     +V     1/JETACC+AOSV
 0327   REF   1              17,2552  6 3722 0           AD      AXISDIFF         JETACC = 2 JET ACCELERATION (1 FOR FAIL)

 0328   REF 504  LAST 1445   17,2553  50 000 1           INDEX   A
 0329   REF   1              17,2554  4 1571 1           CS      1/ANET2 +1
 0330                        17,2555  0 0006 1           EXTEND
 0331   REF  11  LAST 1449   17,2556  5 1505 0           INDEX   AXISCTR          URATEDIF IS SCALED AT PI/4 RAD/SEC
 0332   REF   5  LAST 1449   17,2557  7 1426 1           MP      URATEDIF          JET TIME IN A      SCALED 32 SEC
 0333   REF 405  LAST 1440   17,2560  54 002 1           TS      Q
 0334   REF 505  LAST 1449   17,2561  20 001 1           DAS     A
 0335   REF 406  LAST 1449   17,2562  6 0002 0           AD      Q
 0336   REF 506  LAST 1449   17,2563  54 000 0           TS      A                 OVERFLOW SKIP
 0337                        17,2564  1 2566 1           TCF     +2
 0338   REF 407  LAST 1449   17,2565  3 0002 0           CA      Q                RIGHT SIGN AND BIGGER THAN 150MS
 0339   REF  12  LAST 1449   17,2566  51'505 0  SETTIME  INDEX   AXISCTR
 0340   REF   8  LAST 1445   17,2567  55'525 0           TS      TJU              SCALED AT 10.67 WHICH IS CLOSE TO 10.24
 0341   REF   2  LAST 1446   17,2570  1 2727 0           TCF     AFTERTJ

 0342   REF 298  LAST 1449   17,2571  3 4755 1  ZEROTJ   CA      ZERO
 0343   REF   1              17,2572  1 2566 1           TCF     SETTIME

 0344   REF   1              17,2573   02532 1  HANDADR  GENADR  BACKHAND

A0345                                           GTS WILL BE TRIED IF
A0346                                              1. USEQRJTS= 0,
A0347                                              2. ALLOWGTS POS,
A0348                                              3. JETS ARE OFF(Q,R-AXES)
 0349   REF   4  LAST  863   17,2574  3 4736 1  TRYGTS   CAF     USEQRJTS         IS JET USE MANDATORY.        (AS LONG AS
 0350   REF  61  LAST 1446   17,2575  7 0111 1           MASK    DAPBOOLS         USEQRJTS BIT IS NOT BIT 15, CCS IS SAFE)
 0351   REF 507  LAST 1449   17,2576  10 0000 0          CCS     A
 0352   REF   1              17,2577  1 2107 1           TCF     RCS
 0353   REF   2  LAST 1412   17,2600  11'502 0           CCS     ALLOWGTS         NO.  DOES AOSTASK OK CONTROL FOR GTS?
 0354                         17,2601  1 2603 1            TCF      +2
 0355   REF    2  LAST 1449   17,2602  1 2107 1            TCF      RCS
 0356                         17,2603  0 0006 1            EXTEND
 0357   REF    6  LAST 1413   17,2604  00 005 1            READ     CHAN5
 0358   REF  508  LAST 1449   17,2605  10 000 0            CCS      A
 0359   REF    1              17,2606  1 2612 1            TCF      CHKINGTS
 0360                         17,2607  0 0006 1  GOTOGTS   EXTEND
 0361   REF    1              17,2610  3 2625 1            DCA      GTSCADR
 0362                         17,2611  52 006 0            DTCB

 0363   REF    3  LAST 1446   17,2612  11'633 1  CHKINGTS  CCS      INGTS              WAS THE TRIM GIMBAL CONTROLLING
 0364                         17,2613  1 2615 0            TCF      +2                   YES.  SET UP A DAMPED NULLING DRIVE.
 0365   REF    3  LAST 1450   17,2614  1 2107 1            TCF      RCS                  NO.  NULLING WAS SET UP BEFORE. DO RCS
 0366                         17,2615  0 0004 0            INHINT
 0367   REF   59  LAST 1448   17,2616  0 4674 0            TC       IBNKCALL
 0368   REF    1              17,2617   43330 0            CADR     TIMEGMBL
 0369                         17,2620  0 0003 1            RELINT
 0370   REF  299  LAST 1449   17,2621  3 4755 1            CAF      ZERO
 0371   REF    4  LAST 1450   17,2622  55'633 1            TS       INGTS
 0372   REF    4  LAST 1450   17,2623  1 2107 1            TCF      RCS

 0373   REF   26  LAST 1442   E6,1635                      EBANK=   CDUXD
 0374   REF    1              17,2624   03077 1  GTSCADR   2CADR    GTS
 0374   REF    1              17,2625   42106 0
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P0375   SUBROUTINE TO COMPUTE Q,R-AXES ATTITUDE ERRORS FOR USE IN THE RCS AND GTS CONTROL LAWS AND THE DISPLAYS.

 0377   REF  14  LAST 1437   17,2626  30 033 1  QERRCALC CAE     CDUY              Q-ERROR CALCULATION
 0378                        17,2627  0 0006 1           EXTEND
 0379   REF   8  LAST 1437   17,2630  21'636 1           MSU     CDUYD             CDU ANGLE - ANGLE DESIRED (Y-AXIS)
 0380   REF  27  LAST 1434   17,2631  55'737 1           TS      DAPTEMP1          SAVE FOR RERRCALC
 0381                        17,2632  0 0006 1           EXTEND
 0382   REF   4  LAST 1424   17,2633  7 1415 1           MP      M21               (CDUY-CDUYD)*M21 SCALED AT PI RADIANS
 0383   REF   4  LAST 1438   17,2634  55'752 1           TS      E
 0384   REF  17  LAST 1421   17,2635  30 034 0           CAE     CDUZ              SECOND TERM CALCULATION:
 0385                        17,2636  0 0006 1           EXTEND
 0386   REF   7  LAST 1422   17,2637  21'637 0           MSU     CDUZD             CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0387   REF   9  LAST 1427   17,2640  55'740 1           TS      DAPTEMP2          SAVE FOR RERRCALC
 0388                        17,2641  0 0006 1           EXTEND
 0389   REF   7  LAST 1424   17,2642  7 1417 0           MP      M22               (CDUZ-CDUZD)*M22 SCALED AT PI RADIANS
 0390   REF   3  LAST 1408   17,2643  6 1300 0           AD      DELQEROR          KALCMANU INERFACE ERROR
 0391   REF   5  LAST 1451   17,2644  6 1752 0           AD      E
 0392   REF   4  LAST 1444   17,2645  57'450 1           XCH     QERROR            SAVE Q-ERROR FOR EIGHT-BALL DISPLAY.

 0393   REF  28  LAST 1451   17,2646  31'737 0  RERRCALC CAE     DAPTEMP1          R-ERROR CALCULATION:
 0394                        17,2647  0 0006 1           EXTEND                    CDU ANGLE -ANGLE DESIRED (Y-AXIS)
 0395   REF   4  LAST 1424   17,2650  7 1416 1           MP      M31               (CDUY-CDUYD)*M31 SCALED AT PI RADIANS
 0396   REF   6  LAST 1451   17,2651  55'752 1           TS      E
 0397   REF  10  LAST 1451   17,2652  31'740 0           CAE     DAPTEMP2          SECOND TERM CALCULATION:
 0398                        17,2653  0 0006 1           EXTEND                    CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0399   REF   5  LAST 1424   17,2654  7 1420 1           MP      M32               (CDUZ-CDUZD)*M32 SCALED AT PI RADIANS
 0400   REF   3  LAST 1408   17,2655  6 1301 1           AD      DELREROR          KALCMANU INERFACE ERROR
 0401   REF   7  LAST 1451   17,2656  6 1752 0           AD      E
 0402   REF   4  LAST 1444   17,2657  57'452 0           XCH     RERROR            SAVE R-ERROR FOR EIGHT-BALL DISPLAY.
 0403   REF 408  LAST 1449   17,2660  0 0002 0           TC      Q
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P0404    "ATTSTEER" IS THE ENTRY POINT FOR Q,R-AXES (U,V-AXES) ATTITUDE CONTROL USING THE REACTION CONTROL SYSTEM

 0406    REF   3  LAST 1447    17,2661                ATTSTEER EQUALS STILLRCS          "STILLRCS" IS THE RCS EXIT FROM TRYGTS.

 0407    REF   5  LAST 1451    17,2661  3 1452 0   STILLRCS CA       RERROR
 0408    REF 509  LAST 1450    17,2662  22 000 1            LXCH     A
 0409    REF   5  LAST 1451    17,2663  3 1450 1            CA       QERROR
 0410    REF   3  LAST 1447    17,2664  0 3146 1            TC       ROT-TOUV
 0411    REF   2  LAST  131    17,2665  53'752 1            DXCH     UERROR

A0412                                                 PREPARES CALL TO TJETLAW (OR SPSRCS(DOCKED))
A0413                                                 PREFORMS SKIP LOGIC ON U OR V AXIS IF NEEDED.
 0414    REF   1               17,2666  3 3113 1   TJLAW    CA       TJLAWADR
 0415    REF   3  LAST 1448    17,2667  55'477 0            TS       RETJADR
 0416    REF 169  LAST 1449    17,2670  3 4753 1            CA       ONE
 0417    REF  13  LAST 1449    17,2671  55'505 1            TS       AXISCTR
 0418    REF  14  LAST 1452    17,2672  51'505 0            INDEX    AXISCTR
 0419    REF   5  LAST 1449    17,2673  51'535 0            INDEX    SKIPU
 0420                          17,2674  1 2675 0            TCF      +1
 0421    REF  40  LAST 1449    17,2675  3 4751 0            CA       FOUR
 0422    REF  15  LAST 1452    17,2676  51'505 0            INDEX    AXISCTR
 0423    REF   6  LAST 1452    17,2677  55'535 1            TS       SKIPU
 0424    REF   2  LAST 1449    17,2700  1 3005 0            TCF      LOOPER
 0425    REF  16  LAST 1452    17,2701  51'505 0            INDEX    AXISCTR
 0426    REF   3  LAST 1452    17,2702  3 1751 0            CA       UERROR
 0427    REF   8  LAST 1451    17,2703  55'752 1            TS       E
 0428    REF  17  LAST 1452    17,2704  51'505 0            INDEX    AXISCTR
 0429    REF  12  LAST 1442    17,2705  3 1426 0            CA       OMEGAU
 0430    REF   2  LAST  130    17,2706  55'427 0            TS       EDOT
 0431    REF  62  LAST 1449    17,2707  3 0111 0            CA       DAPBOOLS
 0432    REF  10  LAST 1445    17,2710  7 4737 1            MASK     CSMDOCKD
 0433    REF 510  LAST 1452    17,2711  10 000 0            CCS      A
 0434                          17,2712  1 2715 1            TCF      +3
 0435    REF   2  LAST 1438    17,2713  0 3252 1            TC       TJETLAW
 0436    REF   3  LAST 1449    17,2714  1 2727 0            TCF      AFTERTJ
 0437    REF  63  LAST 1452    17,2715  4 0111 1   +3       CS       DAPBOOLS          DOCKED.  IF GIMBAL USABLE DO GTS CONTROL
 0438    REF   5  LAST 1449    17,2716  7 4736 0            MASK     USEQRJTS            ON THE NEXT PASS.
 0439    REF 511  LAST 1452    17,2717  10 000 0            CCS      A                 USEQRJTS BIT MUST NOT BE BIT 15.
 0440    REF   5  LAST 1446    17,2720  55'631 0            TS       CCTROLER          GIMBAL USABLE.  STORE POSITIVE VALUE.
 0441   *                      17,2721  0 0004 0            INHINT
 0442   *REF  60  LAST 1450    17,2722  0 4674 0            TC       IBNKCALL
 0443   *REF   2  LAST 1438    17,2723   43727 1            CADR     SPSRCS            DETERMINE RCS CONTROL
 0444   *                      17,2724  0 0003 1            RELINT
 0445    REF  41  LAST 1452    17,2725  3 4751 0            CAF      FOUR              ALWAYS CALL FOR 2-JET CONTROL ABOUT U,V.
 0446    REF  10  LAST 1449    17,2726  55'743 1            TS       NUMBERT           FALL THROUGH TO JET SELECTION, ETC.

A0447                                                 Q,R-JET-SELECTION-LOGIC

A0448                                                 INPUT: AXISCTR        0,1 FOR  U,V
A0449                                                        SNUFFBIT       ZERO TJETU,V AND TRANS. ONLY IF SET IN A DPS BURN
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A0450                                                    TJU,TJV         JET TIME SCALED 10.24 SEC.
A0451                                                    NUMBERT         INDICATES NUMBER OF JETS AND TYPE OF POLICY
A0452                                                    RETJADR         WHERE TO RETURN TO

A0453                                            OUTPUT:  NO.U(V)JETS  RATE DERIVATION FEEDBACK
A0454                                                     CHANNEL 5
A0455                                                     SKIPU,SKIRV FOR LESS THAN 150MS FIRING

A0456                                            NOTES:  IN CASE OF FAILURE IN DESIRED ROTATION POLICY,"ALL" UNFAILED
A0457                                                    JETS OF THE DESIRED POLICY ARE SELECTED. SINCE THERE ARE ONLY
A0458                                                    TWO JETS, THIS MEANS THE OTHER ONE OR NONE. THE ALARM IS SENT
A0459                                                    IF NONE CAN BE FOUND.

A0460                                                    TIMES LESS THAN 14 MSEC ARE TAKEN TO CALL FOR A SINGLE-JET
A0461                                                    MINIMUM IMPULSE, WITH THE JET CHOSEN SEMI-RANDOMLY.

 0462   REF  30  LAST 1338    17,2727  3 0101 1  AFTERTJ  CA      FLAGWRD5        IF SNUFFBIT SET DURING A DPS BURN GO TO
 0463   REF   1               17,2730  7 4737 1           MASK    SNUFFBIT          XTRANS; THAT IS, INHIBIT CONTROL.
 0464                         17,2731  0 0006 1           EXTEND
 0465   REF   1               17,2732  1 2743 1           BZF     DOROTAT
 0466   REF  23  LAST 1443    17,2733  4 0106 1           CS      FLGWRD10
 0467   REF  15  LAST 1443    17,2734  7 4737 1           MASK    APSFLBIT
 0468                         17,2735  0 0006 1           EXTEND
 0469   REF   2  LAST 1453    17,2736  1 2743 1           BZF     DOROTAT
 0470   REF  64  LAST 1452    17,2737  3 0111 0           CA      DAPBOOLS
 0471   REF   5  LAST 1443    17,2740  7 4744 0           MASK    DRIFTBIT
 0472                         17,2741  0 0006 1           EXTEND
 0473   REF   3  LAST 1445    17,2742  1 3063 0           BZF     XTRANS

 0474   REF  98  LAST 1445    17,2743  3 4752 0  DOROTAT  CAF     TWO
 0475   REF 278  LAST 1447    17,2744  54 001 1           TS      L
 0476   REF  18  LAST 1452    17,2745  51'505 0           INDEX   AXISCTR
 0477   REF   9  LAST 1449    17,2746  11'525 0           CCS     TJU
 0478                         17,2747  1 2754 1           TCF     +5
 0479   REF   1               17,2750  1 2777 0           TCF     NOROTAT
 0480                         17,2751  1 2753 0           TCF     +2
 0481   REF   2  LAST 1453    17,2752  1 2777 0           TCF     NOROTAT
 0482                         17,2753  22 007 0           ZL
 0483   REF 170  LAST 1452    17,2754  6 4753 1           AD      ONE
 0484   REF   5  LAST 1437    17,2755  55'737 1           TS      ABSTJ

 0485   REF  19  LAST 1453    17,2756  3 1505 0           CA      AXISCTR
 0486   REF 279  LAST 1453    17,2757  6 0001 0           AD      L
 0487   REF   8  LAST 1443    17,2760  55'744 0           TS      ROTINDEX        0 1 2 3  = -U -V -+U +V

 0488   REF   6  LAST 1453    17,2761  3 1737 0           CA      ABSTJ
 0489   REF   1               17,2762  6 3110 1           AD      -150MS
 0490                         17,2763  0 0006 1           EXTEND
 0491   REF   1               17,2764  6 3010 0           BZMF    DOSKIP
 0492    REF   2  LAST 1443    17,2765  0 3173 1               TC      SELCTSUB

 0493    REF  20  LAST 1453    17,2766  51'505 0               INDEX   AXISCTR
 0494    REF   1               17,2767  3 3105 0               CA      INDEXES
 0495    REF 280  LAST 1453    17,2770  54 001 1               TS      L

 0496    REF   7  LAST 1444    17,2771  3 1741 1               CA      POLYTEMP
 0497                          17,2772  0 0004 0               INHINT
 0498    REF 281  LAST 1454    17,2773  50 001 0               INDEX   L
 0499    REF   4  LAST 1437    17,2774  0 5754 1               TC      WRITEP

 0500                          17,2775  0 0003 1               RELINT
 0501    REF   1               17,2776  1 3051 1               TCF     FEEDBACK

 0502    REF  21  LAST 1454    17,2777  51'505 0  NOROTAT      INDEX   AXISCTR
 0503    REF   2  LAST 1454    17,3000  3 3105 0               CA      INDEXES
 0504                          17,3001  0 0004 0               INHINT
 0505    REF 512  LAST 1452    17,3002  50 000 1               INDEX   A
 0506    REF   5  LAST 1454    17,3003  0 5753 0               TC      WRITEP -1

 0507                          17,3004  0 0003 1               RELINT
 0508    REF  22  LAST 1454    17,3005  11'505 1  LOOPER       CCS     AXISCTR
 0509    REF   4  LAST 1452    17,3006  0 1477 1               TC      RETJADR
 0510    REF   1               17,3007  1 3236 1               TCF     CLOSEOUT
 0511    REF   7  LAST 1453    17,3010  4 1737 1  DOSKIP       CS      ABSTJ
 0512    REF   2  LAST 1446    17,3011  6 3107 1               AD      +TJMINT6         14MS
 0513                          17,3012  0 0006 1               EXTEND
 0514    REF   1               17,3013  6 3032 0               BZMF    NOTMIN

 0515    REF   8  LAST 1454    17,3014  27'737 1               ADS     ABSTJ
 0516    REF  23  LAST 1454    17,3015  51'505 0               INDEX   AXISCTR
 0517    REF  10  LAST 1453    17,3016  11'525 0               CCS     TJU
 0518    REF   3  LAST 1454    17,3017  3 3107 1               CA      +TJMINT6
 0519                          17,3020  1 3022 0               TCF     +2
 0520    REF   4  LAST 1454    17,3021  4 3107 0               CS      +TJMINT6
 0521    REF  24  LAST 1454    17,3022  51'505 0               INDEX   AXISCTR
 0522    REF  11  LAST 1454    17,3023  55'525 0               TS      TJU

 0523    REF   4  LAST 1443    17,3024  11'500 1               CCS     SENSETYP         ENSURE MIN-IMPULSE NOT AGAINST TRANS
 0524    REF   2  LAST 1454    17,3025  1 3031 1               TCF     NOTMIN -1
 0525                          17,3026  0 0006 1               EXTEND
 0526    REF   4  LAST  381    17,3027  00 004 0               READ    LOSCALAR
 0527    REF 171  LAST 1453    17,3030  7 4753 0               MASK    ONE
 0528    REF  11  LAST 1452    17,3031  55'743 1               TS      NUMBERT

 0529    REF   3  LAST 1454    17,3032  0 3173 1  NOTMIN       TC      SELCTSUB

 0530    REF  25  LAST 1454    17,3033  51'505 0               INDEX   AXISCTR
 0531    REF   3  LAST 1454    17,3034  3 3105 0               CA      INDEXES
 0532                          17,3035  0 0004 0               INHINT
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L        Q,R-AXES RCS AUTOPILOT                                                          USER'S PAGE NO.  14       E6 S4

 0533   REF   5  LAST 1437    17,3036  55'471 0              TS      T6FURTHA +1
 0534   REF   8  LAST 1454    17,3037  3 1741 1              CA      POLYTEMP
 0535   REF   6  LAST 1455    17,3040  51'471 1              INDEX   T6FURTHA +1
 0536   REF   6  LAST 1454    17,3041  0 5754 1              TC      WRITEP

 0537   REF   9  LAST 1454    17,3042  3 1737 0              CA      ABSTJ
 0538   REF   7  LAST 1455    17,3043  55'470 1              TS      T6FURTHA
 0539   REF   2  LAST 1437    17,3044  0 3114 0              TC      JTLST                  IN QR BANK BY NOW

 0540                         17,3045  0 0003 1              RELINT

 0541   REF 300  LAST 1450    17,3046  3 4755 1              CA      ZERO
 0542   REF  26  LAST 1454    17,3047  51'505 0              INDEX   AXISCTR
 0543   REF   7  LAST 1452    17,3050  55'535 1              TS      SKIPU

 0544   REF  44  LAST 1389    17,3051  4 6245 0    FEEDBACK  CS      THREE
 0545   REF  12  LAST 1454    17,3052  6 1743 0              AD      NUMBERT
 0546                         17,3053  0 0006 1              EXTEND
 0547                         17,3054  6 3057 0              BZMF    +3

 0548   REF  99  LAST 1453    17,3055  3 4752 0              CA      TWO
 0549                         17,3056  1 3060 0              TCF     +2
 0550   REF 172  LAST 1454    17,3057  3 4753 1              CA      ONE
 0551   REF  27  LAST 1455    17,3060  51'505 0              INDEX   AXISCTR
 0552   REF   2  LAST  133    17,3061  55'522 1              TS      NO.UJETS
 0553   REF   3  LAST 1452    17,3062  1 3005 0              TCF     LOOPER

 0554   REF 301  LAST 1455    17,3063  3 4755 1    XTRANS    CA      ZERO
 0555   REF  12  LAST 1454    17,3064  55'525 0              TS      TJU
 0556   REF   3  LAST 1445    17,3065  55'526 0              TS      TJV
 0557   REF  42  LAST 1452    17,3066  3 4751 0              CA      FOUR
 0558                         17,3067  0 0004 0              INHINT
 0559   REF   8  LAST 1455    17,3070  57'535 0              XCH     SKIPU
 0560                         17,3071  0 0006 1              EXTEND
 0561                         17,3072  1 3074 0              BZF     +2
 0562   REF   1               17,3073  0 5757 1              TC      WRITEU -1
 0563   REF  43  LAST 1455    17,3074  3 4751 0              CA      FOUR
 0564   REF   2  LAST 1412    17,3075  57'536 0              XCH     SKIPV
 0565                         17,3076  0 0003 1              RELINT

 0566                         17,3077  0 0006 1              EXTEND
 0567   REF   2  LAST 1454    17,3100  1 3236 1              BZF     CLOSEOUT
 0568                         17,3101  0 0004 0              INHINT
 0569   REF   1               17,3102  0 5770 1              TC      WRITEV -1
 0570                         17,3103  0 0003 1              RELINT

 0571   REF   3  LAST 1455    17,3104  1 3236 1              TCF     CLOSEOUT
 0572                         17,3105   00004 0    INDEXES   DEC     4
 0573                         17,3106   00015 0              DEC     13
 0574                         17,3107   00026 0    +TJMINT6  DEC     22
 0575                       17,3110   77417 0  -150MS    DEC     -240
 0576                       17,3111   00600 1  BIT8,9    OCT     00600
 0577                       17,3112   00266 0  SCLNORM   OCT     266
 0578  REF   1              17,3113   02671 0  TJLAWADR GENADR TJLAW +3        RETURN ADDRESS FOR RCS ATTITUDE CONTROL

A0579                                          THE JET LIST:
A0580                                          THIS IS A WAITLIST FOR T6RUPTS.

A0581                                          CALLED BY:
A0582                                                    CA  TJ               TIME WHEN NEXT JETS WILL BE WRITTEN
A0583                                                    TS  T6FURTHA
A0584                                                    CA  INDEX            AXIS TO BE WIRTTEN AT IJ (FROM NOW)
A0585                                                    TS  T6FURTHA +1
A0586                                                    TC JTLST

A0587                                          EXAMPLE-  U-AXIS AUTOPILOT WILL WRITE ITS ROTATION CODE OF
A0588                                          JETS INTO CHANNEL 5.   IF IT DESIRES TO TURN OFF THIS POLICY WITHIN
A0589                                          150MS AND THEN FIRE NEXTU, A CALL TO JTLST IS MADE WITH T6FURTHA
A0590                                          CONTAINING THE TIME TO TURN OFF THE POLICY, T6FURTHA +1 THE INDEX
A0591                                          OF THE U-AXIS(4), AND NEXTU WILL CONTAIN THE "U-TRANS" POLICY OR ZERO.

A0592                                          THE LIST IS EXACTLY 3 LONG.(THIS LEADS TO SKIP LOGIC AND 150MS LIMIT)
A0593                                           THE INPUT IS THE LAST MEMBER OF THE LIST

A0594                                          RETURNS BY:
A0595                                                  +  TC  Q

A0596                                          DEFINITIONS:(OUTPUT)
A0597                                          TIME6                 TIME OF NEXT RUPT
A0598                                          T6NEXT                DELTA TIME TO NEXT RUPT
A0599                                          T6FURTHA              DELTA TIME FROM 2ND TO LAST RUPT
A0600                                          NXT6ADR               AXIS INDEX        0 - P-AXIS
A0601                                          T6NEXT +1             AXIS INDEX        4 - U-AXIS
A0602                                          T6FURTHA +1           AXIS INDEX       13 - V-AXIS
 0603  REF   8  LAST 1455   17,3114   4 1470 1  JTLST     CS      T6FURTHA
 0604  REF   5  LAST 1412   17,3115   6 0031 0            AD      TIME6
 0605                       17,3116   0 0006 1            EXTEND
 0606  REF   1              17,3117   6 3131 1            BZMF    MIDORLST          TIME6 - T IS IN A

 0607  REF   4  LAST 1412   17,3120   23'465 1            LXCH    NXT6ADR
 0608  REF   9  LAST 1412   17,3121   53'467 1            DXCH    T6NEXT
 0609  REF   9  LAST 1456   17,3122   53'471 0            DXCH    T6FURTHA
 0610  REF   6  LAST 1456   17,3123   54 031 1            TS      TIME6
 0611  REF   5  LAST 1456   17,3124   23'465 1            LXCH    NXT6ADR

 0612  REF  51  LAST 1446   17,3125   3 4735 1  TURNON    CA      BIT15
 0613                       17,3126   0 0006 1            EXTEND
 0614  REF  25  LAST 1434   17,3127   05 013 0            WOR     CHAN13
 0615  REF 409  LAST 1451   17,3130   0 0002 0            TC      Q
 0616    REF  10  LAST 1456     17,3131   6 1466 1  MIDORLST AD      T6NEXT
 0617                           17,3132   0 0006 1           EXTEND
 0618    REF   1                17,3133   6 3142 0           BZMF    LASTCHG           TIME6 + T6NEXT - T  IS IN A

 0619    REF  11  LAST 1457     17,3134  23'467 0            LXCH    T6NEXT +1
 0620    REF  10  LAST 1456     17,3135  53'471 0            DXCH    T6FURTHA
 0621                           17,3136   0 0006 1           EXTEND
 0622    REF   7  LAST 1456     17,3137  60 031 0            SU      TIME6
 0623    REF  12  LAST 1457     17,3140  53'467 1            DXCH    T6NEXT

 0624    REF 410  LAST 1456     17,3141   0 0002 0           TC      Q

 0625    REF 513  LAST 1454     17,3142   4 0000 0  LASTCHG  CS      A
 0626    REF  30  LAST 1395     17,3143   6 4754 0           AD      NEG0
 0627    REF  11  LAST 1457     17,3144  55'470 1            TS      T6FURTHA

 0628    REF 411  LAST 1457     17,3145   0 0002 0           TC      Q


R0629      ROT-TOUV IS ENTERED WITH THE Q-COMPONENT OF THE QUANTITY TO BE TRANSFORMED IN A AND THE R-COMPONENT IN L.
R0631    ROT-TOUV TRANSFORMS THE QUANTITY INTO THE NON-ORTHOGONAL U-V AXIS SYSTEM. IN THE U-V SYSTEM NO CROSS-COUPLING IS
R0633    PRODUCED FROM RCS JET FIRINGS. AT THE COMPLETION OF ROT-TOUV, THE U-COMPONENT OF THE TRANSFORMED QUANTITY IS IN
R0635    A AND THE V-COMPONENT IS IN L.

 0636    REF   1                17,3146  23'740 0  ROT-TOUV LXCH    ROTEMP2           (R) IS PUT INTO ROTEMP2
 0637                           17,3147   0 0006 1           EXTEND
 0638    REF   2  LAST  134     17,3150   7 1627 1           MP      COEFFQ
 0639    REF   2  LAST 1457     17,3151  57'740 0            XCH     ROTEMP2           (R) GOES TO A AND COEFFQ.(Q) TO ROTEMP2
 0640                           17,3152   0 0006 1           EXTEND
 0641    REF   1                17,3153   7 1630 1           MP      COEFFR
 0642    REF 282  LAST 1454     17,3154  54 001 1            TS      L                 COEFFR.(R) IS PUT INTO L
 0643    REF   3  LAST 1457     17,3155   6 1740 0           AD      ROTEMP2
 0644    REF   1                17,3156  55'737 1            TS      ROTEMP1           COEFFQ.(Q)+COEFFR.(R) IS PUT IN ROTEMP1
 0645                           17,3157   1 3163 1           TCF     +4
 0646    REF 514  LAST 1457     17,3160  50 000 1            INDEX   A                 COEFFQ.(Q) + COEFFR.(R) HAS OVERFLOWED
 0647    REF   8  LAST 1420     17,3161   4 4734 1           CS      LIMITS            AND IS LIMITED TO POSMAX OR NEGMAX
 0648    REF   2  LAST 1457     17,3162  55'737 1            TS      ROTEMP1
 0649    REF   4  LAST 1457     17,3163   4 1740 1           CS      ROTEMP2
 0650    REF 283  LAST 1457     17,3164   6 0001 0           AD      L                 -COEFFQ.(Q) + COEFFR.(R) IS NOW IN A
 0651                           17,3165  54 007 1            TS      7
 0652                           17,3166   1 3171 1           TCF     +3
 0653    REF 515  LAST 1457     17,3167  50 000 1            INDEX   A                 -COEFFQ.(Q) + COEFFR.(R) HAS OVERFLOWED
 0654    REF   9  LAST 1457     17,3170   4 4734 1           CS      LIMITS            AND IS LIMITED TO POSMAX OR NEGMAX
 0655    REF   3  LAST 1457     17,3171  23'737 0            LXCH    ROTEMP1           COEFFQ.(Q) + COEFFR.(R) IS PUT INTO L
 0656    REF 412  LAST 1457     17,3172   0 0002 0           TC      Q
 0657    REF   9  LAST 1453     17,3173  51'744 1   SELCTSUB INDEX   ROTINDEX
 0658    REF   1                17,3174   3 3225 1           CA      ALLJETS
 0659    REF  13  LAST 1455     17,3175  51'743 0            INDEX   NUMBERT
 0660    REF   1                17,3176   7 3231 0           MASK    TYPEPOLY
 0661    REF   9  LAST 1455     17,3177  55'741 0            TS      POLYTEMP
 0662    REF   7  LAST  212    17,3200   7 1262 1            MASK    CH5MASK
 0663    REF 516  LAST 1457    17,3201  10 000 0             CCS     A
 0664                          17,3202   1 3204 0            TCF     +2

 0665    REF 413  LAST 1457    17,3203   0 0002 0            TC      Q

 0666    REF  45  LAST 1455    17,3204   3 6245 1            CA      THREE
 0667    REF  14  LAST 1457    17,3205  55'743 1   FAILOOP   TS      NUMBERT
 0668    REF  10  LAST 1457    17,3206  51'744 1             INDEX   ROTINDEX
 0669    REF   2  LAST 1457    17,3207   3 3225 1            CA      ALLJETS
 0670    REF  15  LAST 1458    17,3210  51'743 0             INDEX   NUMBERT
 0671    REF   2  LAST 1457    17,3211   7 3231 0            MASK    TYPEPOLY
 0672    REF  10  LAST 1457    17,3212  55'741 0             TS      POLYTEMP
 0673    REF   8  LAST 1458    17,3213   7 1262 1            MASK    CH5MASK
 0674                          17,3214   0 0006 1            EXTEND
 0675    REF   1               17,3215   1 3203 1            BZF     FAILOOP -2
 0676    REF  16  LAST 1458    17,3216  11'743 1             CCS     NUMBERT
 0677    REF   2  LAST 1458    17,3217   1 3205 1            TCF     FAILOOP
 0678    REF  28  LAST 1455    17,3220  51'505 0             INDEX   AXISCTR
 0679    REF  13  LAST 1455    17,3221  55'525 0             TS      TJU
 0680    REF  51  LAST 1443    17,3222   0 5567 0            TC      ALARM
 0681                          17,3223    02004 1            OCT     02004        1028
 0682    REF   3  LAST 1453    17,3224   1 2777 0            TCF     NOROTAT
 0683                          17,3225    00110 1  ALLJETS   OCT     00110              -U         6 13
 0684                          17,3226    00022 1            OCT     00022              -V         2  9
 0685                          17,3227    00204 1            OCT     00204              +U         5 14

 0686                          17,3230    00041 1            OCT     00041              +V         1 10
 0687                          17,3231    00125 1  TYPEPOLY  OCT     00125              -X   1 5 9   13
 0688                          17,3232    00252 1            OCT     00252              +X 2 6 10 14
 0689                          17,3233    00146 1            OCT     00146              A    2 5 10 13
 0690                          17,3234    00231 1            OCT     00231              B    1 6 9 14
 0691                          17,3235    00377 1            OCT     00377              ALL 1 2 5 6 9 10 13 14

R0692     THE FOLLOWING SETS THE INTERRUPT FLIP-FLOP AS SOON AS POSSIBLE, WHICH PERMITS A RETURN TO THE INTERRUPTED JOB.

 0694    REF   1               17,3236   3 3240 1  CLOSEOUT  CA      ADRRUPT
 0695    REF   1               17,3237   0 7754 0            TC      MAKERUPT

 0696    REF   1               17,3240    03241 0  ADRRUPT   ADRES   ENDJASK

 0697    REF   5  LAST 1428    17,3241  53'754 1   ENDJASK   DXCH    DAPARUPT
 0698    REF  13  LAST 1428    17,3242  52 011 0             DXCH    ARUPT
 0699    REF   2  LAST 1428    17,3243  53'756 0             DXCH    DAPBQRPT
 0700    REF   4  LAST 1428    17,3244  56 017 1             XCH     BRUPT
 0701    REF 414  LAST 1458    17,3245  22 002 0             LXCH    Q
 0702    REF  10  LAST 1429    17,3246   3 4735 1            CAF     NEGMAX             NEGATIVE DAPZRUPT SIGNALS JASK IS OVER.
 0703    REF   4  LAST 1428    17,3247  53'760 0             DXCH    DAPZRUPT
 0704    REF   2  LAST 1428    17,3250  52 016 1             DXCH    ZRUPT
 0705    REF   1               17,3251   1 5272 1            TCF     NOQRSM
 0706                            7754                       BLOCK   3
 0707     REF    4  LAST 1302    6000                       SETLOC FFTAG6
 0708                            7754                       BANK

 0709     REF    1                                          COUNT* $$/DAP

 0710                            7754   0 0006 1  MAKERUPT  EXTEND
 0711     REF    2  LAST 1456    7755   07 754 0            EDRUPT MAKERUPT
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L        TJET LAW                                                                        USER'S PAGE NO.   1      E0 S4

R0001    PROGRAM DESCRIPTION

R0002    DESIGNED BY: R. D. GOSS AND P. S. WEISSMAN

R0003    CODED BY: P. S. WEISSMAN 28 FEBRUARY 1968

R0004         TJETLAW IS CALLED AS A SUBROUTINE WHEN THE LEM IS NOT DOCKED AND THE  AUTOPILOT IS IN THE AUTOMATIC OR
R0006    ATTITUDE-HOLD MODE TO CALCULATE THE JET-FIRING-TIME (TJET) REQUIRED FOR THE AXIS INDICATED BY AXISCTR:
R0008                        -1 INDICATES THE P-AXIS
R0009                        +0 INDICATES THE U-AXIS
R0010                        +1 INDICATES THE V-AXIS.
R0011    THE REGISTERS E AND EDOT CONTAIN THE APPROPRIATE ATTITUDE ERROR AND ERROR RATE AND SENSETYP SHOWS WHETHER
R0013    UNBALANCED COUPLES ARE PREFERRED.  TJETLAW ALSO USES VARIOUS FUNCTIONS OF ACCELERATION AND DEADBAND WHICH ARE
R0015    COMPUTED IN THE 1/ACCONT SECTION OF 1/ACCS AND ARE STORED IN SUCH AN ORDER THAT THEY CAN BE CONVENIENTLY
R0017    ACCESSED BY INDEXING.
R0018         THE SIGN OF THE REQUIRED ROTATION IS CARRIED THROUGH TJETLAW AS ROTSENSE AND IS FINALLY APPLIED TO TJET JUST
R0020    PREVIOUS TO ITS STORAGE IN THE LOCATION CORRESPONDING TO THE AXIS (TJP, TJU OR TJV).  THE NUMBER OF JETS THAT
R0022    TJETLAW ASSUMES WILL BE USED IS INDICATED BY THE SETTING OF NUMBERT FOR THE U- OR V-AXIS.  TWO JETS ARE ALWAYS
R0024    ASSUMED FOR THE P-AXIS  ALTHOUGH FOUR JETS WILL BE FIRED WHEN FIREFCT IS MORE NEGATIVE THAN -4.0 DEGREES
R0026    (FIREFCT IS THE DISTANCE TO A SWITCH CURVE IN THE PHASE PLANE) AND A LONG FIRING IS CALLED FOR.
R0028         IN ORDER TO AVOID SCALING DIFFICULTIES, SIMPLE ALGORITHMS TAGGED RUFLAW1, -2 AND -3 ARE RESORTED TO WHEN THE
R0030    ERROR AND/OR ERROR RATE ARE LARGE.

R0031    CALLING SEQUENCE:
R0032                  TC      TJETLAW         (MUST BE IN JASK)
R0033       OR
R0034                  INHINT                  (MUST BE IN JASK)
R0035                  TC      IBNKCALL
R0036                  CADR    TJETLAW
R0037                  RELINT

R0038    EXIT: RETURN TO Q.

R0039    INPUT:
R0040       FROM THE CALLER: E, EDOT, AXISCTR, SENSETYP, TJP,-U,-V.
R0041       FROM 1/ACCONT: 48 ERASABLES BEGINNING AT BLOCKTOP (INCLUDING FLAT, ZONE3LIM AND ACCSWU,-V).

R0043    OUTPUT:
R0044       TJP,-U OR -V, NUMBERT (DAPTEMP5), FIREFCT (DAPTEMP3).

R0045    DEBRIS:
R0046       A, L, Q, E, EDOT, DAPTEMP1-6, DAPTREG1-4.

R0047    ALARM: NONE


 0048                          17,3252                     BANK    17
 0049    REF    4  LAST 1442   17,2000                     SETLOC DAPS2
 0050                          17,3252                     BANK
 0051    REF   13  LAST 1438   E6,1524                     EBANK= TJP
 0052    REF    1                                                   COUNT* $$/DAPTJ

 0053                          17,3252  0 0006 1  TJETLAW  EXTEND                      SAVE Q FOR RETURN.
 0054    REF    1              17,3253  23'745 0           QXCH   HOLDQ

R0055    SET INDEXERS TO CORRESPOND TO THE AXIS AND TO THE SIGN OF EDOT

 0056    REF   29  LAST 1458   17,3254  51'505 0           INDEX  AXISCTR              AXISDIFF(-1)=NO OF LOCATIONS BET P AND U
 0057    REF    2  LAST 1449   17,3255  3 3722 0           CAF    AXISDIFF             AXISDIFF(0) = 0
 0058    REF    1              17,3256  55'746 1           TS     ADRSDIF1             AXISDIFF(+1)=NO OF LOCATIONS BET V AND U

 0059    REF    3  LAST 1452   17,3257  31'427 1           CAE    EDOT                 IF EDOT NEGATIVE, PICK UP SET OF VALUES
 0060                          17,3260  0 0006 1           EXTEND                        THAT ALLOW USE OF SAME CODING AS FOR
 0061    REF    1              17,3261  6 3266 0           BZMF   NEGEDOT                POSITIVE EDOT.
 0062    REF    2  LAST 1461   17,3262  31'746 0           CAE    ADRSDIF1             SET A SECOND INDEXER WHICH MAY BE
 0063    REF    1              17,3263  55'744 0           TS     ADRSDIF2               MODIFIED BY A DECISION FOR MAX JETS.
 0064    REF    1              17,3264  3 3724 0           CAF    SENSOR               FOR POSITIVE EDOT, ROTSENSE IS
 0065    REF    1              17,3265  1 3276 0           TCF    SETSENSE               INITIALIZED POSITIVE.

 0066    REF    9  LAST 1452   17,3266  4 1752 1  NEGEDOT  CS     E                    IN ORDER FOR NEG EDOT CASE TO USE CODING
 0067    REF   10  LAST 1461   17,3267  55'752 1           TS     E                      OF POS EDOT, MUST MODIFY AS FOLLOWS:
 0068    REF    4  LAST 1461   17,3270  4 1427 0           CS     EDOT                   1.COMPLEMENT E AND EDOT.
 0069    REF    5  LAST 1461   17,3271  55'427 0           TS     EDOT                   2.SET SENSE OF ROTATION TO NEGATIVE
 0070    REF   62  LAST 1444   17,3272  3 4753 1           CAF    BIT1                     (REVERSED LATER IF NECESSARY).
 0071    REF    3  LAST 1461   17,3273  27'746 1           ADS    ADRSDIF1               3.INCREMENT INDEXERS BY ONE SO THAT
 0072    REF    2  LAST 1461   17,3274  55'744 0           TS     ADRSDIF2                 THE PROPER PARAMETERS ARE ACCESSED.
 0073    REF    2  LAST 1461   17,3275  4 3724 1           CS     SENSOR
 0074    REF    1              17,3276  55'740 1  SETSENSE TS     ROTSENSE

R0075    TEST MAGNITUDE OF E (ATTITUDE ERROR, SINGLE-PRECISION, SCALED AT PI RADIANS):
R0077             IF GREATER THAN (OR EQUAL TO) PI/16 RADIANS, GO TO THE SIMPLIFIED TJET ROUTINE.
R0079             IF LESS THAN PI/16 RADIANS. RESCALE TO PI/4.

 0080    REF   11  LAST 1461   17,3277  31'752 0           CAE    E                    PICK UP ATTITUDE ERROR FOR THIS AXIS
 0081                          17,3300  0 0006 1           EXTEND
 0082    REF   49  LAST 1444   17,3301  7 4747 0           MP     BIT5                 SHIFT RIGHT TEN BITS; IF A-REGISTER IS
 0083    REF  517  LAST 1458   17,3302  10 000 0           CCS    A                      ZERO, RESCALE AND TEST EDOT.
 0084    REF    1              17,3303  1 3664 1           TCF    RUFLAW2
 0085    REF    1              17,3304  1 3306 0           TCF    SCALEE
 0086    REF    1              17,3305  1 3630 0           TCF    RUFLAW1
 0087    REF   56  LAST 1444   17,3306  3 4737 0  SCALEE   CAF    BIT13                ERROR IS IN L SCALED AT PI/16.  RESCALE
 0088                          17,3307  0 0006 1           EXTEND                        IT TO PI/4 AND SAVE IT.
 0089    REF  284  LAST 1457   17,3310  7 0001 1           MP     L
 0090    REF   12  LAST 1461   17,3311  55'752 1           TS     E

R0091    TEST MAGNITUDE OF EDOT (ERROR RATE SCALED AT PI/4 RADIANS/SECOND)
R0092             IF GREATER THAN (OR EQUAL TO) PI/32 RADIANS/SECOND, GO TO THE SIMPLIFIED TJET ROUTINE.
R0094             IF LESS THAN PI/32 RADIANS/SECOND, THEN RESCALE TO PI/32 RADIANS/SECOND.

 0096    REF    6  LAST 1461   17,3312  31'427 1           CAE    EDOT                 PICK UP SINGLE-PRECISION ERROR-RATE
 0097                        17,3313  0 0006 1           EXTEND                FOR THIS AXIS=
 0098  REF  57  LAST 1431    17,3314  7 4750 0           MP       BIT4         SHIFT RIGHT ELEVEN BITS, IF THE A-REG IS
 0099                        17,3315  0 0006 1           EXTEND                ZERO, THEN RESCALE AND USE FINELAW.
 0100  REF   1               17,3316  1 3320 1           BZF      SCALEDOT
 0101  REF   1               17,3317  1 3672 0           TCF      RUFLAW3
R0102  *** FINELAW STARTS HERE ***

 0103  REF   7  LAST 1461    17,3320  23'427 1  SCALEDOT LXCH     EDOT         EDOT IS SCALED AT PI/32 RADIANS/SECOND.

 0104  REF   8  LAST 1462    17,3321  31'427 1           CAE      EDOT         COMPUTE (EDOT)(EDOT)
 0105                        17,3322  0 0006 1           EXTEND
 0106                        17,3323  7 0000 0           SQUARE                PRODUCT SCALED AT PI(2)/2(10) RAD/SEC.
 0107                        17,3324  0 0006 1           EXTEND
 0108  REF  57  LAST 1461    17,3325  7 4737 1           MP       BIT13        SHIFT RIGHT TWO BITS TO RESCALE EDOTSQ
 0109  REF   1               17,3326  55'737 1           TS       EDOTSQ         TO PI(2)/2(8) RAD(2)/SEC(2).

 0110  REF  13  LAST 1461    17,3327  11'752 1  ERRTEST  CCS      E            DOES BIG ERROR (THREE DEG BEYOND THE
 0111  REF   1               17,3330  6 3725 1           AD       -3DEG          DEADBAND) REQUIRE MAXIMUM JETS?
 0112                        17,3331  1 3333 0           TCF      +2
 0113  REF   2  LAST 1462    17,3332  6 3725 1           AD       -3DEG
 0114                        17,3333  0 0006 1           EXTEND
 0115  REF   4  LAST 1461    17,3334  5 1746 0           INDEX    ADRSDIF1
 0116  REF   1               17,3335  61'601 1           SU       FIREDB
 0117                        17,3336  0 0006 1           EXTEND
 0118  REF   1               17,3337  6 3344 1           BZMF     SENSTEST     IF NOT: ARE UNBALANCED JETS PREFERRED|
 0119  REF 100  LAST 1455    17,3340  3 4752 0  MAXJETS  CAF      TWO          IF YES : INCREMENT ADDRESS LOCATOR AND
 0120  REF   3  LAST 1461    17,3341  27'744 0           ADS      ADRSDIF2       SET SWITCH FOR JET SELECT LOGIC TO 4.
 0121  REF  44  LAST 1455    17,3342  3 4751 0           CAF      FOUR           (ALWAYS DO THIS FOR P-AXIS)
 0122  REF   1               17,3343  1 3347 0           TCF      TJCALC
 0123  REF   5  LAST 1454    17,3344  11'500 1  SENSTEST CCS      SENSETYP     DOES TRANSLATION PREFER MIN JETS.
 0124  REF   2  LAST 1462    17,3345  1 3347 0           TCF      TJCALC       YES.  USE MIN-JET PARAMETERS.
 0125  REF   1               17,3346  1 3340 1           TCF      MAXJETS      NO.  GET MAX-JET PARAMETERS.
 0126  REF  17  LAST 1458    17,3347  55'743 1  TJCALC   TS       NUMBERT      SET TO +0,1,4 FOR (U,V-AXES) JET SELECT.

R0127  BEGINNING OF TJET CALCULATIONS:

 0128  REF   2  LAST 1462    17,3350  4 1737 1           CS       EDOTSQ       SCALED AT PI(2)/2(8).
 0129                        17,3351  0 0006 1           EXTEND
 0130  REF   4  LAST 1462    17,3352  5 1744 1           INDEX    ADRSDIF2
 0131  REF   8  LAST  134    17,3353  7 1567 0           MP       1/ANET1      .5/ACC SCALED AT 2(6)/PI SEC(2)/RADIAN.
 0132  REF   5  LAST 1462    17,3354  51'746 0           INDEX    ADRSDIF1
 0133  REF   2  LAST 1462    17,3355  6 1601 1           AD       FIREDB       DEADBAND SCALED AT PI/4 RADIAN.
 0134                        17,3356  0 0006 1           EXTEND
 0135  REF  14  LAST 1462    17,3357  51'752 0           SU       E            ATTITUDE ERROR SCALED AT PI/4 RADIAN.
 0136  REF   2  LAST 1438    17,3360  55'741 0           TS       FIREFCT      -E-.5(EDOTSQ)/ACC-DB AT PI/4 RADIAN.
 0137                        17,3361  0 0006 1           EXTEND
 0138  REF   1               17,3362  6 3542 1           BZMF     ZON1,2,3

 0139  REF   6  LAST 1462    17,3363  51'746 0  ZONE4,5  INDEX    ADRSDIF1
 0140  REF   1               17,3364  31'573 1           CAE      1/ACOAST     .5/ACC SCALED AT  2(6)/PI WHERE
 0141                        17,3365  0 0006 1             EXTEND                ACC = MAX(AMIN, ADS-).
 0142   REF   3  LAST 1462   17,3366  7 1737 1             MP       EDOTSQ     SCALED AT PI/2(8).
 0143   REF  15  LAST 1462   17,3367  6 1752 0             AD       E          SCALED AT PI/4
 0144   REF   7  LAST 1462   17,3370  51'746 0             INDEX    ADRSDIF1
 0145   REF   1              17,3371  6 1603 0             AD       COASTDB    SCALED AT PI/4  POS. FOR NEG. INTERCEPT.
 0146                        17,3372  0 0006 1             EXTEND              TEST E+.5(EDOTSQ)/ACC+DB AT PI/4 RADIAN.
 0147   REF   1              17,3373  6 3426 1             BZMF     ZONE5      IF FUNCTION NEGATIVE, FIND TJET.
A0148                                                                          IF FUNCTION POSITIVE, IN ZONE 4.

R0149     ZONE 4 IS THE COAST REGION.  HOWEVER, IF THE JETS ARE ON AND DRIVING TOWARD
R0151        A. THE AXIS WITHIN + OR - (DB + FLAT) FOR DRIFTING FLIGHT, OR
R0152        B. THE USUAL TARGET PARABOLA FOR POWERED FLIGHT
R0153   THEN THE THRUSTERS ARE KEPT ON.

 0154   REF  30  LAST 1461   17,3374  51'505 0  ZONE4      INDEX    AXISCTR    IS THE CURRENT VALUE IN TJET NON-ZERO
 0155   REF   1              17,3375  4 1525 0             CS       TJETU        WITH SENSE OPPOSITE TO EDOT,
 0156                        17,3376  0 0006 1             EXTEND                (I.E., ARE JETS ON AND FIRING TOWARD
 0157   REF   2  LAST 1461   17,3377  7 1740 1             MP       ROTSENSE     THE DESIRABLE STATE).
 0158                        17,3400  0 0006 1             EXTEND
 0159   REF   1              17,3401  6 3422 0             BZMF     COASTTJ    NO.  COAST.

 0160   REF   1              17,3402  11'555 1  JETSON     CCS      FLAT       YES. IS THIS DRIFTING OR POWERED FLIGHT|
 0161   REF   1              17,3403  1 3414 1             TCF      DRIFT/ON   DRIFTING. GO MAKE FURTHER TEST.

 0162   REF   3  LAST 1462   17,3404  4 1741 0             CS       FIREFCT    POWERED (OR ULLAGE). CAN TARGET PARABOLA
 0163   REF   8  LAST 1463   17,3405  51'746 0             INDEX    ADRSDIF1     BE REACHED FROM THIS POINT IN THE
 0164   REF   1              17,3406  6 1605 0             AD       AXISDIST     PHASE PLANE|
 0165                        17,3407  0 0006 1             EXTEND
 0166   REF   2  LAST 1463   17,3410  6 3422 0             BZMF     COASTTJ    NO. SET TJET = 0.
 0167   REF   1              17,3411  0 3526 0             TC       Z123COMP   YES. CALCULATE TJET AS THOUGH IN ZONE 1
 0168   REF   4  LAST 1463   17,3412  31'741 1             CAE      FIREFCT      AFTER COMPUTING THE REQUIRED
 0169   REF   1              17,3413  1 3562 1             TCF      ZONE1        PARAMETERS.

 0170   REF   9  LAST 1463   17,3414  51'746 0  DRIFT/ON   INDEX    ADRSDIF1   CAN TARGET STRIP OF AXIS BE REACHED FROM
 0171   REF   3  LAST 1462   17,3415  4 1601 0             CS       FIREDB       THIS POINT IN THE PHASE PLANE|
 0172                        17,3416  6 0000 1             DOUBLE
 0173   REF   5  LAST 1463   17,3417  6 1741 1             AD       FIREFCT
 0174                        17,3420  0 0006 1             EXTEND
 0175                        17,3421  6 3424 0             BZMF     +3
 0176   REF 302  LAST 1463   17,3422  3 4755 1  COASTTJ    CAF      ZERO       NO.  SET TJET = 0.
 0177   REF   1              17,3423  1 3466 1             TCF      RETURNTJ

 0178   REF   2  LAST 1463   17,3424  0 3526 0             TC       Z123COMP   YES. CALCULATE TJET AS THOUGH IN ZONE 2
 0179   REF   1              17,3425  1 3547 0             TCF      ZONE2,3      OR 3 AFTER COMPUTING REQUIRED VALUES.

 0180   REF 285  LAST 1461   17,3426  54 001 1  ZONE5      TS       L          TEMPORARILY STORE FUNCTION IN L.
 0181   REF   3  LAST 1463   17,3427  11'740 1             CCS      ROTSENSE   MODIFY ADRSDIF2 FOR ACCESSING 1/ANET2
 0182                        17,3430  1 3434 0             TCF      +4         AND ACCFCTZ5, WHICH MUST BE PICKED UP
 0183   REF  21  LAST 1404   17,3431  0 5705 0             TC       CCSHOLE    FROM THE NEXT LOWER REGISTER IF THE
 0184   REF 101  LAST 1462   17,3432  4 4752 1             CS       TWO        (ACTUAL) ERROR RATE IS NEGATIVE.
 0185   REF   5  LAST 1462   17,3433  27'744 0            ADS     ADRSDIF2

 0186   REF 286  LAST 1463   17,3434  30 001 0   +4       CAE     L
 0187                        17,3435  0 0006 1            EXTEND
 0188   REF   6  LAST 1464   17,3436  5 1744 1            INDEX   ADRSDIF2            TTOAXIS AND HH ARE THE PARAMETERS UPON
 0189   REF   1              17,3437  7 1576 0            MP      ACCFCTZ5              WHICH THE APPROXIMATIONS TO TJET ARE
 0190                        17,3440  20 001 1            DDOUBL                        BASED.
 0191                        17,3441  20 001 1            DDOUBL
 0192   REF   1              17,3442  53'750 0            DXCH    HH                  DOUBLE PRECISION H SCALED AT 8 SEC(2).
 0193   REF   7  LAST 1464   17,3443  51'744 1            INDEX   ADRSDIF2
 0194   REF   2  LAST 1449   17,3444  31'570 1            CAE     1/ANET2             SCALED AT 2(7)/PI SEC(2)/RAD.
 0195                        17,3445  0 0006 1            EXTEND
 0196   REF   9  LAST 1462   17,3446  7 1427 0            MP      EDOT                SCALED AT PI/2(5)
 0197   REF   1              17,3447  55'742 0            TS      TTOAXIS             SCALED AT 4 SEC.

R0198   TEST WHETHER TJET GREATER THAN 50 MSEC.
 0199                        17,3450  0 0006 1            EXTEND
 0200   REF   1              17,3451  7 3734 0            MP      -.05AT2             H - .05 TTOAXIS - .00125 G.T. ZERO
 0201   REF   2  LAST 1464   17,3452  6 1747 1            AD      HH                    (SCALED AT 8 SEC(2) ).
 0202   REF   8  LAST 1308   17,3453  6 7746 0            AD      NEG2
 0203                        17,3454  0 0006 1            EXTEND
 0204   REF   1              17,3455  6 3503 1            BZMF    FORMULA1

R0205   TEST WHETHER TJET GREATER THAN 150 MSEC.
 0206   REF   2  LAST 1464   17,3456  31'742 1            CAE     TTOAXIS
 0207                        17,3457  0 0006 1            EXTEND
 0208   REF   1              17,3460  7 3735 1            MP      -.15AT2             H - .15 TTOAXIS - .01125 G.T. ZERO
 0209   REF   3  LAST 1464   17,3461  6 1747 1            AD      HH                    (SCALED AT 8 SEC(2) )
 0210   REF   1              17,3462  6 3726 1            AD      -.0112A8
 0211                        17,3463  0 0006 1            EXTEND
 0212   REF   1              17,3464  6 3513 0            BZMF    FORMULA2

R0213   IF TJET GREATER THAN 150 MSEC, ASSIGN IT VALUE OF 250 MSEC, SINCE THIS
R0214     IS ENOUGH TO ASSURE NO SKIP NEXT CSP (100 MSEC).

 0215   REF  31  LAST 1336   17,3465  3 4741 1  FULLTIME CAF     BIT11               250 MSEC SCALED AT 4 SEC.

R0216   RETURN TO CALLING PROGRAM WITH JET TIME SCALED AS TIME6 AND SIGNED.

 0217                        17,3466  0 0006 1  RETURNTJ EXTEND                      ALL BRANCHES TERMINATE HERE WITH TJET
 0218   REF   4  LAST 1463   17,3467  7 1740 1            MP      ROTSENSE              (SCALED AT 4 SEC) IN THE ACCUMULATOR.
 0219   REF  31  LAST 1463   17,3470  51'505 0            INDEX   AXISCTR             ROTSENSE APPLIES SIGN AND CHANGES SCALE.
 0220   REF   2  LAST 1463   17,3471  55'525 0            TS      TJETU
 0221                        17,3472  0 0006 1            EXTEND
 0222   REF  32  LAST 1464   17,3473  5 1505 0            INDEX   AXISCTR
 0223   REF   2  LAST  134   17,3474  7 1547 1            MP      ACCSWU              SET SWITCH FOR JET SELECT IF ROTATION IS
 0224   REF 287  LAST 1464   17,3475  30 001 0            CAE     L
 0225                        17,3476  0 0006 1            EXTEND                        IN A SENSE FOR WHICH 1/ACCS HAS FORCED
 0226                        17,3477  6 3502 0            BZMF    +3                    A MAX-JET CALCULATION.
 0227   REF  45  LAST 1462   17,3500  3 4751 0            CAF     FOUR
 0228   REF  18  LAST 1462   17,3501  55'743 1            TS       NUMBERT
 0229   REF   2  LAST 1461   17,3502  0 1745 0            TC       HOLDQ              RETURN VIA SAVED Q.

R0230      TJET = H/(.025 + TTOAXIS)   FOR TJET LESS THAN 50 MSEC.

 0231   REF   1              17,3503  4 3733 1  FORMULA1 CS       -.025AT4           .025 SEC SCALED AT 4.
 0232   REF   3  LAST 1464   17,3504  6 1742 1            AD       TTOAXIS            SCALED AT 4 SECONDS.
 0233   REF   4  LAST 1464   17,3505  53'750 0            DXCH     HH                 STORE DENOMINATOR IN FIRST WORD OF H,
 0234                        17,3506  0 0006 1            EXTEND                        WHICH NEED NOT BE PRESERVED. PICK UP
 0235   REF   5  LAST 1465   17,3507  11'747 0            DV       HH                   DP H AND DIVIDE BY DENOMINATOR.
 0236                        17,3510  0 0006 1            EXTEND
 0237   REF  93  LAST 1423   17,3511  7 4736 0            MP       BIT14              RESCALE TJET FROM 2 TO USUAL 4 SEC.
 0238   REF   1              17,3512  1 3623 1            TCF      CHKMINTJ           CHECK THAT TJET IS NOT LESS THAN MINIMUM

R0239      TJET = (H + .00375)/(0.1 + TTOAXIS)   FOR TJET GREATER THAN 50 MSEC.

 0240                        17,3513  0 0006 1  FORMULA2 EXTEND
 0241   REF   1              17,3514  3 3737 1            DCA      .00375A8           .00375 SEC(2) SCALED AT 8.
 0242   REF   6  LAST 1465   17,3515  21'750 0            DAS      HH                 STORE NUMERATORIN DP H, WHICH NEED NOT
A0243                                                                                   BE PRESERVED.
 0244   REF   4  LAST 1465   17,3516  31'742 1            CAE      TTOAXIS            SCALED AT 4 SEC.
 0245   REF   1              17,3517  6 3727 0            AD       .1AT4              0.1 SEC SCALED AT 4.
 0246   REF   7  LAST 1465   17,3520  53'750 0            DXCH     HH                 STORE DENOMINATOR IN FIRST WORD OF H,
 0247                        17,3521  0 0006 1            EXTEND                        WHICH NEED NOT BE PRESERVED.  PICK UP
 0248   REF   8  LAST 1465   17,3522  11'747 0            DV       HH                   DP NUMERATOR AND DIVIDE BY DENOMINATOR
 0249                        17,3523  0 0006 1            EXTEND
 0250   REF  84  LAST 1465   17,3524  7 4736 0            MP       BIT14              RESCALE TJET FROM 2 TO USUAL 4 SEC.
 0251   REF   2  LAST 1463   17,3525  1 3466 1            TCF      RETURNTJ           END SUBROUTINE.

R0252   SUBROUTINIZED COMPUTATIONS REQUIRED FOR ALL ENTRIES INTO CODING FOR ZONES 1, 2, AND 3.

R0254   REACHED BY TC FROM 3 POINTS IN TJETLAW.

 0255   REF   5  LAST 1464   17,3526  4 1740 1  Z123COMP CS       ROTSENSE           USED IN RETURNTJ SECTION TO RESCALE TJET
 0256   REF   6  LAST 1465   17,3527  55'740 1            TS       ROTSENSE             AS TIME6 AND GIVE IT PROPER SIGN.
 0257   REF  10  LAST 1464   17,3530  31'427 1            CAE      EDOT               SCALED AT PI/2(5) RAD/SEC.
 0258                        17,3531  0 0006 1            EXTEND
 0259   REF   8  LAST 1464   17,3532  5 1744 1            INDEX    ADRSDIF2
 0260   REF   9  LAST 1462   17,3533  7 1567 0            MP       1/ANET1            SCALED AT 2(7)/PI SEC(2)/RAD.
 0261   REF   5  LAST 1465   17,3534  55'742 0            TS       TTOAXIS            STORE TIME-TO-AXIS SCALED AT 4 SECONDS.
 0262   REF   1              17,3535  6 3740 1            AD       -TJMAX
 0263                        17,3536  0 0006 1            EXTEND                      IS TIME TO AXIS LESS THAN 150 MSEC.
 0264                        17,3537  6 3541 1            BZMF     +2
 0265   REF   1              17,3540  1 3465 1            TCF      FULLTIME           NO.  FIRE JETS, DO NOT CALCULATE TJET.
 0266                        17,3541  0 0002 0            RETURN                      YES.  GO ON TO FIND TJET

 0267   REF   3  LAST 1463   17,3542  0 3526 0  ZON1,2,3 TC       Z123COMP           SUBROUTINIZED PREPARATION FOR ZONE1,2,3.

R0268   IF THE (NEG) DISTANCE BEYOND PARABOLA IS LESS THAN FLAT, USE SPECIAL
R0269   LOGIC TO ACQUIRE MINIMUM IMPULSE LIMIT CYCLE.  DURING POWERED FLIGHT
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R0270    OR ULLAGE, FLAT = 0

 0271    REF    6  LAST 1463    17,3543  31'741 1              CAE     FIREFCT        SCALED AT PI/4 RAD.
 0272    REF    2  LAST 1463    17,3544  6 1555 0              AD      FLAT
 0273                           17,3545  0 0006 1              EXTEND
 0274    REF    2  LAST 1463    17,3546  6 3562 0              BZMF    ZONE1          NOT-IN SPECIAL ZONES.

R0275    FIRE TO AXIS OR, IF CLOSE, FIRE MINIMUM IMPULSE.  IF ON AXIS, COAST.

 0276    REF    1               17,3547  4 1556 1   ZONE2,3    CS      ZONE3LIM       HEIGHT OF MIN-IMPULSE ZONE SET BY 1/ACCS
 0277    REF    6  LAST 1465    17,3550  6 1742 1              AD      TTOAXIS          35 MSEC IN DRIFTING FLIGHT
 0278                           17,3551  0 0006 1              EXTEND                   ZERO WHEN TRYING TO ENTER GTS CONTROL.
 0279    REF    1               17,3552  6 3555 1              BZMF    ZONE3
 0280    REF    7  LAST 1466    17,3553  31'742 1   ZONE2      CAE     TTOAXIS        FIRE TO AXIS.
 0281    REF    3  LAST 1465    17,3554  1 3466 1              TCF     RETURNTJ
 0282    REF   11  LAST 1465    17,3555  11'427 0   ZONE3      CCS     EDOT           CHECK IF EDOT IS ZERO.
 0283    REF   64  LAST 1465    17,3556  3 4746 0              CAF     BIT6           FIRE A ONE-JET MINIMUM IMPULSE.
 0284    REF    4  LAST 1466    17,3557  1 3466 1              TCF     RETURNTJ       TJET = +0.
 0285    REF   22  LAST 1463    17,3560  0 5705 0              TC      CCSHOLE        CANNOT BE BECAUSE NEG EDOT COMPLEMENTED.
 0286    REF    5  LAST 1466    17,3561  1 3466 1              TCF     RETURNTJ       TJET = +0.

 0287                           17,3562  0 0006 1   ZONE1      EXTEND
 0288    REF   10  LAST 1463    17,3563  5 1746 0              INDEX   ADRSDIF1
 0289    REF    2  LAST 1463    17,3564  61'605 0              SU      AXISDIST       SCALED AT PI/4 RAD.
 0290                           17,3565  0 0006 1              EXTEND
 0291    REF    9  LAST 1465    17,3566  5 1744 1              INDEX   ADRSDIF2
 0292    REF    1               17,3567  7 1575 0              MP      ACCFCTZ1       SCALED AT 2(7)/PI SEC(2)/RAD.
 0293                           17,3570  20 001 1              DDOUBL
 0294                           17,3571  20 001 1              DDOUBL
 0295    REF    9  LAST 1465    17,3572  53'750 0              DXCH    HH             DOUBLE PRECISION H SCALED AT 8 SEC(2).

R0296    TEST WHETHER TOTAL TIME REQUIRED GREATER THAN 150 MSEC:
R0297                          2                                  2
R0298      IS .5(.150 - TTOAXIS)  - H   NEGATIVE (SCALED AT 8 SECONDS )

 0299    REF    8  LAST 1466    17,3573  31'742 1              CAF     TTOAXIS        TTOAXIS SCALED AT 4 SECONDS.
 0300    REF    2  LAST 1465    17,3574  6 3740 1              AD      -TJMAX         -.150 SECOND SCALED AT 4.
 0301                           17,3575  0 0006 1              EXTEND
 0302                           17,3576  7 0000 0              SQUARE
 0303                           17,3577  0 0006 1              EXTEND
 0304    REF   10  LAST 1466    17,3600  61'747 1              SU      HH             HIGH WORD OF H SCALED AT 8 SEC(2).
 0305                           17,3601  0 0006 1              EXTEND
 0306    REF    2  LAST 1465    17,3602  6 3465 0              BZMF    FULLTIME       YES. NEED NOT CALCULATE TJET.

R0307    TEST WHETHER TIME BEYOND AXIS GREATER THAN 50 MSEC TO DETERMINE WHICH APPROXIMATION TO USE.

 0309    REF   11  LAST 1466    17,3603  31'747 1              CAE     HH
 0310    REF    9  LAST 1464    17,3604  6 7746 0              AD      NEG2
 0311                           17,3605  0 0006 1              EXTEND
 0312    REF    1               17,3606  6 3616 0              BZMF    FORMULA3
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R0313       TJET = H/0.1 + TTOAXIS + .0375   FOR APPROXIMATION OVER MORE THAN 50 MSEC.

 0315    REF   1              17,3607  3 3730 0            CAF      .1AT2            STORE .1 SEC SCALED AT 2 FOR DIVISION.
 0316    REF  12  LAST 1466   17,3610  53'750 0            DXCH     HH               DP H SCALED AT 8 SEC(2) NEED NOT BE
 0317                         17,3611  0 0006 1            EXTEND                      PRESERVED.
 0318    REF  13  LAST 1467   17,3612  11'747 0            DV       HH               QUOTIENT SCALED AT 4 SECONDS.
 0319    REF   9  LAST 1466   17,3613  6 1742 1            AD       TTOAXIS          SCALED AT 4 SEC.
 0320    REF   1              17,3614  6 3731 1            AD       .0375AT4         .0375 SEC SCALED AT 4.
 0321    REF   6  LAST 1466   17,3615  1 3466 1            TCF      RETURNTJ         END COMPUTATION.

R0322       TJET = H/.025 + TTOAXIS   FOR APPROXIMATION OVER LESS THAN 50 MSEC.

 0323    REF   1              17,3616  4 3732 0  FORMULA3 CS       -.025AT2         STORE +.025 SEC SCALED AT 2 FOR DIVISION
 0324    REF  14  LAST 1467   17,3617  53'750 0            DXCH     HH               PICK UP DP H AT 8, WHICH NEED NOT BE
 0325                         17,3620  0 0006 1            EXTEND                      PRESERVED.
 0326    REF  15  LAST 1467   17,3621  11'747 0            DV       HH               QUOTIENT SCALED AT 4 SECONDS.
 0327    REF  10  LAST 1467   17,3622  6 1742 1            AD       TTOAXIS          SCALED AT 4 SEC.

R0328    IF COMPUTED JET TIME IS LESS THAN TJMIN, TJET IS SET TO ZERO.
R0329    MINIMUM IMPULSES REQUIRED IN ZONE 3 ARE NOT SUBJECT TO THIS CONSTRAINT, NATURALLY.
 0331    REF   1              17,3623  6 3742 0  CHKMINTJ AD       -TJMIN           IS COMPUTED TIME LESS THAN THE MINIMUM.
 0332                         17,3624  0 0006 1            EXTEND
 0333    REF   3  LAST 1463   17,3625  5 3422 0            BZMF     COASTTJ          YES, SET TIME TO ZERO.
 0334    REF   1              17,3626  6 3741 0            AD       TJMIN            NO, RESTORE COMPUTED TIME.
 0335    REF   7  LAST 1467   17,3627  1 3466 1            TCF      RETURNTJ         END COMPUTATION.
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P0336    *** ROUGHLAW ***

R0337      BEFORE ENTRY TO RUFLAW:
R0338        1. INDEXERS ADRSDIF1 AND ADRSDIF2 ARE SET ON BASIS OF AXIS, AND SIGN OF EDOT.
R0340        2. IF EDOT WAS NEGATIVE. E AND EDOT ARE ROTATED INTO UPPER HALF-PLANE AND ROTSENSE IS MADE NEGATIVE.
R0342        3. E IS SCALED AT PI RADIANS AND EDOT AT PI/4 RAD/SEC.
R0343           (EXCEPT THE RUFLAW3 ENTRY WHEN E IS AT PI/4)

R0344      RUFLAW1: ERROR MORE NEGATIVE THAN PI/16 RAD.  FIRE TO A RATE OF 6.5 DEG/SEC (IF JET TIME EXCEEDS 20 MSEC.).
R0346      RUFLAW2: ERROR MORE POSITIVE THAN PI/16 RAD.  FIRE TO AN OPPOSING RATE OF 6.5 DEG/SEC.
R0348      RUFLAW3: ERROR RATE GREATER THAN PI/32 RAD/SEC AND ERROR WITHIN BOUNDS.  COAST IF BELOW FIREFCT, FIRE IF ABOVE

  0350    REF   1                17,3630   4 3743 0   RUFLAW1   CS       RUFRATE            DECREMENT EDOT BY .1444 RAD/SEC AT PI/4
  0351    REF  12  LAST 1466     17,3631  27'427 0              ADS      EDOT                 WHICH IS THE TARGET RATE
  0352                           17,3632   0 0006 1             EXTEND
  0353    REF   1                17,3633   6 3654 0             BZMF     SMALRATE           BRANCH IF RATE LESS THAN TARGET.
  0354    REF   1                17,3634   0 3712 0             TC       RUFSETUP           REVERSE ROTSENSE AND INDICATE MAX JETS.
  0355    REF  13  LAST 1468     17,3635  31'427 1              CAE      EDOT               PICK UP DESIRED RATE CHANGE.

  0356                           17,3636   0 0006 1   RUFLAW12  EXTEND                      COMPUTE TJET
  0357    REF  10  LAST 1466     17,3637   5 1744 1             INDEX    ADRSDIF2             =(DESIRED RATE CHANGE)/(2-JET ACCEL.)
  0358    REF  10  LAST 1465     17,3640   7 1571 1             MP       1/ANET1 +2
  0359    REF   3  LAST [illegible]     17,3641   6 7741 1             AD       -1/8               IF TJET, SCALED AT 32 SEC, EXCEEDS
  0360                           17,3642   0 0006 1             EXTEND                        4 SECONDS, SET TJET TO TJMAX.
  0361                           17,3643   6 3645 0             BZMF     +2
  0362    REF   3  LAST 1466     17,3644   1 3465 1             TCF      FULLTIME
  03621                          17,3645   0 0006 1             EXTEND
  03622   REF   4  LAST 1468     17,3646   1 3465 1             BZF      FULLTIME
  0363    REF  41  LAST 1437     17,3647   6 4740 0             AD       BIT12              RESTORE COMPUTED TJET TO ACCUMULATOR.
  0364    REF 518  LAST 1441     17,3650  20 0001 1             DAS      A
  0365    REF 519  LAST 1468     17,3651  20 0001 1             DAS      A
  0366    REF 520  LAST 1468     17,3652  20 0001 1             DAS      A                  RESCALED TJET AT 4 SECONDS.
  0367    REF   2  LAST 1465     17,3653   1 3623 1             TCF      CHKMINTJ           RETURN AS FROM FINELAW.

  0368    REF   2  LAST 1468     17,3654   0 3714 0   SMALRATE  TC       RUFSETUP +2        SET NUMBERT AND FIREFCT FOR MAXIMUM JETS
  0369    REF   7  LAST 1465     17,3655  11'740 1              CCS      ROTSENSE
  0370    REF 173  LAST 1455     17,3656   3 4753 1             CAF      ONE                MODIFY INDEXER TO POINT TO 1/ANET
  0371                           17,3657   1 3661 1             TCF      +2                   CORRESPONDING TO THE PROPER SENSE.
  0372    REF  13  LAST 1286     17,3660   3 7747 1             CAF      NEGONE
  0373    REF  11  LAST 1468     17,3661  27'744 0              ADS      ADRSDIF2

  0374    REF  14  LAST 1468     17,3662   4 1427 0             CS       EDOT               (.144 AT PI/4 - EDOT)=DESIRED RATE CHNG.
  0375    REF   1                17,3663   1 3636 0             TCF      RUFLAW12

  0376    REF   3  LAST 1468     17,3664   0 3712 0   RUFLAW2   TC       RUFSETUP           REVERSE ROTSENSE AND INDICATE MAX JETS.
  0377    REF   2  LAST 1468     17,3665   3 3743 1             CAF      RUFRATE
  0378    REF  15  LAST 1468     17,3666   6 1427 1             AD       EDOT               (.144 AT PI/4 + EDOT)=DESIRED RATE CHNG.
  0379    REF 521  LAST 1468     17,3667  54 0000 0             TS       A                  IF OVERFLOW SKIP, FIRE FOR FULL TIME.
  0380    REF   2  LAST 1468     17,3670   1 3636 0             TCF      RUFLAW12             OTHERWISE, COMPUTE JET TIME.
  0381    REF   5  LAST 1468     17,3671   1 3465 1             TCF      FULLTIME
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 0382   REF   4  LAST 1468   17,3672   0 3712 0  RUFLAW3  TC      RUFSETUP          EXECUTE COMMON RUFLAW SUBROUTINE.
 0383   REF  11  LAST 14     17,3673  51'746 0            INDEX   ADRSDIF1
 0384   REF   4  LAST 1463   17,3674   4 1601 0           CS      FIREDB            CALCULATE DISTANCE FROM SWITCH CURVE
 0385   REF  16  LAST 1463   17,3675   6 1752 0           AD      E                      1/ANET1*EDOT*EDOT +E - FIREDB = 0
 0386                        17,3676   0 0006 1           EXTEND                                 SCALED AT 4 PI RADIANS
 0387   REF  32  LAST 1464   17,3677   7 4741 0           MP      BIT11
 0388   REF  16  LAST 1468   17,3700  57'427 1            XCH     EDOT
 0389                        17,3701   0 0006 1           EXTEND
 0390                        17,3702   7 0000 0           SQUARE
 0391                        17,3703   0 0006 1           EXTEND
 0392   REF  12  LAST 1469   17,3704   5 1746 0           INDEX   ADRSDIF1
 0393   REF  11  LAST 1468   17,3705   7 1571 1           MP      1/ANET1 +2
 0394   REF  17  LAST 1469   17,3706   6 1427 1           AD      EDOT
 0395                        17,3707   0 0006 1           EXTEND
 0396   REF   4  LAST 1467   17,3710   6 3422 0           BZMF    COASTTJ             COAST IF BELOW IT.
 0397   REF   6  LAST 1468   17,3711   1 3465 1           TCF     FULLTIME            FIRE FOR FULL PERIOD IF ABOVE IT.

R0398   SUBROUTINE USED IN ALL ENTRIES TO ROUGHLAW.

 0399   REF   8  LAST 1468   17,3712   4 1740 1  RUFSETUP CS      ROTSENSE          REVERSE ROTSENSE WHEN ENTER HERE.
 0400   REF   9  LAST 1469   17,3713  55'740 1            TS      ROTSENSE
 0401   REF  46  LAST 1464   17,3714   3 4751 0    +2     CAF     FOUR              REQUIRE MAXIMUM (2) JETS IN U,V-AXES.
 0402   REF  19  LAST 1465   17,3715  55'743 1            TS      NUMBERT
 0403   REF  11  LAST 1458   17,3716   3 4735 1           CAF     NEGMAX            SUGGEST MAXIMUM (4) JETS IN P-AXIS.
 0404   REF   7  LAST 1466   17,3717  55'741 0            TS      FIREFCT
 0405   REF 415  LAST 1458   17,3720   0 0002 0           TC      Q

R0406   CONSTANTS FOR TJETLAW

 0407                        17,3721    77757 1           DEC     -16               AXISDIFF(INDEX) = NUMBER OF REGISTERS
 0408                        17,3722    00000 1  AXISDIFF DEC     +0                  BETWEEN STORED 1/ACCS PARAMETERS FOR
 0409                        17,3723    00020 0           DEC     16                  THE INDEXED AXIS AND THE U-AXIS.
 0410                        17,3724    14400 0  SENSOR   OCT     14400             RATIO OF TJET SCALING WITHIN TJETLAW
A0411                                                                                 (4 SEC) TO SCALING FOR T6 (10.24 SEC).
 0412                        17,3725    75673 1  -3DEG    DEC     -.06667           -3.0 DEGREES SCALED AT 45.
 0413                        17,3726    77750 0  -.0112A8 DEC     -.00141           -.01125 SEC(2) SCALED AT 8.
 0414                        17,3727    00632 0  .1AT4    DEC     .025              0.1 SECOND SCALED AT 4.
 0415                        17,3730    01463 1  .1AT2    DEC     .05               0.1 SEC SCALED AT 2.
 0416                        17,3731    00232 1  .0375AT4 DEC     .00938            .0375 SEC SCALED AT 4.
 0417                        17,3732    77462 1  -.025AT2 DEC     -.0125            -.025 SEC SCALED AT 2.
 0418                        17,3733    77631 0  -.025AT4 DEC     -.00625
 0419                        17,3734    77145 1  -.05AT2  DEC     -.025
 0420                        17,3735    75462 0  -.15AT2  DEC     -.075
 0421                        17,3736    00007 0  .00375A8 2DEC    .00375 B-3
 0421                        17,3737    25605 0
 0422                        17,3740    76631 1  -TJMAX   DEC     -.0375            LARGEST CALCULATED TIME. .150 SEC AT 4.
 0423                        17,3741    00122 0  TJMIN    DEC     .005              SMALLEST ALLOWABLE TIME.  .020 SEC AT 4.
 0424                        17,3742    77655 1  -TJMIN   DEC     -.005
 0425                        17,3743    04476 0  RUFRATE  DEC     .1444             CORRESPONDS TO TARGET RATE OF 6.5 DEG/S.
 0001   REF    3  LAST 1455   E6,1522                           EBANK= NO.UJETS
 0002                         16,3641                           BANK   15
 0003   REF    3  LAST 1421   16,2000                           SETLOC DAPS1
 0004                         16,3641                           BANK

 0005   REF    1                                                COUNT* $$/DAP

 0006   REF  102  LAST 1463   16,3641   3 4752 0  RATELOOP CA     TWO
 0007   REF    3  LAST  133   16,3642  55'744 0           TS     DAPTEMP6
 00071                        16,3643   6 0000 1           DOUBLE
 00072  REF  416  LAST 1469   16,3644  54 002 1           TS     Q
 0008   REF    4  LAST 1470   16,3645  51'744 1           INDEX  DAPTEMP6
 0009   REF   14  LAST 1460   16,3646  11'524 1           CCS    TJP
 0010                         16,3647   1 3651 1           TCF    +2
 0011   REF    1              16,3650   1 3670 1           TCF    LOOPRATE
 0012   REF    1              16,3651   6 3731 1           AD     -100MST6
 0013                         16,3652   0 0006 1           EXTEND
 0014   REF    1              16,3653   6 3707 1           BZMF   SMALLTJU
 0015   REF    5  LAST 1470   16,3654  51'744 1           INDEX  DAPTEMP6
 0016   REF   15  LAST 1470   16,3655  11'524 1           CCS    TJP
 0017   REF    2  LAST 1470   16,3656   3 3731 1           CA     -100MST6
 0018                         16,3657   1 3661 1           TCF    +2
 0019   REF    3  LAST 1470   16,3660   4 3731 0           CS     -100MST6
 0020   REF    6  LAST 1470   16,3661  51'744 1           INDEX  DAPTEMP6
 0021   REF   16  LAST 1470   16,3662  27'524 1           ADS    TJP
 0022   REF    7  LAST 1470   16,3663  51'744 1           INDEX  DAPTEMP6
 0023   REF   17  LAST 1470   16,3664  11'524 1           CCS    TJP
 0024   REF    1              16,3665   4 3615 1           CS     -100MS          0.1 AT 1
 0025                         16,3666   1 3670 1           TCF    +2
 0026   REF    2  LAST 1470   16,3667   3 3615 0           CA     -100MS
 0027                         16,3670   0 0006 1  LOOPRATE EXTEND
 0028   REF    8  LAST 1470   16,3671   5 1744 1           INDEX  DAPTEMP6
 0029   REF    3  LAST 1437   16,3672   7 1521 1           MP     NO.PJETS
 0030   REF  288  LAST 1464   16,3673   3 0001 0           CA     L
 0031   REF    9  LAST 1470   16,3674  51'744 1           INDEX  DAPTEMP6
 00311  REF   29  LAST 1451   16,3675  55'737 1           TS     DAPTEMP1        SIGNED TORQUE AT 1 JET-SEC FOR FILTER
 00312                        16,3676   0 0006 1           EXTEND
 00313  REF   51  LAST 1410   16,3677   7 4742 0           MP     BIT10           RESCALE TO 32; ONE BIT ABOUT 2 JET-MSEC
 00314                        16,3700   0 0006 1           EXTEND
 00315  REF    1              16,3701   6 3732 1           BZMF   NEGTORK
 00316  REF  417  LAST 1470   16,3702  50 002 0  STORTORK INDEX  Q               INCREMENT DOWNLIST REGISTER.
 00317  REF    7  LAST  133   16,3703  27'513 0           ADS    DOWNTORK          NOTE: NOT INITIALIZED; OVERFLOWS.

 0032   REF   10  LAST 1470   16,3704  11'744 0           CCS    DAPTEMP6
 0033   REF    2  LAST 1428   16,3705   1 3642 0           TCF    RATELOOP +1
 0034   REF    1              16,3706   1 3716 0           TCF    ROTORQUE
 0035   REF  303  LAST 1463   16,3707   3 4755 1  SMALLTJU CA     ZERO
 0036   REF   11  LAST 1470   16,3710  51'744 1           INDEX  DAPTEMP6
 0037   REF   18  LAST 1470   16,3711  57'524 0           XCH    TJP
 0038                         16,3712   0 0006 1           EXTEND
 0039   REF   4  LAST 1099    16,3713  7 4760 0             MP      ELEVEN           10.24 PLUS
 0040   REF 289  LAST 1470    16,3714  3 0001 0             CA      L
 0041   REF   2  LAST 1470    16,3715  1 3670 1             TCF     LOOPRATE
 0042   REF  11  LAST 1451    16,3716  3 1740 0  ROTORQUE   CA      DAPTEMP2
 0043   REF   7  LAST 1447    16,3717  6 1741 1             AD      DAPTEMP3
 0044                         16,3720  0 0006 1             EXTEND
 0045   REF   1               16,3721  7 1532 0             MP      1JACCR
 0046   REF   3  LAST 1427    16,3722  55'747 0             TS      JETRATER
 0047   REF   8  LAST 1471    16,3723  4 1741 0             CS      DAPTEMP3
 0048   REF  12  LAST 1471    16,3724  6 1740 0             AD      DAPTEMP2
 0049                         16,3725  0 0006 1             EXTEND
 0050   REF   1               16,3726  7 1531 0             MP      1JACCQ
 0051   REF   3  LAST 1426    16,3727  55'746 1             TS      JETRATEQ
 0052   REF   1               16,3730  1 2316 0             TCF     BACKP
 0053                         16,3731   77537 0  -100MST6   DEC     -160
R0054
 0055                         16,3732  4 0000 0  NEGTORK    COM
 0056   REF 418  LAST 1470    16,3733  24 002 0             INCR    Q
 0057   REF   1               16,3734  1 3702 0             TCF     STORTORK
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L         TRIM GIMBAL CONTROL SYSTEM                                                          USER'S PAGE NO.   1       EO S4

 0001                            21,3077                         BANK    21
 0002    REF    1                E6,1450                         EBANK=  QDIFF
 0003    REF    1                21,2000                         SETLOC  DAPS4
 0004                            21,3077                         BANK

 00045   REF    1                                                COUNT*  $$/DAPGT

R0005    CONTROL REACHES THIS POINT UNDER EITHER OF THE FOLLOWING TWO CONDITIONS ONCE THE DESCENT ENGINE AND THE DIGITAL
R0007    AUTOPILOT ARE BOTH ON:
R0008              A) THE TRIM GIMBAL CONTROL LAW WAS ON DURING THE PREVIOUS Q,R-AXIS TIME5 INTERRUPT (OR THE DAPIDLER
R0010                 INITIALIZATION WAS SET FOR TRIM GIMBAL CONTROL AND THIS IS THE FIRST PASS), OR
R0012              B) THE Q,R-AXES RCS AUTOPILOT DETERMINED THAT THE VEHICLE WAS ENTERING (OR HAD JUST ENTERED) A COAST
R0014                 ZONE WITH A SMALL OFFSET ANGULAR ACCELERATION.

R0015    GTS IS THE ENTRY TO THE GIMBAL TRIM SYSTEM FOR CONTROLLING ATTITUDE ERRORS AND RATES AS WELL AS ACCELERATIONS.

 0018    REF  14  LAST 1468   21,3077  3 7747 1  GTS        CAF     NEGONE           MAKE THE NEXT PASS THROUGH THE DAP BE
 0019    REF   4  LAST 1452   21,3100  55'631 0             TS      COTROLER           THROUGH RCS CONTROL,
 0020    REF  47  LAST 1469   21,3101  3 4751 0             CAF     FOUR               AND ENSURE THAT IT IS NOT A SKIP.
 0021    REF   9  LAST 1455   21,3102  55'535 1             TS      SKIPU
 0022    REF   3  LAST 1455   21,3103  55'536 1             TS      SKIPV

 00225   REF 103  LAST 1470   21,3104  3 4752 0             CAF     TWO
 0023    REF   5  LAST 1450   21,3105  55'633 1             TS      INGTS            SET INDICATOR OF GTS CONTROL POSITIVE.
 0024    REF   7  LAST 1429   21,3106  55'632 0             TS      QGIMTIMR         SET TIMERS TO 200 MSEC TO AVOID BOTH
 0025    REF   5  LAST 1429   21,3107  55'634 0             TS      RGIMTIMR         RUNAWAY AND INTERFERENCE BY NULLING.

R0026    THE DRIVE SETTING ALGORITHM

R0027    DEL = SGN(OMEGA + ALPHA*ABS(ALPHA)/(2*K))

R0028                                               2                 1/2                        2        3/2
R0030    NEGUSUM = ERROR*K + ALPHA*(DEL*OMEGA + ALPHA /(3*K)) + DEL*K    (DEL*OMEGA + ALPHA /(2*K))

R0032    DRIVE = -SGN(NEGUSUM)

 0033    REF  27  LAST 1305   21,3110  3 0021 1             CA      SR               SAVE THE SR.  SHIFT IT LEFT TO CORRECT
 0034    REF 522  LAST 14[illegible]   21,3111  6 0000 1             AD      A                FOR THE RIGHT SHIFT DUE TO EDITING.
 0035    REF   1              21,3112  55'505 1             TS      SAVESR

 0036    REF 104  LAST 1472   21,3113  3 4752 0  GTSGO+ON   CAF     TWO              SET INDEXER FOR R-AXIS CALCULATIONS.
 0037    REF   1              21,3114  1 3116 0             TCF     GOQTRIMG +1

 0038    REF 304  LAST 1470   21,3115  3 4755 1  GOQTRIMG   CAF     ZERO             SET INDEXER FOR Q-AXIS CALCULATIONS
 0039    REF   1              21,3116  55'750 0             TS      QRCNTR

 0040    REF   2  LAST 1472   21,3117  51'750 1             INDEX   QRCNTR           AOS SCALED AT PI/2
 0041    REF  23  LAST 1441   21,3120  3 1537 1             CA      AOSQ
 0042                         21,3121  0 0006 1             EXTEND
 0043    REF  54  LAST 1444   21,3122  7 4752 1             MP      BIT2             RESCALE ACS TO PI/4
 0044                         21,3123  0 0006 1            EXTEND
 0045   REF   1               21,3124  1 3130 1            BZF      GTSQAXIS -3      USE FULL SCALE FOR LARGER AOS ESTIMATES.

 0046   REF 523  LAST 1472    21,3125  50 000 1            INDEX    A
 0047   REF  10  LAST 1457    21,3126  4 4734 1            CS       LIMITS           LIMITS +1 CONTAINS NEGMAX.
 0048   REF 290  LAST 1471    21,3127  56 001 0            XCH      L                LIMITS -1 CONTAINS POSMAX.

 0049   REF   3  LAST 1472    21,3130  11'750 0            CCS      QRCNTR           PICK UP RATE FOR THIS AXIS.  RATE CELLS
 0050   REF 524  LAST 1473    21,3131  50 000 1            INDEX    A                ARE ADJACENT, NOT SEPARATED.  AT PI/4
 0051   REF   5  LAST 1442    21,3132  3 1436 1            CA       EDOTQ
 0052   REF   1               21,3133  53'744 0  GTSQAXIS  DXCH     WCENTRAL

 0053   REF   4  LAST 1473    21,3134  51'750 1            INDEX    QRCNTR           COLLECT K FOR THIS AXIS
 0054   REF   3  LAST  132    21,3135  3 1504 1            CA       KQ
 0055   REF   1               21,3136  55'741 0            TS       KCENTRAL

 0056                         21,3137  0 0006 1            EXTEND                    CONTROL AUTHORITY  ZERO.  AVOID DRIVING
 0057   REF   1               21,3140  1 3576 1            BZF      POSDRIVE +1      ENGINE BELL TO THE STOPS.

 0058   REF   5  LAST 1473    21,3141  51'750 1            INDEX    QRCNTR           QDIFF, RDIFF ARE STORED IN D.P.
 0059   REF   2  LAST 1472    21,3142  31'450 1            CAE      QDIFF

 0060                         21,3143  0 0006 1  ALGORTHM  EXTEND                    Q(R)DIFF IS THETA (ERROR) SCALED AT PI.
 0061   REF   2  LAST 1473    21,3144  7 1741 0            MP       KCENTRAL         FORM K*ERROR AT PI(2)/2(8), IN D.P.
 0062   REF   1               21,3145  23'737 0            LXCH     K2THETA
 0063                         21,3146  0 0006 1            EXTEND
 0064   REF  50  LAST 1461    21,3147  7 4747 0            MP       BIT5             RESCALE TO 4*PI(2)
 0065   REF   2  LAST 1473    21,3150  53'740 1            DXCH     K2THETA
 0066                         21,3151  0 0006 1            EXTEND
 0067   REF  51  LAST 1473    21,3152  7 4747 0            MP       BIT5             FIRST TERM OF NEGUSUM IN K2THETA.
 0068   REF   3  LAST 1473    21,3153  27'740 1            ADS      K2THETA   +1     NO CARRY NEEDED     D.P. AT 4*PI(2)

 0069   REF   1               21,3154  4 1744 0            CS       ACENTRAL         FORM ALPHA(2)/(2*K) AT 16*PI, IN D.P.,
 0070                         21,3155  0 0006 1            EXTEND                    LIMITING QUOTIENT TO AVOID OVERFLOW.
 0071   REF  85  LAST 1465    21,3156  7 4736 0            MP       BIT14            -ALPHA/2 IN A, SCALED AT PI/4
 0072                         21,3157  0 0006 1            EXTEND
 0073   REF   2  LAST 1473    21,3160  7 1744 0            MP       ACENTRAL         -ALPHA(2)/2 IN A,L, SCALED AT PI(2)/16
 0074   REF   3  LAST 1473    21,3161  6 1741 1            AD       KCENTRAL
 0075                         21,3162  0 0006 1            EXTEND
 0076   REF   1               21,3163  6 3200 0            BZMF     HUGEQUOT         K-ALPHA(2)/2 SHOULD BE PNZ FOR DIVISION

 0077                         21,3164  0 0006 1            EXTEND
 0078   REF 525  LAST 1473    21,3165  4 0001 1            DCS      A                ALPHA(2)/2 - K
 0079   REF   4  LAST 1473    21,3166  6 1741 1            AD       KCENTRAL
 0080                         21,3167  0 0006 1            EXTEND
 0081   REF   5  LAST 1473    21,3170  11'741 0            DV       KCENTRAL         HIGH ORDER OF QUOTIENT.
 0082   REF   1               21,3171  57'746 0            XCH      A2CNTRAL
 0083   REF 291  LAST 1473    21,3172  3 0001 0            CA       L                SHIFT UP THE REMAINDER.
 0084                         21,3173  22 007 0            LXCH     7                ZERO LOW-ORDER DIVIDEND.
 0085                         21,3174  0 0006 1            EXTEND
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0086  REF   6  LAST 1473   21,3175  11'741 0            DV      KCENTRAL
0087  REF   2  LAST 1473   21,3176  57'747 1            XCH     A2CNTRAL +1    QUOTIENT STORED AT 16*PI , D.P.
0088  REF   1              21,3177  1 3203 1            TCF     HAVEQUOT

0089  REF  40  LAST 1422   21,3200  3 4733 1  HUGEQUOT CA      POSMAX
0090  REF 292  LAST 1473   21,3201  54 001 1            TS      L
0091  REF   3  LAST 1474   21,3202  53'747 0            DXCH    A2CNTRAL       LIMITED QUOTIENT STORED AT 16*PI, D.P.

0092  REF   2  LAST 1473   21,3203  3 1743 0  HAVEQUOT CA      WCENTRAL
0093                       21,3204  0 0006 1            EXTEND
0094  REF  36  LAST 1446   21,3205  7 4743 1            MP      BIT9           RESCALE OMEGA AT 16*PI IN D.P.
0095  REF   1              21,3206  53'743 1            DXCH    K2CNTRAL       LOWER WORD OVERLAYS OMEGA IN WCENTRAL

0096                       21,3207  0 0006 1            EXTEND
0097  REF   2  LAST 1474   21,3210  3 1743 0            DCA     K2CNTRAL
0098  REF   1              21,3211  53'752 1            DXCH    FUNCTION

0099  REF   3  LAST 1473   21,3212  3 1744 1            CA      ACENTRAL       GET ALPHA*ABS(ALPHA)/(2*K)
0100                       21,3213  0 0006 1            EXTEND
0101                       21,3214  6 3220 1            BZMF     +4

0102                       21,3215  0 0006 1            EXTEND
0103  REF   4  LAST 1474   21,3216  3 1747 1            DCA     A2CNTRAL
0104                       21,3217  1 3222 1            TCF      +3

0105                       21,3220  0 0006 1            EXTEND
0106  REF   5  LAST 1474   21,3221  4 1747 0            DCS     A2CNTRAL

0107  REF   2  LAST 1474   21,3222  21'752 1            DAS     FUNCTION       OMEGA + ALPHA*ABS(ALPHA)/2*K) AT 16*PI

0108  REF   3  LAST 1474   21,3223  11'751 1            CCS     FUNCTION       DEL = +1 FOR FUNCT1 GREATER THAN ZERO.
0109  REF   1              21,3224  1 3230 1            TCF     POSFNCT1       OTHERWISE DEL = -1
0110                       21,3225  1 3227 1            TCF      +2
0111  REF   1              21,3226  1 3232 0            TCF     NEGFNCT1

0112  REF   4  LAST 1474   21,3227  11'752 1            CCS     FUNCTION +1    USE LOW ORDER WORD SINCE HIGH IS ZERO
0113  REF  63  LAST 1461   21,3230  3 4753 1  POSFNCT1 CAF     BIT1
0114                       21,3231  1 3233 1            TCF      +2
0115  REF  64  LAST 1474   21,3232  4 4753 0  NEGFNCT1 CS      BIT1
0116  REF   1              21,3233  55'745 1            TS      DEL

0117  REF   2  LAST 1474   21,3234  11'745 1            CCS     DEL            REPLACE OMEGA BY DEL*OMEGA
0118  REF   1              21,3235  1 3247 1            TCF     FUNCT2         POSITIVE DEL VALUE.  PROCEED.
0119  REF   1              21,3236  1 3240 0            TCF     DEFUNCT
0120  REF   1              21,3237  1 3244 1            TCF     NEGFNCT2

0121  REF   3  LAST 1474   21,3240  55'742 0  DEFUNCT  TS      K2CNTRAL
0122  REF   4  LAST 1474   21,3241  55'743 1            TS      K2CNTRAL +1
0123  REF   2  LAST 1474   21,3242  1 3247 1            TCF     FUNCT2
```

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 0124                          21,3243    65252 1  NEG1/3    DEC       -.33333

 0125                          21,3244   0 0006 1  NEGFNCT2  EXTEND
 0126   REF    5  LAST 1474    21,3245   4 1743 1            DCS       K2CNTRAL
 0127   REF    6  LAST 1475    21,3246   53'743 1            DXCH      K2CNTRAL

 0128                          21,3247   0 0006 1  FUNCT2    EXTEND
 0129   REF    6  LAST 1474    21,3250   3 1747 1            DCA       A2CNTRAL
 0130   REF    7  LAST 1475    21,3251   21'743 1            DAS       K2CNTRAL           DEL*OMEGA + ALPHA(2)/(2*K) AT 16*PI,D.P.

 0131   REF    7  LAST 1475    21,3252   3 1746 0  FUNCT3    CA        A2CNTRAL
 0132                          21,3253   0 0006 1            EXTEND
 0133   REF    1               21,3254   7 3243 0            MP        NEG1/3
 0134   REF    8  LAST 1475    21,3255   53'747 0            DXCH      A2CNTRAL
 0135   REF  293  LAST 1474    21,3256   3 0001 0            CA        L
 0136                          21,3257   0 0006 1            EXTEND
 0137   REF    2  LAST 1475    21,3260   7 3243 0            MP        NEG1/3
 0138   REF    9  LAST 1475    21,3261   27'747 0            ADS       A2CNTRAL +1
 0139   REF  294  LAST 1475    21,3262   54 001 1            TS        L
 0140                          21,3263   1 3265 1            TCF        +2                A2CNTRAL NOW CONTAINS  -ALPHA(2)/(6*K),
 0141   REF   10  LAST 1475    21,3264   27'746 1            ADS       A2CNTRAL           SCALED AT 16*PI, IN D.P.

 0142                          21,3265   0 0006 1            EXTEND
 0143   REF    8  LAST 1475    21,3266   3 1743 0            DCA       K2CNTRAL           DEL*OMEGA + ALPHA(2)/(3*K) IN A2CNTRAL,
 0144   REF   11  LAST 1475    21,3267   21'747 0            DAS       A2CNTRAL           SCALED AT 16*PI, D.P.

 0145   REF   12  LAST 1475    21,3270   3 1746 0            CA        A2CNTRAL
 0146                          21,3271   0 0006 1            EXTEND
 0147   REF    4  LAST 1474    21,3272   7 1744 0            MP        ACENTRAL
 0148   REF    4  LAST 1473    21,3273   21'740 1            DAS       K2THETA
 0149   REF   13  LAST 1475    21,3274   3 1747 1            CA        A2CNTRAL +1
 0150                          21,3275   0 0006 1            EXTEND
 0151   REF    5  LAST 1475    21,3276   7 1744 0            MP        ACENTRAL           ACENTRAL MAY NOW BE OVERLAID.
 0152   REF    5  LAST 1475    21,3277   27'740 1            ADS       K2THETA  +1
 0153   REF  295  LAST 1475    21,3300   54 001 1            TS        L
 0154                          21,3301   1 3303 0            TCF        +2                TWO TERMS OF NEGUSUM ACCUMULATED, SO FAR
 0155   REF    6  LAST 1475    21,3302   27'737 1            ADS       K2THETA            SCALED AT 4*PI(2), IN D.P.

 0156   REF    9  LAST 1475    21,3303   3 1742 1  GETROOT   CA        K2CNTRAL           K*(DEL*OMEGA + ALPHA(2)/(2*K)) IS THE
 0157                          21,3304   0 0006 1            EXTEND                       TERM FOR WHICH A SQUARE ROOT IS NEEDED.
 0158   REF    7  LAST 1474    21,3305   7 1741 0            MP        KCENTRAL           K AT PI/2(8)
 0159   REF    5  LAST 1474    21,3306   53'752 1            DXCH      FUNCTION
 0160   REF   10  LAST 1475    21,3307   3 1743 0            CA        K2CNTRAL +1
 0161                          21,3310   0 0006 1            EXTEND
 0162   REF    8  LAST 1475    21,3311   7 1741 0            MP        KCENTRAL
 0163   REF    6  LAST 1475    21,3312   27'752 1            ADS       FUNCTION +1
 0164   REF  296  LAST 1475    21,3313   54 001 1            TS        L
 0165                          21,3314   1 3316 1            TCF        +2
 0166   REF    7  LAST 1475    21,3315   27'751 1            ADS       FUNCTION           DESIRED TERM IN FUNCTION, AT PI(2)/16
 0167   REF   3  LAST 1474   21,3316  11'745 1               CCS      DEL
 0168   REF   1              21,3317  1 3524 0               TCF      RSTOFGTS
 0169   REF   1              21,3320  1 3566 0               TCF      NEGUSUM
 0170   REF   1              21,3321  1 3323 1               TCF      NEGATE
 0171   REF   2  LAST 1476   21,3322  1 3566 0               TCF      NEGUSUM

 0172                        21,3323  0 0006 1  NEGATE       EXTEND
 0173   REF  11  LAST 1475   21,3324  4 1743 1               DCS      K2CNTRAL
 0174   REF  12  LAST 1476   21,3325  53'743 1               DXCH     K2CNTRAL
 0175   REF   2  LAST 1476   21,3326  1 3524 0               TCF      RSTOFGTS

 0176                        16,3735                         BANK     16
 0177   REF   5  LAST 1428   E6,1501                         EBANK=   NEGUQ
 0178   REF   4  LAST 1470   16,2000                         SETLOC   DAPS1
 0179                        16,3735                         BANK

R0180   THE WRCHN12 SUBROUTINE SETS BITS 9,10,11,12 OF CHANNEL 12 ON THE BASIS OF THE CONTENTS OF NEGUQ,NEGUR WHICH ARE
R0182   THE NEGATIVES OF THE DESIRED ACCELERATION CHANGES.  ACDT+C12 SETS Q(R)ACCDOT TO REFLECT THE NEW DRIVES.

R0184   WARNING:  ACDT+C12 AND WRCHN12 MUST BE CALLED WITH INTERRUPT INHIBITED.

 0185                        16,3735   07400 1  BGIM         OCTAL    07400
 0186   REF   8  LAST 1300      0066            CHNL12       EQUALS   ITEMP6
 0187   REF   6  LAST 1476   16,3736  4 1501 0  ACDT+C12     CS       NEGUQ
 0188                        16,3737  0 0006 1               EXTEND                    GIMBAL DRIVE REQUESTS.
 0189   REF   4  LAST  132   16,3740  7 1507 0               MP       ACCDOTQ
 0190   REF   4  LAST 1428   16,3741  23'510 1               LXCH     QACCDOT
 0191   REF   3  LAST 1429   16,3742  4 1503 1               CS       NEGUR
 0192                        16,3743  0 0006 1               EXTEND
 0193   REF   1              16,3744  7 1511 1               MP       ACCDOTR
 0194   REF   4  LAST 1429   16,3745  23'512 0               LXCH     RACCDOT

 0195   REF   7  LAST 1476   16,3746  11'501 0               CCS      NEGUQ
 0196   REF  52  LAST 1470   16,3747  3 4742 1               CAF      BIT10
 0197                        16,3750  1 3752 0               TCF       +2
 0198   REF  37  LAST 1474   16,3751  3 4743 0               CAF      BIT9
 0199   REF   1              16,3752  54 066 0               TS       CHNL12

 0200   REF   4  LAST 1476   16,3753  11'503 1               CCS      NEGUR
 0201   REF  42  LAST 1468   16,3754  3 4740 0               CAF      BIT12
 0202                        16,3755  1 3757 0               TCF       +2
 0203   REF  33  LAST 1469   16,3756  3 4741 1               CAF      BIT11
 0204   REF   2  LAST 1476   16,3757  26 066 0               ADS      CHNL12           (STORED RESULT NOT USED AT PRESENT)

 0205   REF   1              16,3760  4 3735 1               CS       BGIM
 0206                        16,3761  0 0006 1               EXTEND
 0207   REF  71  LAST 1429   16,3762  02 012 0               RAND     CHAN12
 0208   REF   3  LAST 1476   16,3763  6 0066 1               AD       CHNL12
 0209                        16,3764  0 0006 1               EXTEND
 0210   REF  72  LAST 1476   16,3765  01 012 0               WRITE    CHAN12
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R0211
 0212    REF   2  LAST 1428    16,3766  4 4747 0        CS      CALLGMBL        TURN OFF REQUEST FOR ACDT+C12 EXECUTION.
 0213    REF  52  LAST 1448    16,3767  7 1273 1        MASK    RCSFLAGS
 0214    REF  53  LAST 1477    16,3770  5 1273 1        TS      RCSFLAGS

 0215    REF 419  LAST 1471    16,3771  0 0002 0        TC      Q               RETURN TO CALLER.

 0216                          21,3327                  BANK    21
 0217    REF   3  LAST 1473    E6,1450                  EBANK=  QDIFF
 0218    REF   2  LAST 1472    21,2000                  SETLOC  DAPS4
 0219                          21,3327                  BANK
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P0220    SUBROUTINE TIMEGMBL:  MOD 0,  OCTOBER 1967, CRAIG WORK

R0221    TIMEGMBL COMPUTES THE DRIVE TIME NEEDED FOR THE TRIM GIMBAL TO POSITION THE DESCENT ENGINE NOZZLE SO AS TO NULL
R0223    THE OFFSET ANGULAR ACCELERATION ABOUT THE Q (OR R) AXIS.  INSTEAD OF USING AOSQ(R), TIMEGMBL USES .4*AOSQ(R),
R0225    SCALED AT PI/8.                            FOR EACH AXIS, THE DRIVE TIME IS COMPUTED AS ABS(ALPHA/ACCDOT).  A ZERO
R0227    ALPHA OR ACCDOT OR A ZERO QUOTIENT TURNS OFF THE GIMBAL DRIVE IMMEDIATELY.  OTHERWISE, THE GIMBAL IS TURNED ON
R0229    DRIVING IN THE CORRECT DIRECTION. THE Q(R)GIMTIMR IS SET TO TERMINATE THE DRIVE AND Q(R)ACCDOT
R0231    IS STORED TO REFLECT THE NEW ACCELERATION DERIVATIVE.  NEGUQ(R) WILL CONTAIN +1,+0,-1 FOR A Q(R)ACCDOT VALUE
R0233    WHICH IS NEGATIVE, ZERO, OR POSITIVE.

R0234    INPUTS:  AOSQ,AOSR, SCALED AT PI/2, AND ACCDOTQ, ACCDOTR AT PI/2(7).    PI/2(7).

R0236    OUTPUTS:   NEW GIMBAL DRIVE BITS IN CHANNEL 12,NEGUQ,NEGUR,QACCDOT AND RACCDOT, THE LAST SCALED AT PI/2(7).
R0238               Q(R)GIMTIMR WILL BE SET TO TIME AND TERMINATE GIMBAL DRIVE(S)

R0239    DEBRIS:  A,L,Q, ITEMPS 2,3,6, RUPTREG2 AND ACDT+C12 DEBRIS.

R0240    EXITS:  VIA TC Q.

R0241    ALARMS, ABORTS, :  NONE

R0242    SUBROUTINES:  ACDT+C12, IBNKCALL

R0243    WARNING:  THIS SUBROUTINE WRITES INTO CHANNEL 12 AND USES THE ITEMPS.  THEREFORE IT MAY ONLY BE CALLED WITH
R0245    INTERRUPT INHIBITED.

R0246    ERASABLE STORAGE CONFIGURATION (NEEDED BY THE INDEXING METHODS):

A0247                                                         NEGUQ    ERASE   +2             NEGATIVE OF Q-AXIS GIMBAL DRIVE
A0248                                                         (SPWORD) EQUALS NEGUQ +1        ANY S.P. ERASABLE NUMBER, NOW THRSTCMD
A0249                                                         NEGUR    EQUALS NEGUQ +2        NEGATIVE OF R-AXIS GIMBAL DRIVE

A0250                                                         ACCDOTQ  ERASE   +2             Q-JERK TERM SCALED AT PI/2(7) RAD/SEC(3)
A0251                                                         (SPWORD) EQUALS ACCDOTQ +1      ANY S.P. ERASABLE NUMBER  NOW QACCDOT
A0252                                                         ACCDOTR  EQUALS ACCDOTQ +2      R-JERK TERM SCALED AT PI/2(7) RAD/SEC(3)
A0253                                                                                         ACCDOTQ,ACCDOTR ARE MAGNITUDES.
A0254                                                         AOSQ     ERASE  +4              Q-AXIS ACC.,D.P. AT PI/2 R/SEC(2)
A0255                                                         AOSR     EQUALS AOSQ +2         R-AXIS ACCELERATION SCALED AT PI/2 R/S2

 0256    REF   9  LAST 1476       0066                QRNDXER  EQUALS ITEMP6
 0257                         21,3327    23146 0      OCT23146 OCTAL  23146                  DECIMAL .6
 0258    REF  30  LAST 1375       0063                NZACCDOT EQUALS ITEMP3

 0259    REF 174  LAST 1468   21,3330   3 4753 1      TIMEGMBL CAF     ONE                   INITIALIZE ALLOWGTS.
 0260    REF   3  LAST 1449   21,3331   55'502 0               TS      ALLOWGTS

 0261    REF 105  LAST 1472   21,3332   3 4752 0               CAF     TWO                   SET UP LOOP FOR R AXIS.
 0262    REF 420  LAST 1477   21,3333   22 002 0               LXCH    Q                     SAVE RETURN ADDRESS.
 0263    REF  25  LAST 1409   21,3334   22 071 1               LXCH    RUPTREG2
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0264                        21,3335  1 3337 1           TCF      +2
0265  REF 305  LAST 1472    21,3336  3 4755 1  TIMQGMBL CAF      ZERO          NOW DO THE Q-AXIS
0266  REF   1               21,3337  54 066 0           TS       QRNDXER
0267  REF   2  LAST 1479    21,3340  50 066 1           INDEX    QRNDXER
0268  REF   5  LAST 1476    21,3341  3 1507 1           CA       ACCDOTQ       ACCDOT IS PRESUMED TO BE AT PI/2(7).
0269                        21,3342  0 0006 1           EXTEND
0270  REF   1               21,3343  6 3413 1           BZMF     TGOFFNOW      IS ACCDOT LESS THAN OR EQUAL TO 0?
0271  REF   1               21,3344  54 063 0           TS       NZACCDOT      NO.  STORE NON-ZERO, POSITIVE ACCDOT.

0272  REF   3  LAST 1479    21,3345  50 066 1  ALPHATRY INDEX    QRNDXER
0273  REF  24  LAST 1472    21,3346  4 1537 0           CS       AOSQ
0274                        21,3347  0 0006 1           EXTEND
0275  REF   2  LAST 1479    21,3350  1 3413 0           BZF      TGOFFNOW      IS ALPHA ZERO?

0276  REF 421  LAST 1478    21,3351  54 002 1           TS       Q             SAVE A COPY OF  -AOS.
0277                        21,3352  0 0006 1           EXTEND                 NO.  RESCALE FOR TIMEGMBL USE.
0278  REF   1               21,3353  7 3327 0           MP       OCT23146      OCTAL 23146 IS DECIMAL .6
0279  REF 422  LAST 1479    21,3354  6 0002 0           AD       Q             -1.6*AOS AT PI/2 = -.4*AOS AT PI/8.
0280  REF 297  LAST 1475    21,3355  54 001 1           TS       L             WAS THERE OVERFLOW?
0281  REF   1               21,3356  1 3363 0           TCF      SETNEGU       NO.  COMPUTE DRIVE TIME.

0282  REF 526  LAST 1473    21,3357  4 0000 0           CS       A             RECOVER  -SGN(AOS) IN THE A REGISTER.
0283  REF   4  LAST 1479    21,3360  50 066 1           INDEX    QRNDXER       YES.  START DRIVE WITHOUT WAITLIST.
0284  REF   8  LAST 1476    21,3361  57'501 1           XCH      NEGUQ
0285  REF   1               21,3362  1 3417 1           TCF      NOTALLOW      KNOCK DOWN THE ALLOWGTS FLAG.

0286                        21,3363  0 0006 1  SETNEGU  EXTEND
0287  REF   1               21,3364  6 3371 1           BZMF     POSALPH

0288                        21,3365  4 0000 0           COM
0289  REF  27  LAST 1376    21,3366  54 062 1           TS       ITEMP2        STORE  -ABS(.4*AOS) SCALED AT PI/8.
0290  REF  65  LAST 1474    21,3367  4 4753 0           CS       BIT1
0291  REF   2  LAST 1479    21,3370  1 3373 1           TCF      POSALPH +2
0292  REF  28  LAST 1479    21,3371  54 062 1  POSALPH  TS       ITEMP2        STORE  -ABS(.4*AOS) SCALED AT PI/8.
0293  REF  66  LAST 1479    21,3372  3 4753 1           CA       BIT1
0294  REF   5  LAST 1479    21,3373  50 066 1    +2     INDEX    QRNDXER       SGN(AOS) INTO NEGU
0295  REF   9  LAST 1479    21,3374  55'501 0           TS       NEGUQ         STORE SGN(APLHA) AS NEGU

0296  REF   2  LAST 1479    21,3375  3 0063 1           CA       NZACCDOT
0297                        21,3376  0 0006 1           EXTEND
0298  REF  43  LAST 1476    21,3377  7 4740 1           MP       BIT12         2*ACCDOT, SCALED AT PI/8.
0299  REF  29  LAST 1479    21,3400  6 0062 0           AD       ITEMP2        -ABS(ALPHA) + 2*ACCDOT, AT PI/8.
0300                        21,3401  0 0006 1           EXTEND
0301  REF   2  LAST 1479    21,3402  6 3417 0           BZMF     NOTALLOW      IS DRIVE TIME MORE THAN TWO SECONDS?
0302  REF  30  LAST 1479    21,3403  4 0062 1           CS       ITEMP2        NO.  COMPUTE DRIVE TIME.
0303                        21,3404  0 0006 1           EXTEND                 ABS(ALPHA) AT PI/8.
0304  REF   1               21,3405  7 3440 0           MP       OCT00240      DECIMAL 10/1024
0305                        21,3406  0 0006 1           EXTEND                 QUOTIENT IS DRIVE TIME AT WAITLIST.
0306  REF   3  LAST 1479    21,3407  10 063 0           DV       NZACCDOT      ABS(ALPHA)/ACCDOT AT 2(14)/100
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 0307                          21,3410  0 0006 1              EXTEND
 0308   REF   3  LAST 1479     21,3411  1 3413 0              BZF      TGOFFNOW        DRIVE TIME MUST BE GREATER THAN ZERO.

 0309   REF   1                21,3412  1 3425 0              TCF      DRIVEON

 0310   REF 306  LAST 1479     21,3413  3 4755 1    TGOFFNOW  CAF      ZERO            TURN OFF GIMBAL NOW.
 0311   REF   6  LAST 1479     21,3414  50 066 1              INDEX    QRNDXER
 0312   REF  10  LAST 1479     21,3415  55'501 0              TS       NEGUQ

 0313   REF   1                21,3416  1 3427 1              TCF      DONEYET

 0314   REF   4  LAST  829     21,3417  3 6010 0    NOTALLOW  CAF      OCT31
 0315   REF   7  LAST 1480     21,3420  50 066 1              INDEX    QRNDXER
 0316   REF   8  LAST 1472     21,3421  55'632 0              TS       QGIMTIMR
 0317   REF 307  LAST 1480     21,3422  3 4755 1              CAF      ZERO            DRIVE TIME IS MORE THAN 2 SECONDS, SO
 0318   REF   4  LAST 1478     21,3423  55'502 0              TS       ALLOWGTS        DO NOT PERMIT FURTHER GTS ATTITUDE-RATE
A0319                                                                                  CONTROL UNTIL AOSTASK APPROVES.
 0320   REF   2  LAST 1480     21,3424  1 3427 1              TCF      DONEYET         NO WAITLIST CALL IS MADE.

 0321   REF   8  LAST 1480     21,3425  50 066 1    DRIVEON   INDEX    QRNDXER
 0322   REF   9  LAST 1480     21,3426  55'632 0              TS       QGIMTIMR        CHOOSE Q OR R AXIS.

 0323   REF   9  LAST 1480     21,3427  10 066 0    DONEYET   CCS      QRNDXER
 0324   REF   1                21,3430  1 3336 0              TCF      TIMQGMBL

 0325   REF  13  LAST 1362     21,3431  52 073 1              DXCH     RUPTREG3        PROTECT IBNKCALL ERASABLES.  ACDT+C12
 0326   REF  31  LAST 1479     21,3432  52 063 0              DXCH     ITEMP2          LEAVES ITEMPS2,3 ALONE.

 0327   REF  61  LAST 1452     21,3433  0 4674 0              TC       IBNKCALL        TURN OF CHANNEL BITS, SET Q(R)ACCDOTS.
 0328   REF   2  LAST 1428     21,3434    35736 0             CADR     ACDT+C12

 0329   REF  32  LAST 1480     21,3435  52 063 0              DXCH     ITEMP2          RESTORE ERASABLES FOR IBNKCALL.
 0330   REF  19  LAST 1480     21,3436  52 073 1              DXCH     RUPTREG3

 0331   REF  26  LAST 1478     21,3437  0 0071 1              TC       RUPTREG2        RETURN TO CALLER.

 0332                          21,3440    00240 1   OCT00240  OCTAL    00240           DECIMAL 10/1024
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L        TRIM GIMBAL CONTROL SYSTEM                                                     USER'S PAGE NO.  10       E6 S4

P0333    THE FOLLOWING SECTION IS A CONTINUATION OF THE TRIM GIMBAL CONTROL FROM THE LAST GTS ENTRY. THE QUANTITY NEGUSUM
R0335    IS COMPUTED FOR EACH AXIS (Q,R), .707*DEL*FUNCTION(3/2) + K2THETA = NEGUSUM.  NEW DRIVES ARE ENTERED TO CH 12.

R0337    THE SUBROUTINE GTSQRT ACCEPTS A DOUBLE PRECISION VALUE IN FUNCTION, FUNCTION +1 AND RETURNS A SINGLE-PRECISION
R0339    SQUARE ROOT OF THE FOURTEEN MOST SIGNIFICANT BITS OF THE ARGUMENT.  ALSO, THE CELL SHFTFLAG CONTAINS A BINARY
R0341    EXPONENT S, SUCH THAT THE SQUARE ROOT (RETURNED IN THE A REGISTER) MUST BE SHIFTED RIGHT (MULTIPLIED BY 2 TO THE
R0343    POWER (-S)) IN ORDER TO BE THE TRUE SQUARE ROOT OF THE FOURTEEN MOST SIGNIFICANT BITS OF FUNCTION, FUNCTION +1.
R0345    SQUARE ROOT ERROR IS NOT MORE THAN 2 IN THE 14TH SIGNIFICANT BIT.  CELLS CLOBBERED ARE A,L,SHFTFLAG,ININDEX,
R0347    HALFARG,SCRATCH,SR,FUNCTION, FUNCTION +1.  GTSQRT IS CALLED BY TC GTSQRT AND RETURNS VIA TC Q OR TC FUNCTION +1.
R0349    ZERO OR NEGATIVE ARGUMENTS YIELD ZERO FOR SQUARE ROOTS.

 0350    REF    8  LAST 1475   21,3441  11'751 1  GTSQRT    CCS      FUNCTION
 0351    REF    1              21,3442  1 3460 1            TCF      GOODARG             FUNCTION IS POSITIVE.  TAKE SQUARE ROOT.
 0352                          21,3443  1 3445 0            TCF       +2                 HIGH ORDER WORD IS ZERO.  TRY THE LOWER.
 0353    REF    1              21,3444  1 3451 0            TCF      ZEROOT              NEGATIVE.  USE ZERO FOR 1/2 POWER.

 0354    REF    9  LAST 1481   21,3445  3 1752 0            CA       FUNCTION +1
 0355                          21,3446  0 0006 1            EXTEND
 0356    REF    2  LAST 1481   21,3447  6 3451 1            BZMF     ZEROOT

 0357    REF    1              21,3450  1 3454 0            TCF      ZEROHIGH            PROCEED.
 0358    REF  308  LAST 1480   21,3451  3 4755 1  ZEROOT    CA       ZERO
 0359    REF    1              21,3452  55'741 0            TS       SHFTFLAG
 0360    REF  423  LAST 1479   21,3453  0 0002 0            TC       Q

 0361    REF   10  LAST 1481   21,3454  57'751 0  ZEROHIGH  XCH      FUNCTION            14 MOST SIGNIFICANT BITS ARE IN THE
 0362    REF   11  LAST 1481   21,3455  57'752 0            XCH      FUNCTION +1         LOWER WORD.  EXCHANGE THEM.
 0363    REF   24  LAST 1374   21,3456  3 4757 0            CA       SEVEN
 0364    REF    2  LAST 1481   21,3457  1 3461 0            TCF      GOODARG  +1

 0365    REF  309  LAST 1481   21,3460  3 4755 1  GOODARG   CA       ZERO
 0366    REF    2  LAST 1481   21,3461  55'741 0            TS       SHFTFLAG
 0367    REF    1              21,3462  3 5751 1            CA       TWELVE              INITIALIZE THE SCALING LOOP.
 0368    REF    1              21,3463  55'744 0            TS       ININDEX
 0369    REF    1              21,3464  1 3473 0            TCF      SCALLOOP

 0370    REF   12  LAST 1481   21,3465  3 1751 0  SCALSTRT  CA       FUNCTION
 0371    REF    1              21,3466  1 3507 1            TCF      SCALDONE

 0372    REF    1  LAST 1466   21,3467  3 7746 0  MULBUSH   CA       NEG2                IF ARG IS NOT LESS THAN 1/4, INDEX IS
 0373    REF    2  LAST 1481   21,3470  27'744 0            ADS      ININDEX             ZERO, INDICATING NO SHIFT NEEDED.
 0374                          21,3471  0 0006 1            EXTEND                       BRANCH IF ARG IS NOT LESS THAN 1/4.
 0375    REF    1              21,3472  6 3465 0            BZMF     SCALSTRT            OTHERWISE COMPARE ARG WITH A REFERENCE
A0376                                                                                    WHICH IS 4 TIMES LARGER THAN THE LAST.
 0377    REF   13  LAST 1481   21,3473  4 1751 1  SCALLOOP  CS       FUNCTION
 0378    REF    3  LAST 1481   21,3474  51'744 1            INDEX    ININDEX
 0379    REF   52  LAST 1456   21,3475  6 4735 1            AD       BIT15               REFERENCE MAGNITUDE LESS OR EQUAL TO 1/4
 0380                          21,3476  0 0006 1            EXTEND
 0381    REF    1              21,3477  6 3467 1            BZMF     MULBUSH             IF ARG IS NOT LESS THAN REFERENCE, GO
A0382                                                                                    AROUND THE MULBERRY BUSH ONCE MORE.
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 0383   REF   4  LAST 1481   21,3500  51'744 1           INDEX    ININDEX
 0384   REF  53  LAST 1481   21,3501  3 4735 1           CA       BIT15             THIS IS THE SCALE MAGNITUDE
 0385   REF   1              21,3502  57'747 1           XCH      HALFARG           2**(-ININDEX) IS THE SHIFT DIVISOR.
 0386                        21,3503  0 0006 1           EXTEND                     RESCALE ARGUMENT.
 0387   REF  14  LAST 1481   21,3504  3 1752 0           DCA      FUNCTION
 0388                        21,3505  0 0006 1           EXTEND
 0389   REF   2  LAST 1482   21,3506  11'747 0           DV       HALFARG
A0390                                                                                   ININDEX AND SHFTFLAG PRESERVE INFO FOR

A0391                                                                                   RESCALING AFTER ROOT PROCESS.
 0392                        21,3507  0 0006 1  SCALDONE EXTEND
 0393   REF  15  LAST 1482   21,3510  23'752 0           QXCH     FUNCTION +1       SAVE Q FOR RETURN
 0394                        21,3511  0 0006 1           EXTEND
 0395   REF  86  LAST 1473   21,3512  7 4736 0           MP       BIT14
 0396   REF   3  LAST 1482   21,3513  55'747 0           TS       HALFARG
 0397   REF  58  LAST 1462   21,3514  7 4737 1           MASK     BIT13
 0398   REF 527  LAST 1479   21,3515  10 000 0           CCS      A
 0399   REF   1              21,3516  3 3634 0           CA       OCT11276
 0400   REF   1              21,3517  6 3632 0           AD       ROOTHALF          INITIAL GUESS IS ROOT 1/2 OR POSMAX

 0401   REF   1              21,3520  0 3636 1           TC       ROOTCYCL
 0402   REF   2  LAST 1482   21,3521  0 3636 1           TC       ROOTCYCL
 0403   REF   3  LAST 1482   21,3522  0 3636 1           TC       ROOTCYCL

 0404   REF  16  LAST 1482   21,3523  0 1752 0           TC       FUNCTION +1

R0405   ************************************************************************************************************


 0407   REF   1              21,3524  0 3441 0  RSTOFGTS TC       GTSQRT
 0408   REF  13  LAST 1476   21,3525  57'742 1  PRODUCT  XCH      K2CNTRAL
 0409                        21,3526  0 0006 1           EXTEND
 0410   REF  14  LAST 1482   21,3527  7 1742 0           MP       K2CNTRAL
 0411   REF  15  LAST 1482   21,3530  53'743 1           DXCH     K2CNTRAL
 0412                        21,3531  0 0006 1           EXTEND                                THE PRODUCT OF
 0413   REF 29[illegible] LAST 1479   21,3532  7 0001 1           MP       L                  1/2                    2        1/2
 0414   REF  16  LAST 1482   21,3533  27'743 1           ADS      K2CNTRAL +1       K    *(DEL*OMEGA + ALPHA /(2*K))
 0415   REF 299  LAST 1482   21,3534  54 001 1           TS       L                                    AND
 0416                        21,3535  1 3537 1           TCF       +2                                          2
 0417   REF  17  LAST 1482   21,3536  27'742 0           ADS      K2CNTRAL           DEL*(DEL*OMEGA + ALPHA /(2*K)) NOW IN
A0418                                                                                   K2CNTRAL

 0419   REF   5  LAST 1482   21,3537  3 1744 1  DOSHIFT  CA       ININDEX
 0420                        21,3540  0 0006 1           EXTEND                     MULTIPLY IN THE FACTOR 2(-S), RETURNED
 0421   REF  87  LAST 1482   21,3541  7 4736 0           MP       BIT14             BY THE GTSQRT SUBROUTINE
 0422   REF   3  LAST 1481   21,3542  27'741 0           ADS      SHFTFLAG
 0423                        21,3543  0 0006 1           EXTEND
 0424   REF   1              21,3544  1 3563 0           BZF      ADDITIN
 0425   REF   4  LAST 1482   21,3545  51'741 1           INDEX    SHFTFLAG
 0426   REF  54  LAST 1482   21,3546  3 4735 1           CA       BIT15
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0427   REF  18  LAST 1482   21,3547  57'742 1               XCH     K2CNTRAL
0428                        21,3550   0 0006 1               EXTEND
0429   REF  19  LAST 1483   21,3551   7 1742 0               MP      K2CNTRAL
0430   REF   7  LAST 1475   21,3552  21'740 1               DAS     K2THETA
0431   REF  20  LAST 1483   21,3553  57'742 1               XCH     K2CNTRAL
0432                        21,3554   0 0006 1               EXTEND
0433   REF  21  LAST 1483   21,3555   7 1743 1               MP      K2CNTRAL  +1
0434   REF   8  LAST 1483   21,3556  27'740 1               ADS     K2THETA   +1
0435   REF 300  LAST 1482   21,3557  54 001 1               TS      L
0436                        21,3560   1 3562 1               TCF      +2
0437   REF   9  LAST 1483   21,3561  27'737 1               ADS     K2THETA

0438   REF   3  LAST 1476   21,3562   1 3566 0               TCF     NEGUSUM

0439                        21,3563   0 0006 1   ADDITIN     EXTEND
0440   REF  22  LAST 1483   21,3564   3 1743 0               DCA     K2CNTRAL
0441   REF  10  LAST 1483   21,3565  21'740 1               DAS     K2THETA        NOW ADD IN THE K2THETA TERM.
0442   REF  11  LAST 1483   21,3566  11'737 1   NEGUSUM     CCS     K2THETA        TEST SIGN OF HIGH ORDER PART.
0443   REF   1              21,3567   1 3573 1               TCF     NEGDRIVE
0444                        21,3570   1 3572 0               TCF      +2
0445   REF   2  LAST 1473   21,3571   1 3575 1               TCF     POSDRIVE

0446   REF  12  LAST 1483   21,3572  11'740 1               CCS     K2THETA   +1   SIGN TEST FOR LOW ORDER PART.
0447   REF  67  LAST 1479   21,3573   3 4753 1   NEGDRIVE    CA      BIT1
0448                        21,3574   1 3576 1               TCF      +2            STOP GIMBAL DRIVE FOR A ZERO NEGUSUM.
0449   REF  68  LAST 1483   21,3575   4 4753 0   POSDRIVE    CS      BIT1
0450   REF 301  LAST 1483   21,3576  54 001 1               TS      L              SAVE FOR DRIVE REVERSAL TEST.
0451   REF   6  LAST 1473   21,3577  51'750 1               INDEX   QRCNTR
0452   REF  11  LAST 1480   21,3600  57'501 1               XCH     NEGUQ

0453                        21,3601   0 0006 1               EXTEND
0454   REF 302  LAST 1483   21,3602   7 0001 1               MP      L              MULTIPLY OLD NEGU AND NEW NEGU.
0455   REF 303  LAST 1483   21,3603  10 001 1               CCS     L
0456   REF   1              21,3604   1 3621 0               TCF     LOUPE          NON-ZERO GIMBAL DRIVE BEING CONTINUED.

0457   REF   1              21,3605   1 3616 1               TCF     ZEROLOUP       NO REVERSAL PROBLEM HERE.

0458   REF   1              21,3606   1 3610 1               TCF     REVERSAL       NON-ZERO GIMBAL DRIVE BEING REVERSED.
0459   REF   2  LAST 1483   21,3607   1 3616 1               TCF     ZEROLOUP       NO REVERSAL PROBLEM HERE.

0460   REF   7  LAST 1483   21,3610  51'750 1   REVERSAL    INDEX   QRCNTR         A ZERO-DRIVE PAUSE IS NEEDED HERE.  ZERO
0461   REF   5  LAST 1476   21,3611  55'110 0               TS      QACCDOT        IS IN A REGISTER FROM CCS ON (-1).
0462   REF   8  LAST 1483   21,3612  51'750 1               INDEX   QRCNTR
0463   REF   1              21,3613   4 3633 0               CS      GMBLBITA
0464                        21,3614   0 0006 1               EXTEND
0465   REF  73  LAST 1476   21,3615  03 012 1               WAND    CHAN12

0466   REF  54  LAST 1477   21,3616   4 1273 1   ZEROLOUP    CS      RCSFLAGS       SET UP REQUEST FOR ACDT+C12 CALL.
0467   REF   3  LAST 1477   21,3617   7 4747 0               MASK    CALLGMBL
0468   REF  55  LAST 1483   21,3620  27'273 1               ADS     RCSFLAGS
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 0469   REF   9  LAST 1483   21,3621  11'750 0  LOUPE     CCS     QRCNTR           HAVE BOTH AXES BEEN PROCESSED?
 0470   REF   2  LAST 1472   21,3622  1 3115 0            TCF     GOQTRIMG         NO.  DO Q AXIS NEXT.

 0471   REF   2  LAST 1472   21,3623  3 1505 0            CA      SAVESR           RESTORE THE SR
 0472   REF  28  LAST 1472   21,3624  54 0021 0           TS      SR

 0473                        21,3625  0 0006 1  GOCLOSE   EXTEND                   TERMINATE THE JASK.
 0474   REF   1              21,3626  3 3631 0            DCA     CLOSEADR
 0475                        21,3627  52 006 0            DTCB

 0476   REF  25  LAST 1479   E ,1537                      EBANK=  AOSQ
 0477   REF   4  LAST 1455   21,3630   03236 0  CLOSEADR 2CADR    CLOSEOUT         TERMINATE THE JASK.
 0477                        21,3631   36106 0
R0478
 0479   REF   6  LAST 1431     5751             TWELVE    EQUALS  OCT14
 0480                        21,3632   26501 1  ROOTHALF OCTAL    26501            SQUARE ROOT OF 1/2
 0481                        21,3633   01400 1  GMBLBITA OCTAL    01400            INDEXED WRT GMBLBITB   DO NOT MOVE******
 0482                        21,3634   11276 1  OCT11276 OCTAL    11276            POSMAX - ROOTHALF
 0483                        21,3635   06000 1  GMBLBITB OCTAL    06000            INDEXED WRT GMBLBITA   DO NOT MOVE******
R0484
R0485   SUBROUTINE ROOTCYCL:  BY CRAIG WORK,3 APRIL 68
R0486   ROOTCYCL IS A SUBROUTINE WHICH EXECUTES ONE NEWTON SQUARE ROOT ALGORITHM ITERATION.  THE INITIAL GUESS AT THE
R0488   SQUARE ROOT IS PRESUMED TO BE IN THE A REGISTER AND ONE-HALF THE SQUARE IS TAKEN FROM HALFARG.  THE NEW APPPROXI-
R0490   MATION TO THE SQUARE ROOT IS RETURNED IN THE A REGISTER.  DEBRIS:   A,L,SR,SCRATCH.  ROOTCYCL IS CALLED FROM
R0492   LOCATION (LOC) BY A TC ROOTCYCL, AND RETURNS (TC Q) TO LOC +1.

R0493   WARNING:  IF THE INITIAL GUESS IS NOT GREATER THAN THE SQUARE, DIVIDE OR ADD OVERFLOW IS A REAL POSSIBILITY.

 0495   REF   1              21,3636  55'746 1  ROOTCYCL TS       SCRATCH          STORE X
 0496   REF  29  LAST 1484   21,3637  54 0021 0           TS      SR               X/2 NOW IN SR
 0497   REF   4  LAST 1482   21,3640  3 1747 1            CA      HALFARG          ARG/2 IN THE A REG
 0498                        21,3641  22 007 0            ZL                       PREPARE FOR DIVISION
 0499                        21,3642  0 0006 1            EXTEND
 0500   REF   2  LAST 1484   21,3643  11'746 1            DV      SCRATCH          (ARG/X)/2
 0501   REF  30  LAST 1484   21,3644  6 0021 1            AD      SR               (X + ARG/X)/2 IN THE A REG
 0502   REF 424  LAST 1491   21,3645  0 0002 0            TC      Q

R0503
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R0001   PROGRAM NAME: 1/ACCS
R0002   PROGRAM WRITTEN BY: BOB COVELLI AND MIKE HOUSTON
R0003  *LAST MODIFICATION: FEB.14,1969 BY G.KALAN

R0004   PROGRAM DESCRIPTION:

R0005      1/ACCS PROVIDES THE INTERFACE BETWEEN THE GUIDANCE PROGRAMS AND THE DIGITAL AUTOPILOT. WHENEVER THERE IS A
R0007   CHANGE IN THE MASS OF THE VEHICLE, IN THE DEADBAND SELECTED, IN THE VEHICLE CONFIGURATION (ASCENT-DESCENT-
R0009   DOCKED), AND DURING A FRESH START OR A RESTART, 1/ACCS IS CALLED TO COMMUNICATE THE DATA CHANGES TO THE DAP.

R0011      THE INPUTS TO 1/ACCS ARE MASS, ACCELERATION (ABDELV), DEADBAND (DB), OFFSET ACCELERATIONS (AOSQ AND AOSR),
R0013   STAGE VERIFY BIT (CHAN30,BIT2), DOCKED BIT (DAPBOOLS,BIT13), DRIFT BIT (DAPBOOLS,BIT8), USEQRJTS (DAPBOOLS,
R0015   BIT14), AND SURFACE FLAG (FLAGWRD8,BIT8), AND CH5MASK.

R0016      1/ACCS COMPUTES THE JET ACCELERATIONS (1JACC, 1JACCQ, 1JACCR) AS FUNCTIONS OF MASS. 1JACCU AND 1JACCV ARE
R0018   FORMED BY RESOLVING 1JACCQ NAD 1JACCR. IN THE DESCENT CASE, THE DESCENT ENGINE MOMENT ARM (L,PVT-CG) IS ALSO
R0020   COMPUTED AS A FUNCTION OF MASS. THE RATE OF CHANGE OF ACCELERATION DUE TO ROTATION OF THE GIMBAL (ACCDOTQ,
R0022   ACCDOTR) IS ALSO COMPUTED IN THE DESCENT CASE.

R0023      AFTER THE ABOVE COMPUTATIONS, THE PROGRAM 1/ACCONT COMPUTES THE RECIPROCAL  NET ACCELERATIONS ABOUT THE P, U,
R0025   AND V AXES (2 JETS FOR P AXIS, BOTH 1 AND 2 JETS FOR U AND V AXES), AND THE RECIPROCAL COAST ACCELERATIONS ABOUT
R0027   THE P, U, AND V AXES. THE ACCELERATION FUNCTIONS (ACCFCTZ1 AND ACCFCTZ5)ARE ALSO COMPUTED FOR THESE AXES. THE
R0029   FIRE AND COAST DEADBANDS AND AXISDIST ARE COMPUTED FOR EACH AXIS. FLAT AND ZONE3LIM, THE WIDTH AND HEIGHT OF THE
R0031   MINIMUM IMPULSE ZONE, ARE COMPUTED. 1/ACCONT ALSO SETS ACCSWU AND ACCSWV, WHICH INDICATE WHEN 1 JET ACCELERATION
R0033   IS NOT SUFFICIENT TO PRODUCE MINIMUM ACCELERATION. AT THE COMPLETION OF 1/ACCS, THE ACCSOKAY BIT IS SET.

R0035   SUBROUTINES CALLED:

R0036             TIMEGMBL
R0037             MAKECADR
R0038             ROT45DEG

R0039   CALLING SEQUENCE:

A0040                                                  TC       BANKCALL         (1/ACCS MUST BE CALL BY BANKCALL
A0041                                                  CADR     1/ACCS

R0042   NORMAL EXIT: VIA BANKJUMP         ALARM AND ABORT EXIT MODES: NONE.

R0043   INPUT/OUTPUT: SEE PROGRAM DESCRIPTION

R0044   DEBRIS:

R0045   ALL OF THE EXECUTIVE TEMPORARY REGISTERS, EXCEPT FIXLOC AND OVFIND, AND THE CORE SET AREA FROM MPAC TO BANKSET.

R0047   RESTRICTIONS:

R0048   1/ACCS MUST BE CALLED BY BANKCALL
R0049   EBANK IS SET TO 6, BUT NOT RESTORED.
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 0050                          20,2447                          BANK    20
 0051    REF    5  LAST 1414   20,2000                          SETLOC  DAPS3
 0052                          20,2447                          BANK

 0053    REF    3 LAST   43 TO   44:      3      4*             COUNT*  $$/DAPAP

 0054    REF   26  LAST 1484   E6,1537                          EBANK=  AOSQ

R0055    ENTRY IS THROUGH 1/ACCJOB OR 1/ACCSET WHEN 1/ACCS IS TO BE DONE AS A SEPARATE NOVAC JOB.

R0057    IT IS POSSIBLE FOR MORE THAN ONE OF THESE JOBS TO BE SET UP CONCURRENTLY.  HOWEVER, SINCE THERE IS NO CHECK OF
R0059    NEWJOB, A SECOND MANIFESTATION CANNOT BE STARTED UNTIL THE FIRST IS COMPLETED.

 0061    REF 310  LAST 1481   20,2447  3 4755 1  1/ACCSET CAF     ZERO            ENTRY FROM FRESH START/RESTART CODING.
 0062    REF  27  LAST 1486   20,2450  55'537 0           TS      AOSQ              NULL THE OFFSET ESTIMATES FOR 1/ACCS.
 0063    REF  10  LAST 1427   20,2451  55'541 1           TS      AOSR
 0064    REF   6  LAST 1427   20,2452  55'424 0           TS      ALPHAQ            NULL THE OFFSET ESTIMATES FOR DOWNLIST
 0065    REF   5  LAST 1427   20,2453  55'425 1           TS      ALPHAR

 0066    REF 323  LAST 1402   20,2454  0 4616 1  1/ACCJOB TC      BANKCALL        1/ACCS ASSUMES ENTRY VIA BANKCALL.
 0067    REF   2  LAST  863   20,2455   40461 0           CADR    1/ACCS +2       SKIP EBANK SETTING.

 0068    REF 159  LAST 1392   20,2456  0 5155 0           TC      ENDOFJOB

 0069    REF  10  LAST 1408   20,2457  3 5015 0  1/ACCS   CA      EBANK6          ***** EBANK SET BUT NOT RESTORED *****
 0070    REF  86  LAST 1409   20,2460  54 003 0           TS      EBANK

 0071    REF  16  LAST 1377   20,2461  0 4645 1           TC      MAKECADR        SAVE RETURN SO THAT BUF2 MAY BE USED
 0072    REF   1              20,2462  54 117 1           TS      ACCRETRN

R0073    DETERMINE MASS OF THE LEM.
 0074    REF  65  LAST 1453   20,2463  3 0111 0           CA      DAPBOOLS        IS CSM DOCKED
 0075    REF  11  LAST 1452   20,2464  7 4737 1           MASK    CSMDOCKD
 0076    REF   1              20,2465  54 157 0           TS      DOCKTEMP        STORE RECORD OF STATE IN TEMP (MPAC +3).
 0077    REF 528  LAST 1482   20,2466  10 000 0           CCS     A
 0078    REF   5  LAST  314   20,2467  4 1332 0           CS      CSMMASS           DOCKED:  LEMMASS = MASS - CSMMASS
 0079    REF  14  LAST  860   20,2470  6 1244 1           AD      MASS              LEM ALONE: LEMMASS = MASS
 0080    REF  11  LAST  314   20,2471  55'331 0           TS      LEMMASS

R0081    ON THE BASIS OF APSFLAG:
R0082         SET THE P-AXIS RATE COMMAND LIMIT FOR 2-JET/4-JET CONTROL
R0083         SET MPAC, WHICH INDICATES THE PROPER SET OF COEFFICIENTS FOR THE LEM-ALONE F(MASS) CALCULATIONS
R0085         ENSURE THAT THE LEM MASS VALUE IS WITHIN THE ACCEPTABLE RANGE

 00855                        20,2472  0 0004 0           INHINT
 0086    REF  24  LAST 1453   20,2473  30 106 0           CAE     FLGWRD10        DETERMINE WHETHER STAGED.
 0087    REF  16  LAST 1453   20,2474  7 4737 1           MASK    APSFLBIT
 0088                         20,2475  0 0006 1           EXTEND
 0089    REF   1              20,2476  1 2522 1           BZF     DPSFLITE
 0090   REF  41  LAST 1474   20,2477  4 4733 0             CS       POSMAX        ASCENT (OR ON LUNAR SURFACE)
 0091   REF   3  LAST 1435   20,2500  55'475 1             TS       -2JETLIM      ALWAYS 2 JETS FOR P-AXIS RATE COMMAND
 0092   REF   7  LAST 1484   20,2501  3 5751 1             CAF      OCT14         INITIALIZE INDEX AT 12.
 0093   REF 875  LAST 1402   20,2502  54 154 0             TS       MPAC
 0094   REF  12  LAST 1486   20,2503  4 1331 0             CS       LEMMASS       CHECK IF MASS TOO HIGH.  CATCH STAGING.
 0095   REF   3  LAST  212   20,2504  6 1400 1             AD       HIASCENT
 0096                        20,2505  0 0006 1             EXTEND
 0097   REF   1              20,2506  6 2513 1             BZMF     MASSFIX
 0098   REF  13  LAST 1487   20,2507  4 1331 0             CS       LEMMASS       CHECK IF MASS TOO LOW.  THIS LIMITS THE
 0099   REF   1              20,2510  6 2001 1             AD       LOASCENT        DECREMENTING BY MASSMON.
 0100                        20,2511  0 0006 1             EXTEND
 0101   REF   1              20,2512  6 2540 1             BZMF     F(MASS)

 0102   REF  14  LAST 1487   20,2513  27'331 0  MASSFIX    ADS      LEMMASS       STORE THE VIOLATED LIMIT AS LEMMASS.
 0103                        20,2514  22 007 0             ZL                       ALSO CORRECT TOTAL MASS, ZEROING THE
 0104   REF   2  LAST 1486   20,2515  10 157 0             CCS      DOCKTEMP        LOW-ORDER WORD.
 0105   REF   6  LAST 1486   20,2516  31'332 1             CAE      CSMMASS           DOCKED:  MASS = LEMMASS + CSMMASS
 0106   REF  15  LAST 1487   20,2517  6 1331 1             AD       LEMMASS           LEM ALONE:  MASS = LEMMASS
 0107   REF  15  LAST 1486   20,2520  53'245 1             DXCH     MASS
 0108   REF   2  LAST 1487   20,2521  1 2540 0             TCF      F(MASS)

 0109   REF  53  LAST 1476   20,2522  4 4742 0  DPSFLITE   CS       BIT10         FOUR JETS FOR P-AXIS RATE COMMAND ERRORS
 0110   REF   4  LAST 1487   20,2523  55'475 1             TS       -2JETLIM        EXCEEDING 1.4 DEG/SEC  (SCALED AT 45)
 0111   REF  36  LAST 1440   20,2524  3 6242 0             CAF      SIX           INITIALIZE INDEX AT 6.
 0112   REF 876  LAST 1487   20,2525  54 154 0             TS       MPAC
 0113   REF  16  LAST 1487   20,2526  4 1331 0             CS       LEMMASS       CHECK IF MASS TOO HIGH.  SHOULD NEVER
 0114   REF   1              20,2527  6 2002 1             AD       HIDESCNT        OCCUR EXCEPT PERHAPS BEFORE THE PAD
 0115                        20,2530  0 0006 1             EXTEND                   LOAD IS DONE.
 0116   REF   2  LAST 1487   20,2531  6 2513 1             BZMF     MASSFIX
 0117   REF  17  LAST 1487   20,2532  4 1331 0             CS       LEMMASS       CHECK IF MASS TOO LOW.  THIS LIMITS THE
 0118   REF   1              20,2533  6 2003 0             AD       LODESCNT        DECREMENTING BY MASSMON.
 0119   REF   4  LAST 1487   20,2534  6 1400 1             AD       HIASCENT
 0120                        20,2535  0 0006 1             EXTEND
 0121   REF   3  LAST 1487   20,2536  6 2540 1             BZMF     F(MASS)
 0122   REF   3  LAST 1487   20,2537  1 2513 0             TCF      MASSFIX
R0123   COMPUTATION OF FUNCTIONS OF MASS

 0124                        20,2540  0 0003 1  F(MASS)    RELINT
 0125   REF   3  LAST 1487   20,2541  10 157 0             CCS      DOCKTEMP
 0126   REF   1              20,2542  1 3105 1             TCF      DOCKED        DOCKED: USE SEPERATE COMPUTATION.
 0127   REF 106  LAST 1478   20,2543  3 4752 0             CA       TWO
 0128   REF 877  LAST 1487   20,2544  54 155 1  STCTR      TS       MPAC +1       J=2,1,0 FOR 1JACCP,1JACCQ,1JACC

 0129   REF 107  LAST 1487   20,2545  4 4752 1             CS       TWO
 0130   REF 878  LAST 1487   20,2546  26 154 0             ADS      MPAC          JX=10,8,6 OR 4,2,0 TO INDEX COEFS.

 0131   REF  18  LAST 1487   20,2547  31'331 1  STCTR1     CAE      LEMMASS
 01311  REF 879  LAST 1487   20,2550  50 154 1             INDEX    MPAC
 0132   REF   1              20,2551  6 3060 1             AD       INERCONC
 0133   REF 880  LAST 1487   20,2552  54 156 1             TS       MPAC +2       MASS + C
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  0134                          20,2553   0 0006 1             EXTEND
  0135   REF 881  LAST 1487     20,2554   5 0154 1             INDEX   MPAC
  0136   REF   1                20,2555   3 3042 1             DCA     INERCONA
  0137                          20,2556   0 0006 1             EXTEND
  0138   REF 882  LAST 1488     20,2557  10 156  1             DV      MPAC +2
  0139   REF 883  LAST 1488     20,2560  50 154  1             INDEX   MPAC
  0140   REF   1                20,2561   6 3057 0             AD      INERCONB
  0141   REF 884  LAST 1488     20,2562  50 155  0             INDEX   MPAC +1          1JACC(J)=A(JX)/(MASS+C(JX) + B(JX)
  0142   REF   8  LAST 1423     20,2563  55'530  1             TS      1JACC            1JACC(-1)=L,PVT-CG  SCALED AT 8 FEET

  0143   REF 885  LAST 1488     20,2564  10 155  1             CCS     MPAC +1
  0144   REF   1                20,2565   1 2544 1             TCF     STCTR
  0145   REF   1                20,2566   1 2570 0             TCF     COMMEQS
  0146   REF   1                20,2567   1 2667 0             TCF     LRESC

R0147      COEFFQ AND COEFFR ARE COMPUTED IN THIS SECTION. THEY ARE USED TO RESOLVE Q-R COMPONENTS INTO NON-ORTHOGONAL
R0149    U AND V COMPONENTS (SEE ROT-TOUV SECTION).

  0150   REF   2  LAST 1471     20,2570   4 1532 0  COMMEQS    CS      1JACCR
  0151   REF   2  LAST 1471     20,2571   6 1531 1             AD      1JACCQ
  0152                          20,2572   0 0006 1             EXTEND
  0153   REF   1                20,2573   6 2617 0             BZMF    BIGIQ
  0154                          20,2574   0 0006 1             EXTEND                   EPSILON IS A MEASURE OF COUPLING AND IS
  0155   REF   3  LAST 1488     20,2575  11'531  0             DV      1JACCQ           DEFINED=1-IQ/IR FOR IR GREATER THAN IQ.
  0156   REF   1                20,2576  54 155  1             TS      EPSILON          THE COMPUTED EXPRESSION IS EQUIVALENT
  0157   REF   1                20,2577   6 3104 1             AD      -EPSMAX
  0158                          20,2600   0 0006 1             EXTEND
  0159   REF   1                20,2601   6 2604 1             BZMF    GOODEPS1
  0160   REF   2  LAST 1488     20,2602   4 3104 0             CS      -EPSMAX
  0161   REF   2  LAST 1488     20,2603  54 155  1             TS      EPSILON          EPSILON IS LIMITED TO A MAX. OF .42265
  0162   REF   3  LAST 1488     20,2604   3 0155 0  GOODEPS1   CA      EPSILON
  0163                          20,2605   0 0006 1             EXTEND
  0164   REF   1                20,2606   7 3100 1             MP      0.35356
  0165   REF   1                20,2607   6 3102 1             AD      .7071
  0166   REF   2  LAST 1457     20,2610  55'630  1             TS      COEFFR           IN THIS CASE WHERE IR IS GREATER THAN
  0167   REF  42  LAST 1487     20,2611   4 4733 0             CS      POSMAX           IQ, COEFFQ=-.707(1+.5EPSILON)(1-EPSILON)
  0168   REF   4  LAST 1488     20,2612   6 0155 0             AD      EPSILON          AND COEFFR=.707(1+.5EPSILON)
  0169                          20,2613   0 0006 1             EXTEND
  0170   REF   3  LAST 1488     20,2614   7 1630 1             MP      COEFFR
  0171   REF   3  LAST 1457     20,2615  55'627  1             TS      COEFFQ
  0172   REF   1                20,2616   1 2642 1             TCF     JACCUV
  0173                          20,2617   0 0006 1  BIGIQ      EXTEND                   EPSILON IS DEFINED AS 1-IR/IQ FOR IQ
  0174   REF   3  LAST 1488     20,2620  11'532  0             DV      1JACCR           GREATER THAN IR. -EPSILON IS COMPUTED
  0175   REF   1                20,2621  54 155  1             TS      -EPSILON         RATHER THAN EPSILON FOR CONVENIENCE
  0176   REF   2  LAST 1488     20,2622   4 0155 1             CS      -EPSILON
  0177   REF   3  LAST 1488     20,2623   6 3104 1             AD      -EPSMAX
  0178                          20,2624   0 0006 1             EXTEND
  0179   REF   1                20,2625   6 2630 0             BZMF    GOODEPS2
  0180   REF   4  LAST 1488     20,2626   3 3104 1             CA      -EPSMAX
  0181   REF   3  LAST 1488     20,2627  54 155  1             TS      -EPSILON         EPSILON IS LIMITED TO A MAX. OF .42265
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 0182   REF   4  LAST 1488   20,2630  3 0155 0  GOODEPS2 CA      -EPSILON
 0183                        20,2631  0 0006 1           EXTEND
 0184   REF   2  LAST 1488   20,2632  7 3100 1           MP      0.35356
 0185   REF   1              20,2633  6 3103 0           AD      -.7071
 0186   REF   4  LAST 1488   20,2634  55'627 1           TS      COEFFQ           IN THIS CASE WHERE IQ IS GREATER THAN
 0187   REF   5  LAST 1489   20,2635  4 0155 1           CS      -EPSILON         IR, COEFFQ=-.707(1+.5EPSILON) AND
 0188   REF  12  LAST 1469   20,2636  6 4735 1           AD      NEGMAX           COEFFR=.707(1+.5EPSILON)(1-EPSILON)
 0189                        20,2637  0 0006 1           EXTEND
 0190   REF   5  LAST 1489   20,2640  7 1627 1           MP      COEFFQ
 0191   REF   4  LAST 1488   20,2641  55'630 1           TS      COEFFR
 0192   REF   6  LAST 1489   20,2642  4 1627 1  JACCUV   CS      COEFFQ
 0193                        20,2643  0 0006 1           EXTEND
 0194   REF   4  LAST 1488   20,2644  7 1331 0           MP      1JACCQ           1JACCQ IS SCALED AT PI/4
 0195   REF   1              20,2645  55'533 1           TS      1JACCU           1JACCU USED AS TEMPORARY STORAGE
 0196   REF   5  LAST 1489   20,2646  3 1630 0           CA      COEFFR
 0197                        20,2647  0 0006 1           EXTEND
 0198   REF   4  LAST 1488   20,2650  7 1532 0           MP      1JACCR
 0199   REF   2  LAST 1489   20,2651  6 1533 0           AD      1JACCU
 0200                        20,2652  0 0006 1           EXTEND
 0201   REF  88  LAST 1482   20,2653  7 4736 0           MP      BIT14            SCALING CHANGED FROM PI/4 TO PI/2
 0202   REF   3  LAST 1489   20,2654  55'533 1           TS      1JACCU
 0203   REF   1              20,2655  55'534 0           TS      1JACCV           SCALED AT PI/2 RADIANS/SEC(2)
 0204   REF 886  LAST 1488   20,2656  10 154 0           CCS     MPAC             COMPUTE L,PVT-CG IF IN DESCENT
 0205   REF 311  LAST 1486   20,2657  3 4755 1           CAF     ZERO             ZERO SWITCHES AND GO TO 1/ACCONT IN
 0206   REF   5  LAST 1480   20,2660  55'502 0           TS      ALLOWGTS           ASCENT
 0207   REF   1              20,2661  1 3230 1           TCF     1/ACCONT -1

 0208   REF  10  LAST 1487   20,2662  4 4752 1           CS      TWO
 0209   REF 887  LAST 1489   20,2663  54 154 0           TS      MPAC
 0210   REF 175  LAST 1478   20,2664  4 4753 0           CS      ONE
 0211   REF 888  LAST 1489   20,2665  54 155 1           TS      MPAC +1
 0212   REF   1              20,2666  1 2547 1           TCF     STCTR1
R0213   THIS SECTION COMPUTES THE RATE OF CHANGE OF ACCELERATION DUE TO THE ROTATION OF THE GIMBALS.  THE EQUATION IMPLE
R0215   MENTED IN BOTH THE Y-X PLANE AND THE Z-X PLANE IS -- D(ALPHA)/DT = TL/I*D(DELTA)/DT, WHERE
R0217        T = ENGINE THRUST FORCE
R0218        L = PIVOT TO CG DISTANCE OF ENGINE
R0219        I = MOMENT OF INERTIA

 0220   REF   6  LAST  861   20,2667  31'246 0  LRESC    CAE     ABDELV           SCALED AT 2(13) CM/SEC(2)
 0221                        20,2670  0 0006 1           EXTEND
 0222   REF  16  LAST 1487   20,2671  7 1244 0           MP      MASS             SCALED AT B+16 KGS
 0223   REF   1              20,2672  0 2776 0           TC      DVOVSUB          GET QUOTIENT WITH OVERFLOW PROTECTION
 0224   REF   1              20,2673   03101 1           ADRES   GFACTM

R0225   MASS IS DIVIDED BY ACCELERATION OF GRAVITY IN ORDER TO MATCH THE UNITS OF IXX,IYY,IZZ, WHICH ARE SLUG-FT(2).
R0227   THE RATIO OF ACCELERATION FROM PIPAS TO ACCELERATION OF GRAVITY IS THE SAME IN METRIC OR ENGINEERING UNITS, SO
R0229   THAT IS UNCONVERTED.  2.20462 CONVERTS KG. TO LB.  NOW IT IS IN A SCALED AT 2(14).

 0231                        20,2674  0 0006 1           EXTEND
 0232   REF   1              20,2675  7 1527 1           MP      L,PVT-CG         SCALED AT 8 FEET.
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0233                        20,2676  0 0004 0           INHINT
0234   REF 889  LAST 1489   20,2677  54 154 0           TS     MPAC
0235                        20,2700  0 0006 1           EXTEND
0236   REF   5  LAST 1489   20,2701  7 1532 0           MP     1JACCR
0237   REF   2  LAST 1489   20,2702  0 2776 0           TC     DVOVSUB           GET QUOTIENT WITH OVERFLOW PROTECTION
0238   REF   1              20,2703   02000 0           ADRES  TORKJET1

0239   REF   2  LAST 1476   20,2704  55'511 1           TS     ACCDOTR           SCALED AT PI/2(7)
0240   REF 890  LAST 1490   20,2705  3 0154 1           CA     MPAC
0241                        20,2706  0 0006 1           EXTEND
0242   REF   5  LAST 1489   20,2707  7 1531 0           MP     1JACCQ
0243   REF   3  LAST 1490   20,2710  0 2776 0           TC     DVOVSUB           GET QUOTIENT WITH OVERFLOW PROTECTION
0244   REF   2  LAST 1490   20,2711   02000 0           ADRES  TORKJET1

0245   REF   6  LAST 1479   20,2712  55'507 0  SPSCONT  TS     ACCDOTQ           SCALED AT PI/2(7)
0246                        20,2713  0 0006 1           EXTEND
0247   REF   1              20,2714  7 3077 0           MP     DGBF              .3ACCDOTQ SCALED AT PI/2(8)
0248   REF   4  LAST 1473   20,2715  55'504 0           TS     KQ
0249   REF   3  LAST 1490   20,2716  31'511 0           CAE    ACCDOTR           .3ACCDOTR AT PI/2(8)
0250                        20,2717  0 0006 1           EXTEND
0251   REF   2  LAST 1490   20,2720  7 3077 0           MP     DGBF
0252   REF   1              20,2721  55'506 1           TS     KRDAP
0253                        20,2722  0 0006 1           EXTEND                   NOW COMPUTE QACCDOT, RACCDOT, THE SIGNED
0254   REF  74  LAST 1483   20,2723  00 012 1           READ   CHAN12            JERK TERMS.  STORE CHANNEL 12. WITH GIM
0255   REF 891  LAST 1490   20,2724  54 155 1           TS     MPAC +1           BAL DRIVE BITS 9 THROUGH 12.  SET LOOP
0256   REF  55  LAST 1472   20,2725  3 4752 0           CAF    BIT2              INDEX TO COMPUTE RACCDOT, THEN QACCDOT.
0257   REF   1              20,2726  1 2730 0           TCF    LOOP3
0258   REF 312  LAST 1489   20,2727  3 4755 1           CAF    ZERO              ACCDOTQ AND ACCDOTR ARE NOT NEGATIVE,
0259   REF 892  LAST 1490   20,2730  54 154 0  LOOP3    TS     MPAC              BECAUSE THEY ARE MAGNITUDES
0260   REF 893  LAST 1490   20,2731  3 0155 0           CA     MPAC +1
0261   REF 894  LAST 1490   20,2732  50 154 1           INDEX  MPAC              MASK CHANNEL IMAGE FOR ANY GIMBAL MOTION
0262   REF   1              20,2733  7 3073 1           MASK   GIMBLBTS
0263                        20,2734  0 0006 1           EXTEND
0264   REF   1              20,2735  1 2751 1           BZF    ZACCDOT           IF NONE, Q(R)ACCDOT IS ZERO.
0265   REF 895  LAST 1490   20,2736  3 0155 0           CA     MPAC +1
0266   REF 896  LAST 1490   20,2737  50 154 1           INDEX  MPAC              GIMBAL IS MOVING.  IS ROTATION POSITIVE.
0267   REF   2  LAST 1490   20,2740  7 3074 0           MASK   GIMBLBTS +1
0268                        20,2741  0 0006 1           EXTEND
0269   REF   1              20,2742  1 2746 1           BZF    FRSTZERO          IF NOT POSITIVE, BRANCH
0270   REF 897  LAST 1490   20,2743  50 154 1           INDEX  MPAC              POSITIVE ROTATION, NEGATIVE Q(R)ACCDOT.
0271   REF   7  LAST 1490   20,2744  4 1507 0           CS     ACCDOTQ
0272   REF   1              20,2745  1 2752 1           TCF    STACCDOT
0273   REF 898  LAST 1490   20,2746  50 154 1  FRSTZERO INDEX  MPAC              NEGATIVE ROTATION, POSITIVE Q(R)ACCDOT.
0274   REF   8  LAST 1490   20,2747  3 1507 1           CA     ACCDOTQ
0275   REF   2  LAST 1490   20,2750  1 2752 1           TCF    STACCDOT
0276   REF 313  LAST 1490   20,2751  3 4755 1  ZACCDOT  CAF    ZERO
0277   REF 899  LAST 1490   20,2752  50 154 1  STACCDOT INDEX  MPAC
0278   REF   6  LAST 1483   20,2753  55'510 0           TS     QACCDOT           STORE Q(R)ACCDOT.
0279   REF 900  LAST 1490   20,2754  10 154 0           CCS    MPAC
0280   REF   2  LAST 1490   20,2755  1 2727 0           TCF    LOOP3 -1          NOW DO QACCDOT.
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 0281    REF  66  LAST 1486    20,2756  4 0111 1            CS      DAPBOOLS        IS GIMBAL USABLE?
 0282    REF   6  LAST 1452    20,2757  7 4736 0            MASK    USEQRJTS
 0283                          20,2760  0 0006 1            EXTEND
 0284    REF   1               20,2761  1 3706 1            BZF     DOWNGTS         NO. BE SURE THE GIMBAL SWITCHES ARE DOWN
 0285    REF   5  LAST 1413    20,2762  4 1274 0            CS      T5ADR           YES.  IS THE DAP RUNNING?
 0286    REF   1               20,2763  6 3765 0            AD      PAXISADR
 0287                          20,2764  0 0006 1            EXTEND
 0288                          20,2765  1 2767 1            BZF      +2
 0289    REF   2  LAST 1491    20,2766  1 3706 1            TCF     DOWNGTS         NO. BE SURE THE GIMBAL SWITCHES ARE DOWN
 0290    REF   6  LAST 1472    20,2767  11 4633 1           CCS     INGTS           YES.  IS GTS IN CONTROL?
 0291    REF   1               20,2770  1 2773 1            TCF     DOCKTEST        YES.  PROCEED WITH 1/ACCS.
 0292    REF  62  LAST 1480    20,2771  0 4674 0            TC      IBNKCALL        NO.  NULL OFFSET AND FIND ALLOWGTS
 0293    REF   2  LAST 1450    20,2772   43330 0            CADR    TIMEGMBL

 0294    REF   4  LAST 1487    20,2773  10 1157 0  DOCKTEST CCS     DOCKTEMP        BYPASS 1/ACCONT WHEN DOCKED.
 0295    REF   1               20,2774  1 3671 0            TCF     1/ACCRET
 0296    REF   2  LAST 1489    20,2775  1 3231 0            TCF     1/ACCONT
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R0297    SUBROUTINE:  DVOVSUB

R0298    AUTHOR:  C. WORK, MOD 0 12 JUNE 68

R0299    PURPOSE:  THIS SUBROUTINE PROVIDES A SINGLE-PRECISION MACHINE LANGUAGE DIVISION OPERATION WHICH RETURNS
R0301              (1) THE QUOTIENT, IF THE DIVISION WAS NORMAL.
R0302              (2) NEGMAX, IF THE QUOTIENT WAS IMPROPER AND NEGATIVE.
R0303              (3) POSMAX, IF THE QUOTIENT WAS IMPROPER AND POSITIVE OR IF THERE WAS A ZERO DIVISOR.
R0305              THE CALLING PROGRAM IS PRESUMED TO BE A JOB IN THE F BANK WHICH CONTAINS DVOVSUB. E BANK MUST BE 6.
R0307              THE DIVISOR FOR THIS ROUTINE MAY BE IN EITHER FIXED OR ERASABLE STORAGE.  SIGN AGREEMENT IS
R0309              ASSUMED BETWEEN THE TWO HALVES OF THE DIVIDEND. (THIS IS CERTAIN IF THE A AND L REGISTERS ARE THE RE-
R0311              SULT OF A MULTIPLICATION OPERATION.)
R0312    CALL SEQUENCE:
A0313                                                      L          TC       DVOVSUB
A0314                                                      L +1       ADRES    (DIVISOR)
A0315                                                      L +2       RETURN HERE, WITH RESULT IN A,L

R0316    INPUT:  DIVIDEND IN A,L (SIGN AGREEMENT ASSUMED), DIVISOR IN LOCATION DESIGNATED BY "ADRES".
R0318            DIVISOR MAY BE IN THE DVOVSUB FBANK,FIXED-FIXED FBANK,EBANK 6, OR UNSWITCHED ERASABLE.

R0320    OUTPUT:  QUOTIENT AND REMAINDER, OR POSMAX (NEGMAX), WHICHEVER IS APPROPRIATE.

R0322    DEBRIS:  SCRATCHX,SCRATCHY,SCRATCHZ,A,L  (NOTE:  SCRATCHX,Y,Z ARE EQUATED TO MPAC +4,+5,AND +6.)

R0324    ABORTS OR ALARMS:  NONE

R0325    EXITS:  TO THE CALL POINT + 2.

R0326    SUBROUTINES CALLED:  NONE.

 0327    REF   1              20,2776  54 161 0  DVOVSUB  TS      SCRATCHY         SAVE UPPER HALF OF DIVIDEND
 0328    REF   1              20,2777  54 160 1           TS      SCRATCHX
 0329    REF 425  LAST 1484   20,3000  50 002 0           INDEX   Q                OBTAIN ADDRESS OF DIVISOR.
 0330                         20,3001  3 0000 1           CA      0
 0331    REF 426  LAST 1492   20,3002  24 002 0           INCR    Q                STEP Q FOR PROPER RETURN SEQUENCE.
 0332    REF 529  LAST 1486   20,3003  50 000 1           INDEX   A
 0333                         20,3004  3 0000 1           CA      0                PICK UP THE DIVISOR.
 0334                         20,3005  0 0006 1           EXTEND                   RETURN POSMAX FOR A ZERO DIVISOR.
 0335    REF   1              20,3006  1 3035 0           BZF     MAXPLUS

 0336    REF   1              20,3007  54 162 0           TS      SCRATCHZ         STORE DIVISOR.

 0337    REF 530  LAST 1492   20,3010  10 000 0           CCS     A                GET ABS(DIVISOR) IN THE A REGISTER.
 0338    REF  69  LAST 1483   20,3011  6 4753 1           AD      BIT1
 0339    REF   1              20,3012  1 3014 0           TCF     ZEROPLUS
 0340    REF  70  LAST 1492   20,3013  6 4753 1           AD      BIT1

 0341    REF   2  LAST 1492   20,3014  56 161 1  ZEROPLUS XCH     SCRATCHY         STORE ABS(DIVISOR).  PICK UP TOP HALF OF
 0342                         20,3015  0 0006 1           EXTEND                   DIVIDEND.
 0343    REF   1              20,3016  6 3020 0           BZMF    GOODNEG          GET  -ABS(DIVIDEND)
 0344    REF 531  LAST 1492   20,3017  4 0000 0             CS       A

 0345    REF   3  LAST 1492   20,3020  6 0161 1  GOODNEG    AD       SCRATCHY           ABS(DIVISOR) - ABS(DIVIDEND)
 0346                         20,3021  0 0006 1             EXTEND
 0347    REF   1              20,3022  6 3027 1             BZMF     MAKEMAX            BRANCH IF DIVISION IS NOT PROPER.

 0348    REF   2  LAST 1492   20,3023  3 0160 0             CA       SCRATCHX           RE-ESTABLISH THE DIVIDEND.
 0349                         20,3024  0 0006 1             EXTEND
 0350    REF   2  LAST 1492   20,3025  10 162 0             DV       SCRATCHZ           QUOTIENT IN THE A, REMAINDER IN L.
 0351    REF 427  LAST 1492   20,3026  0 0002 0             TC       Q                  RETURN TO CALLER.

 0352    REF   3  LAST 1493   20,3027  10 160 1  MAKEMAX    CCS      SCRATCHX           DETERMINE THE SIGN OF THE QUOTIENT.
 0353    REF   3  LAST 1493   20,3030  10 162 0             CCS      SCRATCHZ           SCRATCHX AND SCRATCHZ ARE NON-ZERO.
 0354    REF   2  LAST 1492   20,3031  1 3035 0             TCF      MAXPLUS
 0355    REF   4  LAST 1493   20,3032  10 162 0             CCS      SCRATCHZ
 0356    REF  13  LAST 1489   20,3033  3 4735 1             CAF      NEGMAX             +,- OR -,+
 0357    REF 428  LAST 1493   20,3034  0 0002 0             TC       Q
 0358    REF  43  LAST 1493   20,3035  3 4733 1  MAXPLUS    CAF      POSMAX             -,- OR +,+
 0359    REF 429  LAST 1493   20,3036  0 0002 0             TC       Q

R0360    COEFFICIENTS FOR THE JET ACCELERATION CURVE FITS
R0361    THE CURVE FITS ARE OF THE FORM -

R0362              1JACC  =  A/(MASS  +  C)  +  B

R0363    A IS SCALED AT PI/4 RAD/SEC**2 B+16KG, B IS SCALED AT PI/4 RAD/SEC**2, AND C IS SCALED AT B +16 KG.

R0365    THE CURVE FIT FOR L,PVT-CG IS OF THE SAME FORM, EXCEPT THAT A IS SCALED AT 8 FT B+16 KG, B IS SCALED AT 8 FT,
R0367    AND C IS SCALED AT B+16 KG.


 0368                         20,3037   01240 0             2DEC     +.0410511917      L         A   DESCENT
 0368                         20,3040   22513 0

 0369                         20,3041   00141 0  INERCONA   2DEC     +.0059347674      1JACCP    A   DESCENT
 0369                         20,3042   07416 0
 0370                         20,3043   00030 1             2DEC     +.0014979264      1JACCQ    A   DESCENT
 0370                         20,3044   21261 1
 0371                         20,3045   00021 1             2DEC     +.0010451889      1JACCR    A   DESCENT
 0371                         20,3046   03766 0

 0372                         20,3047   00153 0             2DEC     +.0065443852      1JACCP    A   ASCENT
 0372                         20,3050   07111 1
 0373                         20,3051   00072 1             2DEC     +.0035784354      1JACCQ    A   ASCENT
 0373                         20,3052   24103 0
 0374                         20,3053   00135 0             2DEC     +.0056946631      1JACCR    A   ASCENT
 0374                         20,3054   11511 1

 0375                         20,3055   04754 0             DEC      +.155044          L         B   DESCENT
 0376                         20,3056   77142 0             DEC      -.025233          L         C   DESCENT
 0377                           20,3057   00061 0  INERCONB DEC      +.002989          1JACCP  B  DESCENT
 0378                           20,3060   00217 0  INERCONC DEC      +.008721          1JACCP  C  DESCENT
 0379                           20,3061   00464 1           DEC      +.018791          1JACCQ  B  DESCENT
 0380                           20,3062   75642 0           DEC      -.068163          1JACCQ  C  DESCENT
 0381                           20,3063   00536 1           DEC      +.021345          1JACCR  B  DESCENT
 0382                           20,3064   75705 1           DEC      -.066027          1JACCR  C  DESCENT

 0383                           20,3065   00001 0           DEC      +.000032          1JACCP  B  ASCENT
 0384                           20,3066   77616 0           DEC      -.006923          1JACCP  C  ASCENT
 0385                           20,3067   05154 1           DEC      +.162862          1JACCQ  B  ASCENT
 0386                           20,3070   00052 0           DEC      +.002588          1JACCQ  C  ASCENT
 0387                           20,3071   00231 1           DEC      +.009312          1JACCR  B  ASCENT
 0388                           20,3072   77174 0           DEC      -.023608          1JACCR  C  ASCENT


 0389                           20,3073   01400 1  GIMBLBTS OCTAL    01400
 0390                           20,3074   01000 0           OCTAL    01000
 0391                           20,3075   06000 1           OCTAL    06000
 0392                           20,3076   04000 0           OCTAL    04000
 0393                           20,3077   23146 0  DGBF     DEC      0.6                .3 SCALED AT 1/2
 0394                           20,3100   13241 1  0.35356  DEC      0.35356           .70711 SCALED AT 2
 0395                           20,3101   00337 0  GFACTM   OCT      337               979.24/2.20462 AT B+15
 0396                           20,3102   26501 1  .7071    DEC      .70711
 0397                           20,3103   51276 0  -.7071   DEC      -.70711
 0398                           20,3104   62362 1  -FPSMAX  DEC      -.42265
P0399   CSM-DOCKED INERTIA COMPUTATIONS

 0400   REF 176  LAST 1489      20,3105   3 4753 1  DOCKED  CA       ONE               COEFTR = 1 FOR INERTIA COEFFICIENTS
 0401   REF   1                 20,3106   54 160 1 SPSLOOP1 TS       COEFCTR                  = 7 FOR CG COEFFICIENTS
 0402   REF 177  LAST 1494      20,3107   3 4753 1          CA       ONE               MASSCTR = 1 FOR CSM
 0403   REF   1                 20,3110   54 161 0          TS       MASSCTR                  = 0 FOR LEM

 0404   REF   2  LAST 1494      20,3111   50 160 0          INDEX    COEFCTR
 0405   REF   1                 20,3112   3 3212 0          CA       COEFF -1          COEFF -1 = C
 0406                           20,3113   0 0006 1          EXTEND
 0407   REF  19  LAST 1487      20,3114   7 1331 0          MP       LEMMASS
 0408                           20,3115   0 0006 1          EXTEND
 0409   REF   7  LAST 1[illegible]      20,3116   7 1332 0          MP       CSMMASS           LET X = CSMMASS AND Y = LEMMASS

 0410   REF   3  LAST 1494      20,3117   50 160 0          INDEX    COEFCTR
 0411   REF   2  LAST 1494      20,3120   6 3213 1          AD       COEFF             COEFF = F
 0412   REF 901  LAST 1490      20,3121   54 154 0          TS       MPAC              MPAC = C X Y + F
 0413                           20,3122   1 3126 0          TCF      +4

 0414   REF   2  LAST 1494      20,3123   54 161 0 SPSLOOP2 TS       MASSCTR           LOOP TWICE THROUGH HERE TO OBTAIN
 0415                           20,3124   0 0006 1          EXTEND                     MPAC = MPAC + (A X +D)X + (B Y +E)Y
 0416   REF   4  LAST 1494      20,3125   26 160 1          DIM      COEFCTR                         LOOP #1      LOOP #2
 0417   REF   5  LAST 1494      20,3126   50 160 0          INDEX    COEFCTR
 0418   REF   3  LAST 1494      20,3127   3 3215 1          CA       COEFF +2          COEFF +2 = A OR B
 0419                           20,3130   0 0006 1          EXTEND
 0420   REF    3  LAST 1494    20,3131   5 0161 1             INDEX   MASSCTR
 0421   REF   20  LAST 1494    20,3132   7 1331 0             MP      LEMMASS
 0422   REF    6  LAST 1494    20,3133  50 160  0             INDEX   COEFCTR
 0423   REF    4  LAST 1494    20,3134   6 3217 0             AD      COEFF +4         COEFF +4 = E OR D
 0424                          20,3135   0 0006 1             EXTEND
 0425   REF    4  LAST 1495    20,3136   5 0161 1             INDEX   MASSCTR
 0426   REF   21  LAST 1495    20,3137   7 1331 0             MP      LEMMASS
 0427   REF  902  LAST 1494    20,3140  26 154  0             ADS     MPAC

 0428   REF    5  LAST 1495    20,3141  10 161  0             CCS     MASSCTR
 0429   REF    1               20,3142   1 3123 0             TCF     SPSLOOP2
 0430   REF    7  LAST 1495    20,3143  10 160  1             CCS     COEFCTR          IF COEFCTR IS POS , EXIT FROM LOOP WITH
 0431                          20,3144   1 3153 1             TCF     +7               CG X DELDOT = MPAC X 4 PI RAD-CM/SEC
 0432                          20,3145    00000 1   TORQCONS  2DEC    0.51443 B-14     CORRESPONDS TO 500 LB-FT
 0432                          20,3146    20354 1
 0433   REF  903  LAST 1495    20,3147   3 0154 1             CA      MPAC
 0434   REF  904  LAST 1495    20,3150  54 155  1             TS      MPAC +1          INERTIA = (MPAC +1) X 2(38) KG-CM(2)
 0435   REF   2[illegible]  LAST 1481    20,3151   3 4757 0             CA      SEVEN
 0436   REF    1               20,3152   1 3106 1             TCF     SPSLOOP1

 0437  *REF    1               20,3153   3 3212 0             CA      1JACCCON         1JACC=1JACCCON/MASS
 0438  *                       20,3154  22 007  0             ZL
 0439  *REF    4  LAST 1490    20,3155   0 2776 0             TC      DVOVSUB
 0440  *REF   17  LAST 14[illegible]    20,3156    01244 1             ADRES   MASS
 0441   REF    9  LAST 1488    20,3157  55'530  1             TS      1JACC            SCALED AT PI/4

 0442   REF   44  LAST 1493    20,3160   3 4733 1             CA      POSMAX           SET INVERSE JET ACCELERATIONS TO POSMAX,
 0443   REF    2  LAST 1435    20,3161  55'551  0             TS      1/ANETP          WHICH CORRESPONDS TO ACCEL. OF 1.4 D/SS.
 0444   REF    3  LAST 1464    20,3162  55'571  1             TS      1/ANET2 +1
 0445   REF    4  LAST 1495    20,3163  55'572  1             TS      1/ANET2 +2
 0446   REF    5  LAST 1495    20,3164  55'611  1             TS      1/ANET2 +17D
 0447   REF    6  LAST 1495    20,3165  55'612  1             TS      1/ANET2 +18D
 0448                          20,3166   0 0006 1             EXTEND
 0449   REF    1               20,3167   3 3146 1             DCA     TORQCONS
 0450                          20,3170   0 0006 1             EXTEND
 0451   REF  905  LAST 1495    20,3171  10 155  1             DV      MPAC +1
 0452                          20,3172   0 0004 0             INHINT
 0453   REF    6  LAST 1490    20,3173  55'531  0             TS      1JACCQ           SCALED AT PI/4
 0454   REF    6  LAST 1490    20,3174  55'532  0             TS      1JACCR

 0455   REF    2  LAST 1489    20,3175   3 3103 0             CA      -.7071
 0456   REF    7  LAST 1489    20,3176  55'627  1             TS      COEFFQ           COEFFQ AND COEFFR ARE CHOSEN TO MAKE U-
 0457   REF    2  LAST 1488    20,3177   3 3102 1             CA      .7071            AND V-AXES ORTHOGONAL FOR DOCKED CASE
 0458   REF    6  LAST 1489    20,3200  55'630  1             TS      COEFFR
 0459   REF   18  LAST 1495    20,3201   3 1244 1             CA      MASS             SCALED AT 2(16) KG
 0460                          20,3202   0 0006 1             EXTEND
 0461   REF  906  LAST 1495    20,3203   7 0154 0             MP      MPAC             SCALED AT 4 PI RAD-CM/SEC
 0462                          20,3204   0 0006 1             EXTEND
 0463   REF    7  LAST 1489    20,3205   7 1246 1             MP      ABDELV           SCALED AT 2(13) CM/SEC(2)
 0464   REF    5  LAST 1495    20,3206   0 2776 0             TC      DVOVSUB          GET QUOTIENT WITH OVERFLOW PROTECTION
 0465   REF 907  LAST 1495   20,3207   00155 0             ADRES   MPAC +1

 0466   REF   4  LAST 1490   20,3210   55511 1             TS      ACCDOTR
 0467   REF   1              20,3211   1 2712 0            TCF     SPSCONT              CONTINUE K, KSQ CALCULATIONS

 0468   *                    20,3212   00167 1  1JACCCON OCT     00167                SCALED AT PI/4X2(16) RAD/SEC(2)-KG
A0469                                                                                              2      2
A0470                                            COEFFICIENTS FOR CURVE FIT OF THE FORM Z=A X +B Y +C X Y +D X +E Y +F

 0471                        20,3213   06176 1  COEFF    DEC     .19518               C  COEFFICIENT OF INERTIA
 0472                        20,3214   77650 1           DEC     -.00529              F                   ''
 0473                        20,3215   72260 0           DEC     -.17670              B                   ''
 0474                        20,3216   76637 1           DEC     -.03709              A                   ''
 0475                        20,3217   02167 0           DEC     .06974               E                   ''
 0476                        20,3220   00645 0           DEC     .02569               D                   ''

 0477                        20,3221   06335 1           DEC     .20096               C   COEFFICIENT OF CG
 0478                        20,3222   04256 1           DEC     .13564               F         ''
 0479                        20,3223   30163 0           DEC     .75704               B         ''
 0480                        20,3224   64072 0           DEC     -.37142              A         ''
 0481                        20,3225   53632 0           DEC     -.63117              E         ''
 0482                        20,3226   15133 1           DEC     .41179               D         ''

R0483   ASSIGNMENT OF TEMPORARIES FOR 1/ACCS (EXCLUDING 1/ACCONT)

A0484                                           MPAC, MPAC +1, MPAC +2 USED EXPLICITLY
 0485   REF 908  LAST 1496       0160           COEFCTR  EQUALS MPAC +4
 0486   REF 909  LAST 1496       0161           MASSCTR  EQUALS MPAC +5
 0487   REF 910  LAST 1496       0160           SCRATCHX EQUALS MPAC +4             SCRATCH AREA FOR DVOVSUB ROUTINE.
 0488   REF   4  LAST 1493       0161           SCRATCHY EQUALS SCRATCHX +1
 0489   REF   5  LAST 1496       0162           SCRATCHZ EQUALS SCRATCHX +2

 0490   REF 911  LAST 1496       0157           DUCKTEMP EQUALS MPAC +3             RECORD OF CSMDOCKED BIT OF DAPBOOLS
 0491   REF 912  LAST 1496       0155           EPSILON  EQUALS MPAC +1
 0492   REF   5  LAST 1488       0155           -EPSILON EQUALS EPSILON
 0493                        20,3227   71777 0  -.1875   DEC     -.18750
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P0494
 0495                            20,3230                        BANK     20
 0496    REF    6  LAST 1486     20,2000                        SETLOC   DAPS3
 0497                            20,3230                        BANK

 0498    REF   28  LAST 1486     E6,1537                        EBANK=   AOSQ

 0499    REF    4 LAST 1486 TO 1497:     369    373*            COUNT*   $$/DAPAC

 0500    REF    7  LAST 1491     20,3230  55'633 1  -1          TS       INGTS        ZERO  INGTS IN ASCENT
 0501    REF    4  LAST 1407     20,3231  3 1346 1  1/ACCONT    CA       DB           INITIALIZE DBVAL1,2,3
 0502                            20,3232  0 0006 1              EXTEND
 0503    REF   59  LAST 1482     20,3233  7 4737 1              MP       BIT13
 0504    REF  304  LAST 1483     20,3234  54 001 1              TS       L            0.25 DB
 0505    REF  532  LAST 1493     20,3235  6 0000 1              AD       A
 0506    REF    1                20,3236  54 115 0              TS       DBVAL3       0.50 DB
 0507    REF    1                20,3237  4 1346 0              CS       DBVAL1
 0508    REF  305  LAST 1497     20,3240  6 0001 0              AD       L
 0509    REF    1                20,3241  54 114 1              TS       DBVAL2       -.75 DB

 0510                            20,3242  0 0004 0  GETAOSUV    INHINT
 0511    REF   11  LAST 1486     20,3243  31'541 0              CAE      AOSR         COMPUTE AOSU AND AOSV BY ROTATING
 0512    REF  306  LAST 1497     20,3244  54 001 1              TS       L                  AOSQ AND AOSR.
 0513    REF   29  LAST 1497     20,3245  31'537 1              CAE      AOSQ
 0514    REF   63  LAST 1491     20,3246  0 4674 0              TC       IBNKCALL
 0515    REF    4  LAST 1452     20,3247   37146 0              CADR     RCT-TOUV
 0516    REF    1                20,3250  53'544 1              DXCH     AOSU

 0517                            20,3251  0 0003 1              RELINT
 0518    REF   67  LAST 1491     20,3252  3 0111 0              CA       DAPBOOLS
 0519    REF    6  LAST 1453     20,3253  7 4744 0              MASK     DRIFTBIT     ZERO DURING ULLAGE AND POWERED FLIGHT.
 0520    REF  533  LAST 1497     20,3254  10 000 0              CCS      A            IF DRIFTING FLIGHT,
 0521    REF  178  LAST 1494     20,3255  3 4753 1              CA       ONE                SET DRIFTER TO 1
 0522    REF    1                20,3256  54 116 0              TS       DRIFTER      SAVE TO TEST FOR DRIFTING FLIGHT LATER
 0523    REF    6  LAST 1489     20,3257  6 1502 1              AD       ALLOWGTS     NON-ZERO IF DRIFT OR GTS NEAR
 0524    REF  534  LAST 1497     20,3260  10 000 0              CCS      A
 0525    REF    1                20,3261  3 3763 0              CA       FLATVAL      DRIFTING FLIGHT, STORE .8 IN FLAT
 0526    REF    1                20,3262  54 151 0              TS       FLATEMP      IN POWERED FLIGHT, STORE ZERO IN FLAT
 0527                            20,3263  0 0006 1              EXTEND
 0528    REF    1                20,3264  1 3270 0              BZF      DOPAXIS      IF POWERED AND NO GTS, START P AXIS,
 0529    REF    2  LAST 1497     20,3265  10 116 0              CCS      DRIFTER      OTHERWISE SET ZONE3LIM
 0530    REF    1                20,3266  3 3762 1              CA       ZONE3MAX     17.5 MS , SCALED AT 4 SECONDS.
 0531    REF    1                20,3267  54 152 0              TS       Z3TEM

 0532    REF   10  LAST 1497     20,3270  3 1530 0  DOPAXIS     CA       1JACC        1JACC AT PI/4 = 2JACC AT PI/2 =
A0533                                                                                 ANET AT PI/2 = ANET/ACOAST AT 2(6).
 0534    REF   38  LAST 1476     20,3271  6 4743 0              AD       BIT9         1 + ANET/ACOAST AT 2(6)
 0535    REF    1                20,3272  54 157 0              TS       FUNTEM

 0536    REF   11  LAST 1497     20,3273  3 1530 0              CA       1JACC
 0537   REF    1                20,3274  0 3700 0             TC      INVERT
 0538                           20,3275  0 0004 0             INHINT                      P AXIS DATA MUST BE CONSISTENT
 0539   REF    3  LAST 1495     20,3276  55'551 0             TS      1/ANETP             SCALED AT 2(7)/PI.
 0540   REF    4  LAST 1498     20,3277  55'552 0             TS      1/ANETP +1

 0541   REF   39  LAST 1497     20,3300  4 4743 1             CS      BIT9                -1 AT 2(6)
 0542                           20,3301  0 0006 1             EXTEND
 0543   REF    5  LAST 1493     20,3302  7 1551 0             MP      1/ANETP             -1/ANET AT 2(13)/PI
 0544                           20,3303  0 0006 1             EXTEND
 0545   REF    2  LAST 1497     20,3304  10 157 0             DV      FUNTEM              -1/(ANET + ANET**2/ACOAST) AT 2(7)/PI
 0546   REF    1                20,3305  55'557 0             TS      PACCFUN
 0547   REF    2  LAST 1498     20,3306  55'560 1             TS      PACCFUN +1

 0548   REF    1                20,3307  3 4733 1             CA      1/.03               NO AOS FOR P AXIS, ACOAST = AMIN
 0549   REF    1                20,3310  55'553 1             TS      1/ACOSTP
 0550   REF    2  LAST 1498     20,3311  55'554 0             TS      1/ACOSTP +1
 0551                           20,3312  0 0003 1             RELINT


 0552                           20,3313  22 0007 0            ZL
 0553   REF    3  LAST 1497     20,3314  10 116 0             CCS     DRIFTER
 0554   REF    2  LAST 1497     20,3315  53'544 1             DXCH    AOSU                ZERO AOSU,V IF IN DRIFT, JUST TO BE SURE

 0555   REF  314  LAST 1490     20,3316  3 4755 1  UAXIS      CA      ZERO                DO U AXIS COMPUTATIONS
 0556   REF    1                20,3317  54 154 0             TS      UV                  ZERO FOR U AXIS, ONE FOR V AXIS.

 0557   REF    1                20,3320  54 163 1  BOTHAXES   TS      SIGNAOS             CODING COMMON TO U,V AXES
 0558   REF    2  LAST 1498     20,3321  50 154 1             INDEX   UV
 0559   REF    3  LAST 1498     20,3322  11'543 0             CCS     AOSU                PICK UP ABS(AOSU OR AOSV)
 0560   REF  179  LAST 1497     20,3323  6 4753 1             AD      ONE                 RESTORE TO PROPER VALUE
 0561                           20,3324  1 3327 0             TCF     +3                  AND LEAVE SIGNAOS AT ZERO
 0562   REF  180  LAST 1498     20,3325  6 4753 1             AD      ONE                 NEGATIVE, RESTORE TO PROPER VALUE
 0563   REF    2  LAST 1498     20,3326  24 163 0             INCR    SIGNAOS             AND SET SIGNAOS TO ONE TO SHOW AOS NEG
 0564   REF    1                20,3327  54 162 0             TS      ABSAOS              SAVE ABS(AOS)
 0565   REF    3  LAST 1498     20,3330  4 0163 1             CS      SIGNAOS
 0566   REF    1                20,3331  54 164 0             TS      -SIGNAOS            USED AS AN INDEX

 0567   REF    2  LAST 1497     20,3332  3 1346 1             CA      DBVAL1              SET DB1, DB2 TO DBVAL1 (= DB)
 0568   REF    1                20,3333  54 143 0             TS      DBB1
 0569   REF    1                20,3334  54 144 1             TS      DBB2

 0570   REF    2  LAST 1498     20,3335  3 0162 1             CA      ABSAOS              TEST MAGNITUDE OF ABS(AOS)
 0571   REF    1                20,3336  6 3764 1             AD      -.03R/S2
 0572                           20,3337  0 0006 1             EXTEND
 0573   REF    1                20,3340  6 3432 1             BZMF    NOTMUCH             ABS(AOS) LESS THAN AMIN
 0574   REF    2  LAST 1497     20,3341  10 151 0  BIGAOS     CCS     FLATEMP             ABS(AOS) GREATER THAN AMIN
 0575   REF    1                20,3342  1 3372 0             TCF     SKIPDB1             I DRIFT OR GTS, DO NOT COMPUTE DB

 0576   REF    3  LAST 1498     20,3343  3 1346 1             CA      DBVAL1
 0577   REF    2  LAST 1498     20,3344  50 164 1             INDEX   -SIGNAOS
 0578   REF    2  LAST 1498   20,3345   26 144 1              ADS     DBB2            DB2(1) = 2 DB
 0579   REF    4  LAST 1498   20,3346   50 163 0              INDEX   SIGNAOS
 0580   REF    1              20,3347   54 145 0              TS      DBB4            DB4(3) = I DB
 0581   REF    1              20,3350   3 3227 0              CA      -.1875          -.1875 PI/2 RAD/SEC(2) SCALED AT PI/2
 0582   REF    3  LAST 1498   20,3351   6 0162 1              AD      ABSAOS          ABSAOS IS SCALED AT PI/2
 0583                         20,3352   0 0006 1              EXTEND
 0584                         20,3353   6 3356 1              BZMF    +3
 0585   REF    2  LAST 1497   20,3354   4 0115 0              CS      DBVAL3          -.5 DB
 0586   REF    1              20,3355   1 3365 0              TCF     DBONE
 0587   REF    4  LAST 1499   20,3356   4 0162 0              CS      ABSAOS
 0588                         20,3357   6 0000 1              DOUBLE
 0589                         20,3360   6 0000 1              DOUBLE
 0590   REF   93  LAST 1499   20,3361   6 4736 1              AD      BIT14
 0591                         20,3362   6 0000 1              DOUBLE                  1-8 ABSAOS. (8 IS 16/PI SCALED AT 2/PI)
 0592                         20,3363   0 0006 1              EXTEND
 0593   REF    5  LAST 1497   20,3364   7 1346 0              MP      DB
 0594   REF    5  LAST 1499   20,3365   50 163 0   DBONE      INDEX   SIGNAOS         DB1(2)=(1-8 ABSAOS) DB.  IF ABSAOS IS
 0595   REF    2  LAST 1498   20,3366   54 143 0              TS      DBB1            GREATER THAN .1875 THEN DB1(2)=-.5 DB
 0596   REF    2  LAST 1497   20,3367   3 0114 0              CA      DBVAL2
 0597   REF    3  LAST 1498   20,3370   50 164 1              INDEX   -SIGNAOS
 0598   REF    1              20,3371   54 146 0              TS      DBB3            DB3(4) = -.75 DB

 0599   REF    5  LAST 1499   20,3372   3 0162 1   SKIPDB1    CA      ABSAOS          ABS(AOS) GREATER THAN AMIN, SO IT IS
 0600                         20,3373   0 0006 1              EXTEND
 0601   REF   44  LAST 1479   20,3374   7 4740 1              MP      BIT12
 0602   REF    6  LAST 1499   20,3375   6 0162 1              AD      ABSAOS          (9/8) ABSAOS.
 0603   REF    2  LAST 1498   20,3376   0 3700 0              TC      INVERT          ALL RIGHT TO DIVIDE
 0604   REF    4  LAST 1499   20,3377   50 164 1              INDEX   -SIGNAOS
 0605   REF    1              20,3400   54 130 1              TS      1/ACOSTT +1     1/ACOASTPOS(NEG) = 1/ABS(AOS)
 0606   REF    2  LAST 1498   20,3401   3 4733 1              CA      1/.03
 0607   REF    6  LAST 1499   20,3402   50 163 0              INDEX   SIGNAOS
 0608   REF    2  LAST 1499   20,3403   54 127 1              TS      1/ACOSTT        1/ACOASTNEG(POS) = 1/AMIN

 0609   REF    7  LAST 1499   20,3404   3 0162 1              CA      ABSAOS
 0610   REF    4  LAST 1489   20,3405   6 1533 0              AD      1JACCU
 0611   REF    5  LAST 1499   20,3406   6 1533 0              AD      1JACCU          2 JACC + ABS(AOS)
 0612   REF   40  LAST 1498   20,3407   6 4743 0              AD      BIT9            MAXIMUM VALUE IN COMPUTATIONS
 0613   REF  535  LAST 1497   20,3410   54 000 0              TS      A               TEST FOR OVERFLOW
 0614   REF    1              20,3411   1 3456 1              TCF     SKIPDB2         NO OVERFLOW,  DO NORMAL COMPUTATION

 0615   REF    8  LAST 1499   20,3412   3 0162 1              CA      ABSAOS          RESCALE TO PI TO PREVENT OVERFLOW
 0616                         20,3413   0 0006 1              EXTEND
 0617   REF   90  LAST 1499   20,3414   7 4736 0              MP      BIT14
 0618   REF    6  LAST 1499   20,3415   6 1533 0              AD      1JACCU          1 JACC AT PI/2 = 2JACC AT PI
 0619   REF    1              20,3416   54 157 0              TS      ANET            ANETPOS(NEG) MAX SCALED AT PI  =
A0620                                                                                 ANETPOS(NEG) MAX/ACOASTNEG(POS) AT 2(7)
 0621   REF   43  LAST 1443   20,3417   6 4744 1              AD      BIT8            1 + ANETPOS/ACOASTNEG AT 2(7)
 0622   REF    2  LAST 1499   20,3420   56 157 1              XCH     ANET            SAVE IN ANET, WHILE PICKING UP ANET
 0623   REF    3  LAST 1      20,3421   0 3700 0              TC      INVERT
 0624                         20,3422   0 0006 1              EXTEND
 0625   REF  91  LAST 1499   20,3423  7 4736 0              MP      BIT14              SCALE 1/ANET AT 2(7)/PI
 0626   REF   1              20,3424  54 160 1              TS      1/ANET

 0627   REF   1              20,3425  3 3431 1              CA      ACCHERE            SET UP RETURN FROM COMPUTATION ROUTINE
 0628   REF   1              20,3426  54 161 0              TS      ARET
 0629   REF  44  LAST 1499   20,3427  4 4744 0              CS      BIT8               -1 AT 2(7)
 0630   REF   1              20,3430  1 3733 1              TCF     DOACCFUN           FINISH ACCFUN COMPUTATION

 0631   REF   1              20,3431  1 3463 1   ACCHERE    TCF     ACCTHERE


 0632   REF 307  LAST 1497   20,3432  54 001 1   NOTMUCH    TS      L                  ABS(AOS) LESS THAN AMIN, SAVE IN L
 0633   REF   3  LAST 1499   20,3433  3 4733 1              CA      1/.03              ACOASTPOS,NEG = AMIN
 0634   REF   3  LAST 1499   20,3434  54 127 1              TS      1/ACOSTT
 0635   REF   4  LAST 1500   20,3435  54 130 1              TS      1/ACOSTT +1

 0636   REF   3  LAST 1498   20,3436  10 1.1 0              CCS     FLATEMP
 0637   REF   2  LAST 1499   20,3437  1 3456 1              TCF     SKIPDB2            DO NOT COMPUTE DB IF DRIFT OR GTS

 0638   REF   1              20,3440  3 4744 1              CA      .0125RS            AMIN/2
 0639   REF 308  LAST 1500   20,3441  6 0001 0              AD      L                  L HAS ABS(AOS) - AMIN
 0640                        20,3442  0 0006 1              EXTEND                     RESULT IS ABS(AOS) - AMIN/2
 0641   REF   1              20,3443  6 3453 0              BZMF    NOAOS              ABS(AOS) LESS THAN AMIN/2

 0642   REF   3  LAST 1499   20,3444  3 0115 1   SOMEAOS    CA      DBVAL3             AMIN/2 LT ABS(AOS) LT AMIN
 0643   REF   5  LAST 1499   20,3445  50 164 1              INDEX   -SIGNAOS
 0644   REF   2  LAST 1499   20,3446  54 146 0              TS      DBB3               DB3(4) = DB/2
 0645   REF 536  LAST 1499   20,3447  6 0000 1              AD      A
 0646   REF   7  LAST 1499   20,3450  50 163 0              INDEX   SIGNAOS
 0647   REF   2  LAST 1499   20,3451  54 145 0              TS      DBB4               DB4(3) = DB
 0648   REF   3  LAST 1500   20,3452  1 3456 1              TCF     SKIPDB2

 0649   REF   4  LAST 1498   20,3453  3 1346 1   NOAOS      CA      DBVAL1
 0650   REF   3  LAST 1500   20,3454  54 146 0              TS      DBB3               DB3,4 = DB
 0651   REF   3  LAST 1500   20,3455  54 145 0              TS      DBB4

 0652   REF   9  LAST 1499   20,3456  3 0162 1   SKIPDB2    CA      ABSAOS             ANETPOS(NEG) MAX = 2 JACC + ABS(AOS)
 0653   REF   7  LAST 1499   20,3457  6 1533 0              AD      1JACCU
 0654   REF   8  LAST 1500   20,3460  6 1533 0              AD      1JACCU
 0655   REF   3  LAST 1499   20,3461  54 157 0              TS      ANET               CONNOT OVERFLOW HERE
 0656   REF   1              20,3462  0 3724 0   CL1/NET+   TC      DO1/NET+           COMPUTE 1/ANET, ACCFUN

 0657   REF   6  LAST 1500   20,3463  50 164 1   ACCTHERE   INDEX   -SIGNAOS
 0658   REF   1              20,3464  54 134 0              TS      Z5TEM  +2          STORE ACCFUN IN TEMPORARY BUFFER
 0659   REF   2  LAST 1500   20,3465  3 0160 0              CA      1/ANET
 0660   REF   7  LAST 1500   20,3466  50 164 1              INDEX   -SIGNAOS
 0661   REF   1              20,3467  54 126 0              TS      1/ATEM2 +2         STORE 1/ANET IN TEMPORARY BUFFER

 0662   REF  10  LAST 1500   20,3470  3 0162 1              CA      ABSAOS             SEE IF OVERFLOW IN MIN CASE
 0663   REF   9  LAST 1500   20,3471  6 1533 0              AD      1JACCU
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0664  REF  41  LAST 1499   20,3472  6 4743 0             AD      BIT9          MAXIMUM POSSIBLE VALUE
0665  REF 537  LAST 1500   20,3473  54 000 0             TS      A             OVERFLOW POSSIBLE BUT REMOTE
0666                       20,3474  1 3476 0             TCF     +2
0667  REF  45  LAST 1495   20,3475  3 4733 1             CA      POSMAX        IF OVERFLOW, TRUNCATE TO PI/2
0668  REF   2  LAST 1498   20,3476  6 3764 1             AD      -.03R/S2      RESTORE TO CORRECT VALUE
0669  REF   9  LAST 1500   20,3477  54 157 0             TS      ANET
0670  REF   2  LAST 1500   20,3500  0 3724 0             TC      DO1/NET+      COMPUTE 1/ANET, ACCFUN

0671  REF   8  LAST 1500   20,3501  50 164 1             INDEX   -SIGNAOS      STORE MIN VALUES JUST AS MAX VALUES
0672  REF   2  LAST 1500   20,3502  54 132 0             TS      Z5TEM
0673  REF   3  LAST 1500   20,3503  3 0160 0             CA      1/ANET
0674  REF   9  LAST 1501   20,3504  50 164 1             INDEX   -SIGNAOS
0675  REF   2  LAST 1500   20,3505  54 124 1             TS      1/ATEM2


0676  REF  11  LAST 1500   20,3506  4 0162 0             CS      ABSAOS        NOW DO NEG(POS) CASES
0677  REF  10  LAST 1500   20,3507  6 1533 0             AD      1JACCU
0678  REF  11  LAST 1501   20,3510  6 1533 0             AD      1JACCU        ANETNEG(POS) MAX
0679  REF   1              20,3511  0 3712 0             TC      1/ANET-       COMPUTE 1/ANET, ACCFUN, AND ACCSW
0680  REF   8  LAST 1500   20,3512  50 163 0             INDEX   SIGNAOS       STORE NEG(POS) VALUES JUST AS POS(NEG)
0681  REF   1              20,3513  54 133 1             TS      Z1TEM +2
0682  REF 309  LAST 1500   20,3514  54 001 1             TS      L             SAVE IN L FOR POSSIBLE FUTURE USE
0683  REF   4  LAST 1501   20,3515  3 0160 0             CA      1/ANET
0684  REF   9  LAST 1501   20,3516  50 163 0             INDEX   SIGNAOS
0685  REF   1              20,3517  54 125 0             TS      1/ATEM1 +2
0686  REF  12  LAST 1501   20,3520  4 0162 0             CS      ABSAOS
0687  REF  12  LAST 1501   20,3521  6 1533 0             AD      1JACCU        1/ANETNEG(POS) MIN
0688  REF   5  LAST 1501   20,3522  54 157 0             TS      ANET
0689  REF   3  LAST 1501   20,3523  6 3764 1             AD      -.03R/S2      TEST FOR AMIN
0690                       20,3524  0 0006 1             EXTEND                IF ANET LESS THAN AMIN, STORE MAX JET
0691  REF   1              20,3525  6 3743 1             BZMF    FIXMIN        VALUES FOR MIN JETS AND SET ACCSW

0692  REF   1              20,3526  0 3720 1             TC      1/NETMIN      OTHERWISE DO MIN JET COMPUTATIONS
0693  REF  10  LAST 1501   20,3527  50 163 0  STMIN-     INDEX   SIGNAOS       STORE VALUES
0694  REF   2  LAST 1501   20,3530  54 131 0             TS      Z1TEM
0695  REF   5  LAST 1501   20,3531  3 0160 0             CA      1/ANET
0696  REF  11  LAST 1501   20,3532  50 163 0             INDEX   SIGNAOS
0697  REF   2  LAST 1501   20,3533  54 123 0             TS      1/ATEM1


0698  REF   3  LAST 1498   20,3534  50 154 1             INDEX   UV
0699  REF   1              20,3535  3 3770 1             CA      +UMASK
0700  REF   9  LAST 1458   20,3536  7 1262 1             MASK    CH5MASK       TEST FOR +U (+V) JET FAILURES
0701                       20,3537  0 0006 1             EXTEND
0702  REF   1              20,3540  1 3545 1             BZF     FAIL-
0703  REF   3  LAST 1501   20,3541  3 0124 0             CA      1/ATEM2       REPLACE FUNCTION VALUES DEPENDING ON THE
0704  REF   4  LAST 1501   20,3542  54 126 0             TS      1/ATEM2 +2    FAILED JET PAIR WITH CORRESPONDING ONE-
0705  REF   3  LAST 1501   20,3543  3 0132 1             CA      Z5TEM         JET (OR AMIN) FUNCTION VALUES
0706  REF   4  LAST 1501   20,3544  54 134 0             TS      Z5TEM +2
0707  REF   4  LAST 1501   20,3545  50 154 1  FAIL-      INDEX   UV
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 0708   REF   1              20,3546   3 3766 0            CA       -UMASK
 0709   REF  10  LAST 1501   20,3547   7 1262 1            MASK     CH5MASK           TEST FOR -U (-V) JET FAILURES
 0710                        20,3550   0 0006 1            EXTEND
 0711   REF   1              20,3551   1 3556 0            BZF      DBFUN
 0712   REF   3  LAST 1501   20,3552   3 0123 1            CA       1/ATEM1           REPLACE FUNCTION VALUES DEPENDING ON THE
 0713   REF   4  LAST 1502   20,3553  54 125 0             TS       1/ATEM1 +2        FAILED JET PAIR WITH CORRESPONDING ONE-
 0714   REF   3  LAST 1501   20,3554   3 0131 1            CA       Z1TEM             JET (OR AMIN) FUNCTION VALUES
 0715   REF   4  LAST 1502   20,3555  54 133 1             TS       Z1TEM +2

 0716   REF   4  LAST 1500   20,3556   4 0146 0   DBFUN    CS       DBB3              COMPUTE AXISDIST
 0717   REF   3  LAST 1499   20,3557   6 0143 1            AD       DBB1
 0718   REF   4  LAST 1500   20,3560   6 0151 1            AD       FLATEMP
 0719   REF   1              20,3561  54 147 1             TS       AXDSTEM
 0720   REF   4  LAST 1500   20,3562   4 0145 0            CS       DBB4
 0721   REF   3  LAST 1499   20,3563   6 0144 0            AD       DBB2
 0722   REF   5  LAST 1502   20,3564   6 0151 1            AD       FLATEMP
 0723   REF   2  LAST 1502   20,3565  54 150 1             TS       AXDSTEM  +1

 0724                        20,3566   0 0004 0            INHINT
 0725   REF   5  LAST 1501   20,3567  10 154 0             CCS      UV                TEST FOR U OR V AXIS
 0726   REF   1              20,3570   1 3612 0            TCF      STORV             V AXIS   STORE V VALUES

 0727   REF   1              20,3571   3 0122 0            CA       ACCSW             U AXIS   STORE U VALUES
 0728   REF   3  LAST 1464   20,3572  55'547 1             TS       ACCSWU

 0729   REF   1              20,3573   3 4320 1            CA       NINE              TRANSFER 10 WORDS VIA GENTRAN
 0730   REF   3  LAST 1379   20,3574   0 5545 0            TC       GENTRAN +1
 0731   REF   5  LAST 1502   20,3575    00123 1            ADRES    1/ATEM1           TEMPORARY BUFFER
 0732   REF  12  LAST 1469   20,3576    01567 1            ADRES    1/ANET1           THE REAL PLACE

 0733                        20,3577   0 0003 1            RELINT
 0734   REF   4  LAST 1502   20,3600  52 144 1             DXCH     DBB1              SAVE U DBS FOR LATER STORING
 0735   REF   1              20,3601  52 136 1             DXCH     UDB1
 0736   REF   5  LAST 1502   20,3602  52 146 0             DXCH     DBB4
 0737   REF   1              20,3603  52 140 0             DXCH     UDB4

 0738   REF   3  LAST 1502   20,3604  52 150 1             DXCH     AXDSTEM
 0739   REF   1              20,3605  52 142 1             DXCH     UAXDIST

 0740   REF 181  LAST 1498   20,3606   3 4753 1            CA       ONE               NOW DO V AXIS
 0741   REF   6  LAST 1502   20,3607  54 154 0             TS       UV
 0742   REF 315  LAST 1498   20,3610   3 4755 1            CA       ZERO
 0743   REF   1              20,3611   1 3320 1            TCF      BOTHAXES          AND DO IT AGAIN


 0744   REF   2  LAST 1502   20,3612   3 0122 0   STORV    CA       ACCSW             STORE V AXIS VALUES
 0745   REF   1              20,3613  55'550 1             TS       ACCSWV
 0746   REF   2  LAST 1502   20,3614   3 4320 1            CA       NINE
 0747   REF   4  LAST 1502   20,3615   0 5545 0            TC       GENTRAN  +1
 0748   REF   6  LAST 1502   20,3616   00123 1           ADRES   1/ATEM1          TEMPORARY BUFFER
 0749   REF  13  LAST 1502   20,3617   01607 1           ADRES   1/ANET1 +16D     THE REAL PLACE

A0750                                                                             NOW STORE DEADBANDS FOR ALL AXES
 0751   REF   6  LAST 1502   20,3620  52 152 0           DXCH    FLATEMP          FLAT AND ZONE3LIM
 0752   REF   3  LAST 1466   20,3621  53'556 1           DXCH    FLAT

 0753   REF   5  LAST 1500   20,3622  3 1346 1           CA      DBVAL1           COMPUTE P AXIS DEADBANDS
 0754   REF   1              20,3623  55'561 0           TS      PDB1
 0755   REF   1              20,3624  55'562 0           TS      PDB2
 0756   REF   4  LAST 1503   20,3625  6 1555 0           AD      FLAT
 0757   REF   1              20,3626  55'564 0           TS      PDB3
 0758   REF   1              20,3627  55'563 1           TS      PDB4
 0759   REF 316  LAST 1502   20,3630  3 4755 1           CA      ZERO
 0760   REF   1              20,3631  55'565 1           TS      PAXDIST
 0761   REF   2  LAST 1503   20,3632  55'566 1           TS      PAXDIST  +1

 0762   REF   5  LAST 1503   20,3633  11'555 1           CCS     FLAT
 0763   REF   1              20,3634  1 3652 1           TCF     DRFDB            DRIFT OR GTS - COMPUTE DBS

 0764   REF   2  LAST 1502   20,3635  52 136 1           DXCH    UDB1             STORE U DEADBANDS
 0765   REF   5  LAST 1469   20,3636  53'602 0           DXCH    FIREDB           CANNOT USE GENTRAN BECAUSE OF RELINT
 0766   REF   2  LAST 1502   20,3637  52 140 0           DXCH    UDB4
 0767   REF   2  LAST 1463   20,3640  53'604 0           DXCH    COASTDB
 0768   REF   2  LAST 1502   20,3641  52 142 1           DXCH    UAXDIST
 0769   REF   3  LAST 1466   20,3642  53'606 1           DXCH    AXISDIST
 0770   REF   5  LAST 1502   20,3643  52 144 1           DXCH    DBB1             STORE V AXIS DEADBANDS
 0771   REF   6  LAST 1503   20,3644  53'622 1           DXCH    FIREDB +16D      COULD USE GENTRAN IF DESIRED
 0772   REF   6  LAST 1502   20,3645  52 146 0           DXCH    DBB4
 0773   REF   3  LAST 1503   20,3646  53'624 1           DXCH    COASTDB +16D
 0774   REF   4  LAST 1502   20,3647  52 150 1           DXCH    AXDSTEM
 0775   REF   4  LAST 1503   20,3650  53'626 0           DXCH    AXISDIST +16D

 0776   REF   2  LAST 1491   20,3651  1 3672 0           TCF     1/ACCRET +1      ALL DONE
 0777   REF   6  LAST 1503   20,3652  3 1346 1  DRFDB    CA      DBVAL1           DRIFT DEADBANDS
 0778   REF   7  LAST 1503   20,3653  55'601 0           TS      FIREDB
 0779   REF   8  LAST 1503   20,3654  55'602 0           TS      FIREDB +1
 0780   REF   9  LAST 1503   20,3655  55'621 1           TS      FIREDB +16D
 0781   REF  10  LAST 1503   20,3656  55'622 1           TS      FIREDB +17D
 0782   REF   6  LAST 1503   20,3657  6 1555 0           AD      FLAT
 0783   REF   4  LAST 1503   20,3660  55'603 1           TS      COASTDB
 0784   REF   5  LAST 1503   20,3661  55'604 0           TS      COASTDB +1
 0785   REF   6  LAST 1503   20,3662  55'623 0           TS      COASTDB +16D
 0786   REF   7  LAST 1503   20,3663  55'624 1           TS      COASTDB +17D
 0787   REF 317  LAST 1503   20,3664  3 4755 1           CA      ZERO
 0788   REF   5  LAST 1503   20,3665  55'605 1           TS      AXISDIST
 0789   REF   6  LAST 1503   20,3666  55'606 1           TS      AXISDIST +1
 0790   REF   7  LAST 1503   20,3667  55'625 0           TS      AXISDIST +16D
 0791   REF   8  LAST 1503   20,3670  55'626 0           TS      AXISDIST +17D
 0792                        20,3671  0 0004 0  1/ACCRET INHINT
 0793   REF  68  LAST 1497   20,3672  4 0111 1          CS      DAPBOOLS          SET BIT TO INDICATE DATA GOOD.
 0794   REF   3  LAST 1411   20,3673  7 4751 1          MASK    ACCSOKAY
 0795   REF  69  LAST 1504   20,3674  26 111 1          ADS     DAPBOOLS
 0796                        20,3675  0 0003 1          RELINT
 0797   REF   2  LAST 1486   20,3676  3 0117 0          CA      ACCRETRN
 0798   REF  22  LAST 1370   20,3677  0 4640 1          TC      BANKJUMP          RETURN TO CALLER

 0799   REF   1              20,3700  54 165 1  INVERT  TS      HOLD              ROUTINE TO INVERT   -INPUT AT PI/2
 0800   REF  42  LAST 1501   20,3701  3 4743 0          CA      BIT9              1 AT 2(6)
 0801                        20,3702  22 007 0          ZL                        ZERO L FOR ACCURACY AND TO PREVENT OVFLO
 0802                        20,3703  0 0006 1          EXTEND
 0803   REF   2  LAST 1504   20,3704  10 165 1          DV      HOLD
 0804   REF 430  LAST 1493   20,3705  0 0002 0          TC      Q                 RESULT AT 2(7)/PI


 0805   REF 318  LAST 1503   20,3706  3 4755 1  DOWNGTS CAF     ZERO              ZERO SWITCHES WHEN USEQRJTS BIT IS UP
 0806   REF   7  LAST 1497   20,3707  55'502 0          TS      ALLOWGTS            OR DAP IS OFF.
 0807   REF   8  LAST 1497   20,3710  55'633 1          TS      INGTS
 0808   REF   2  LAST 1491   20,3711  1 2773 1          TCF     DOCKTEST

 0809                        20,3712  22 007 0  1/ANET- ZL
 0810   REF   3  LAST 1502   20,3713  22 122 0          LXCH    ACCSW             ZERO ACCSW
 0811   REF   6  LAST 1501   20,3714  54 157 0          TS      ANET              SAVE ANET
 0812   REF   4  LAST 1501   20,3715  6 3764 1          AD      -.03R/S2          TEST FOR MIN VALUE
 0813                        20,3716  0 0006 1          EXTEND
 0814   REF   1              20,3717  6 3740 1          BZMF    NETNEG            ANET LESS THAN AMIN, SO FAKE IT
 0815   REF   7  LAST 1504   20,3720  3 0157 1  1/NETMIN CA     ANET
 0816                        20,3721  0 0006 1          EXTEND
 0817   REF  10  LAST 1501   20,3722  5 0164 1          INDEX   -SIGNAOS
 0818   REF   5  LAST 1500   20,3723  7 0130 1          MP      1/ACOSTT +1       ANETNEG(POS)/ACOASTPOS(NEG) AT 2(6)

A0819                                                                  THE FOLLOWING CODING IS VALID FOR BOTH POS OR NEG
A0820                                                                                    VALUES OF AOS

 0821   REF  43  LAST 1504   20,3724  6 4743 0  DO1/NET+ AD     BIT9              1 + ANET/ACOAST AT 2(6)
 0822   REF   8  LAST 1504   20,3725  56 157 1          XCH     ANET              SAVE AND PICK UP ANET
 0823                        20,3726  0 0006 1          EXTEND
 0824   REF   2  LAST 1500   20,3727  22 161 1          QXCH    ARET              SAVE RETURN
 0825   REF   4  LAST 1499   20,3730  0 3700 0          TC      INVERT
 0826   REF   6  LAST 1501   20,3731  54 160 1          TS      1/ANET            1/ANET AT 2(7)/PI
 0827   REF  44  LAST 1504   20,3732  4 4743 1          CS      BIT9              -1 AT 2(6)
 0828                        20,3733  0 0006 1  DOACCFUN EXTEND
 0829   REF   7  LAST 1504   20,3734  7 0160 1          MP      1/ANET            -1/ANET AT 2(13)/PI
 0830                        20,3735  0 0006 1          EXTEND
 0831   REF   9  LAST 1504   20,3736  10 157 0          DV      ANET              ACCFUN AT 2(7)/PI
 0832   REF   3  LAST 1504   20,3737  0 0161 1          TC      ARET              RETURN

 0833   REF   5  LAST 1504   20,3740  4 3764 0  NETNEG  CS      -.03R/S2          ANET LESS THAN AMIN - SET EQUAL TO AMIN
 0834   REF  10  LAST 1504   20,3741  54 157 0          TS      ANET
 0835   REF   2  LAST 1501   20,3742  1 3721 1           TCF     1/NETMIN +1      CONTINUE AS IF NOTHING HAPPENED


 0836   REF  12  LAST 1501   20,3743  10 163 1  FIXMIN   CCS     SIGNAOS
 0837   REF 109  LAST 1489   20,3744  3 4752 0           CA      TWO              IF AOS NEG, ACCSW = +1
 0838   REF  15  LAST 1472   20,3745  6 7747 1           AD      NEGONE           IF AOS POS, ACCSW = -1
 0839   REF   4  LAST 1504   20,3746  54 122 1           TS      ACCSW
 0840   REF   7  LAST 1502   20,3747  6 0154 1           AD      UV               IF ACCSW = +1, TEST FOR +U (+V) JET FAIL
 0841   REF 538  LAST 1501   20,3750  50 000 1           INDEX   A                IF ACCSW = -1, TEST FOR -U (-V) JET FAIL
 0842   REF   2  LAST 1502   20,3751  3 3767 1           CA      -UMASK +1
 0843   REF  11  LAST 1502   20,3752  7 1262 1           MASK    CH5MASK
 0844                        20,3753  0 0006 1           EXTEND
 0845                        20,3754  1 3760 1           BZF     +4
 0846   REF   6  LAST 1504   20,3755  4 3764 0           CS      -.03R/S2         JET FAILURE - CANNOT USE 2-JET VALUES
 0847   REF  11  LAST 1504   20,3756  54 157 0           TS      ANET             ANET = AMIN
 0848   REF   1              20,3757  1 3526 1           TCF     STMIN-  -1       CALCULATE FUNCTIONS USING AMIN
 0849   REF 310  LAST 1501   20,3760  3 0001 0           CA      L                L HAS ACCFUN
 0850   REF   2  LAST 1505   20,3761  1 3527 0           TCF     STMIN-           STORE MAX VALUES FOR MIN JETS


A0851                                           ERASABLE ASSIGNMENTS FOR 1/ACCONT

 0852   REF   5  LAST  134   E6,1551            1/ANETP  EQUALS BLOCKTOP +2
 0853   REF   6  LAST 1505   E6,1553            1/ACOSTP EQUALS BLOCKTOP +4
 0854   REF   7  LAST 1505   E6,1557            PACCFUN  EQUALS BLOCKTOP +8D
 0855   REF   8  LAST 1505   E6,1561            PDB1     EQUALS BLOCKTOP +10D
 0856   REF   9  LAST 1505   E6,1562            PDB2     EQUALS BLOCKTOP +11D
 0857   REF  10  LAST 1505   E6,1563            PDB4     EQUALS BLOCKTOP +12D
 0858   REF  11  LAST 1505   E6,1564            PDB3     EQUALS BLOCKTOP +13D
 0859   REF  12  LAST 1505   E6,1565            PAXDIST  EQUALS BLOCKTOP +14D

 0860   REF  71  LAST 1264      0122            ACCSW    EQUALS VBUF              EXECUTIVE TEMPORARIES
A0861                                                                             CANNOT DO  CCS    NEWJOB DURING 1/ACCS
 0862   REF   5  LAST 1505      0123            1/ATEM1  EQUALS ACCSW +1          TEMP BUFFER FOR U AND V AXES
 0863   REF   7  LAST 1503      0124            1/ATEM2  EQUALS 1/ATEM1 +1
 0864   REF   8  LAST 1505      0127            1/ACOSTT EQUALS 1/ATEM1 +4
 0865   REF   9  LAST 1505      0131            Z1TEM    EQUALS 1/ATEM1 +6
 0866   REF  10  LAST 1505      0132            Z5TEM    EQUALS 1/ATEM1 +7

 0867   REF  11  LAST 1505      0135            UDB1     EQUALS 1/ATEM1 +10D      U AXIS DEADBAND BUFFER
 0868   REF  12  LAST 1505      0136            UDB2     EQUALS 1/ATEM1 +11D
 0869   REF  13  LAST 1505      0137            UDB4     EQUALS 1/ATEM1 +12D
 0870   REF  14  LAST 1505      0140            UDB3     EQUALS 1/ATEM1 +13D
 0871   REF  15  LAST 1505      0141            UAXDIST  EQUALS 1/ATEM1 +14D

 0872   REF  16  LAST 1505      0143            DBB1     EQUALS 1/ATEM1 +16D      TEMP DEADBAND BUFFER, ALSO V AXIS
 0873   REF  17  LAST 1505      0144            DBB2     EQUALS 1/ATEM1 +17D
 0874   REF  18  LAST 1505      0145            DBB4     EQUALS 1/ATEM1 +18D
 0875   REF  19  LAST 1505      0146            DBB3     EQUALS 1/ATEM1 +19D
 0876   REF  20  LAST 1505      0147            AXDSTEM  EQUALS 1/ATEM1 +20D
 0877   REF  21  LAST 1505      0151                FLATEMP  EQUALS 1/ATEM1 +22D
 0878   REF  22  LAST 1506      0152                Z3TEM    EQUALS 1/ATEM1 +23D    MUST FOLLOW FLATEMP

 0879   REF   6  LAST 1499      1346                DBVAL1   EQUALS DB
 0880   REF   5  LAST  604      0114                DBVAL2   EQUALS INTB15+
 0881   REF   6  LAST 1506      0115                DBVAL3   EQUALS INTB15+ +1

 0882   REF   7  LAST 1506      0116                DRIFTER  EQUALS INTB15+ +2

 0883   REF 913  LAST 1496      0154                UV       EQUALS MPAC
 0884   REF 914  LAST 1506      0157                ANET     EQUALS MPAC +3
 0885   REF 915  LAST 1506      0157                FUNTEM   EQUALS MPAC +3
 0886   REF 916  LAST 1506      0160                1/ANET   EQUALS MPAC +4
 0887   REF 917  LAST 1506      0161                ARET     EQUALS MPAC +5
 0888   REF 918  LAST 1506      0162                ABSAOS   EQUALS MPAC +6
 0889   REF 919  LAST 1506      0163                SIGNAOS  EQUALS MPAC +7
 0890   REF 920  LAST 1506      0164                -SIGNAOS EQUALS MPAC +8D
 0891   REF 921  LAST 1506      0165                HOLD     EQUALS MPAC +9D
 0892   REF  63  LAST 1401      0117                ACCRETRN EQUALS FIXLOC -1


 0893                        20,3762   00110 1  ZONE3MAX DEC     .004375        17.5 MS (35 MS FOR 1 JET) AT 4 SECONDS
 0894                        20,3763   00443 1  FLATVAL  DEC     .01778         .8 AT PI/4 RAD
 0895                        20,3764   77377 1  -.03R/S2 OCT     77377           -PI/2(7) AT PI/2

 0896   REF  45  LAST 1500      4744                .0125RS  EQUALS BIT8           PI/2(+8) AT PI/2
 0897   REF  46  LAST 1501      4733                1/.03    EQUALS POSMAX          2(7)/PI AT 2(7)/PI

 0898   REF   2  LAST 1413   20,3765   02213 0  PAXISADR GENADR PAXIS


A0899                                                                            THE FOLLOWING 4 CONSTANTS ARE JET
A0900                                                                            FAILURE MASKS AND ARE INDEXED
 0901                        20,3766   00110 1  -UMASK   OCT     00110          -U
 0902                        20,3767   00022 1           OCT     00022          -V
 0903                        20,3770   00204 1  +UMASK   OCT     00204          +U
 0904                        20,3771   00041 1           OCT     00041          +V
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L       SPS BACK-UP RCS CONTROL                                                 USER'S PAGE NO.   1        EO S4

P0001   PROGRAM NAME:  SPSRCS

R0002   AUTHOR:  EDGAR M. OSHIKA (AC ELECTRONICS)

R00021  MODIFIED:  TO RETURN TO ALL AXES VIA Q BY P.S.WEISSMAN, OCT 7, 1968

R00022 *MODIFIED TO IMPROVE BENDING STABILITY BY G.KALAN,FEB.14,1969
R0003   FUNCTIONAL DESCRIPTION:

R0004   THIS PROGRAM CONTROLS THE FIRING OF ALL RCS JETS IN THE DOCKED CONFIGURATION ACCORDING TO THE FOLLOWING PHASE
R0006   PLANE LOGIC.

R0007  *1. JET SENSE TEST (SPSRCS)

R0008  *IF JETS ARE FIRING NEGATIVELY,SET OLDSENSE NEGATIVE AND CONTINUE
R0009  *IF JETS ARE FIRING POSITIVELY,SET OLDSENSE POSITIVE AND CONTINUE
R0010  *IF JETS ARE NOT FIRING,SET OLDSENSE TO ZERO AND GO TO OUTER RATE LIMIT  TEST

R0012  *2. RATE DEAD BAND TEST

R0013  *IF JETS ARE FIRING NEGATIVELY AND RATE IS GREATER THAN TARGET RATE,LEAVE
R0014  *JETS ON AND GO TO INHIBITION LOGIC. OTHERWISE,CONTINUE.
R0015  *IF JETS ARE FIRING POSITIVELY AND RATE IS   LESS  THAN TARGET RATE,LEAVE
R0016  *JETS ON AND GO TO INHIBITION LOGIC. OTHERWISE,CONTINUE.

R0017  *3. OUTER RATE LIMIT TEST (SPSSTART)

R0018  *IF MAGNITUDE OF EDOT IS GREATER THAN 1.73 DEG/SEC SET JET FIRING TIME
R0019  * TO REDUCE RATE AND GO TO INHIBITION LOGIC. OTHERWISE,CONTINUE.

R0020  *4. COAST ZONE TEST

R0021   IF STATE (E,EDOT) IS BELOW LINE  E + 4 X EDOT > -1.4 DEG  AND EDOT IS LESS THAN 1.30 DEG/SEC SET JET TIME POSI-
R0023  *TIVE AND CONTINUE. OTHERWISE,SET JET FIRING TIME TO ZERO AND CONTINUE.
R0024   IF STATE IS ABOVE LINE  E + 4X EDOT > +1.4 DEG AND EDOT IS GREATER THAN -1.30 DEG/SEC, SET JET TIME NEGATIVE
R0026  *AND CONTINUE. OTHERWISE,SET JET FIRING TIME TO ZERO AND CONTINUE.

R0027  *5. INHIBITION LOGIC

R0028  *IF OLDSENSE IS NON-ZERO:
R0029  *       A) RETURN IF JET TIME HAS SAME SIGN AS OLDSENSE
R0030  *       B) SET INHIBITION COUNTER*AND RETURN IF JET TIME IS ZERO
R0031  *       C) SET INHIBITION COUNTER,*SET JET TIME TO ZERO AND RETURN IF SIGN
R0032  *          OF JET TIME IS OPPOSITE TO THAT OF OLDSENSE

R0033  *IF OLDSENSE IS ZERO:
R0034  *       A) RETURN IF INHIBITION COUNTER IS NOT POSITIVE
R0035  *       B) SET JET TIME TO ZERO AND RETURN IF INHIBITION COUNTER IS POSITIVE
R0037  **NOTE: INHIBITION COUNTERS CAN BE SET TO 4 OR 10 FOR THE P,AND UV AXES,
R0038  *RESPECTIVELY,IN SPSRCS. THEY ARE DECREMENTED BY ONE AT THE BEGINNING OF
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R0039  *EACH DAP PASS.

R0040   THE MINIMUM PULSE WIDTH OF THIS CONTROLLER IS DETERMINED BY THE REPETITION  RATE AT WHICH THIS ROUTINE IS CALLED
R0042   AND IS NOMINALLY 100 MS FOR ALL AXES IN DRIFTING FLIGHT.   DURING POWERED FLIGHT THE MINIMUM IS 100 MS FOR THE
R0044   P AXIS AND 200 MS FOR THE CONTROL OF THE U AND V AXES.

R0045   CALLING SEQUENCE:

R0046  *          INHINT
R0047                       TC      IBNKCALL
R0048                       CADR    SPSRCS


R0049   EXIT:

R0050           TC      Q
R0051   ALARM/ABORT MODE:     NONE

R0052   SUBROUTINES CALLED:     NONE

R0053   INPUT:       E,EDOT
R0054                TJP, TJV, TJU                     TJ MUST NOT BE NEGATIVE ZERO

R0055   OUTPUT:      TJP, TJV, TJU
R0056  *


 0057  *                     21,3646                       BANK    21
 0058  *REF   3  LAST 1477   21,2000                       SETLOC  DAPS4
 0059                        21,3646                       BANK

 0060   REF   1                                            COUNT*  $$/DAPBU

 0061   REF  14  LAST 1458   E6,1525                       EBANK=  TJU
 0062  *                     21,3646   00632 0  RATELIM2  OCT     00632           1.125 DEG/SEC
 0063   REF  28  LAST 1397   21,3647  3 4736 1  POSTHRST  CA      HALF

 0064   REF  33  LAST 1464   21,3650  51'505 0            NDX     AXISCTR
 0065   REF  15  LAST 1508   21,3651  55'525 0            TS      TJU
 0066  *REF   1              21,3652  11'745 1            CCS     OLDSENSE
 0067  *REF   1              21,3653  1 3673 1            TCF     POSCHECK        JETS FIRING POSITIVELY
 0068  *REF   1              21,3654  1 3676 1            TCF     CTRCHECK        JETS OFF. CHECK INHIBITION CTR
 0069  *REF  34  LAST 1508   21,3655  51'505 0  NEGCHECK  INDEX   AXISCTR         JETS FIRING NEGATIVELY
 0070  *REF  16  LAST 1508   21,3656  4 1525 0            CS      TJU
 0071  *REF 539  LAST 1505   21,3657  10 000 0            CCS     A
 0072  *REF 431  LAST 1504   21,3660  0 0002 0            TC      Q               RETURN
 0073  *                     21,3661  1 3663 0            TCF     +2
 0074  *                     21,3662  1 3663 0            TCF     +1              JETS COMMANDED OFF.SET CTR AND RETURN
 0075  *REF  35  LAST 1508   21,3663  51'505 0  SETCTR    INDEX   AXISCTR         JET FIRING REVERSAL COMMANDED. SET CTR,
 0076  *REF   1              21,3664  3 3705 0            CA      UTIME           SET JET TIME TO ZERO,AND RETURN
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0077  *REF  36  LAST 1508   21,3665  51'505 0            INDEX   AXISCTR
0078  *REF   3  LAST 1[illegible]2[illegible]   21,3666  55'770 1            TS      UJETCTR
0079  *REF 319  LAST 1504   21,3667   3 4755 1  ZAPTJ     CA      ZERO
0080  *REF  37  LAST 1509   21,3670  51'505 0            INDEX   AXISCTR
0081  *REF  17  LAST 1508   21,3671  55'525 0            TS      TJU
0082  *REF 432  LAST 1508   21,3672   0 0002 0            TC      Q
0083  *REF  38  LAST 1509   21,3673  51'505 0  POSCHECK  INDEX   AXISCTR
0084  *REF  18  LAST 1509   21,3674   3 1525 1            CA      TJU
0085  *REF   1              21,3675   1 3657 1            TCF     NEGCHECK +2
0086  *REF  39  LAST 1509   21,3676  51'505 0  CTRCHECK  INDEX   AXISCTR            CHECK JET INHIBITION COUNTER
0087  *REF   4  LAST 1509   21,3677  11'770 1            CCS     UJETCTR
0088  *                     21,3700   1 3702 0            TCF     +2
0089  *REF 433  LAST 1509   21,3701   0 0002 0            TC      Q                  CTR IS NOT POSITIVE. RETURN
0090  *REF   1              21,3702   1 3667 1            TCF     ZAPTJ              CTR IS POSITIVE.INHIBIT FIRINGS
0091  *REF 434  LAST 1509   21,3703   0 0002 0            TC      Q                  CTR IS NOT POSITIVE.RETURN
0092  *                     21,3704    00004 0            OCT     00004
0093  *                     21,3705    00012 1  UTIME     OCT     00012
0094  *                     21,3706    00012 1            OCT     00012
0095  *REF   3  LAST  133   F6,1745             OLDSENSE  EQUALS  DAPTREG1
0096  *REF 182  LAST 1502   21,3707   4 4753 0  NEGFIRE   CS      ONE                JETS FIRING NEGATIVELY
0097  *REF   2  LAST 1508   21,3710  55'745 1            TS      OLDSENSE
0098  *REF  18  LAST 1509   21,3711   3 1427 1            CA      EDOT
0099  *                     21,3712   1 3716 0            TCF     +4
0100  *REF 183  LAST 1509   21,3713   3 4753 1  PLUSFIRE  CA      ONE
0101  *REF   3  LAST 1509   21,3714  55'745 1            TS      OLDSENSE
0102  *REF  19  LAST 1509   21,3715   4 1427 0            CS      EDOT               RATE DEAD BAND TEST
0103   REF 540  LAST 1508   21,3716  22 0000 1            LXCH    A
0104   REF  70  LAST 1504   21,3717   4 0111 1            CS      DAPBOOLS           IF DRIFTBIT = 1, USE ZERO TARGET RATE
0105   REF   7  LAST 1497   21,3720   7 4744 0            MASK    DRIFTBIT           IF DRIFTBIT = 0, USE 0.10 RATE TARGET
0106   REF 541  LAST 1509   21,3721  10 0000 0            CCS     A
0107   REF   1              21,3722   3 4767 0            CA      RATEDB1
0108   REF 311  LAST 1505   21,3723   6 0001 0            AD      L
0109                        21,3724   0 0006 1            EXTEND
0110  *REF   1              21,3725   6 3735 0            BZMF    SPSSTART
0111   REF   1              21,3726   1 3652 1            TCF     POSTHRST +3

0112  *REF  40  LAST 1509   21,3727  51'505 0  SPSRCS    INDEX   AXISCTR            JET SENSE TEST
0113  *REF  19  LAST 1509   21,3730  11'525 0            CCS     TJU
0114  *REF   1              21,3731   1 3713 0            TCF     PLUSFIRE           JETS FIRING POSITIVELY
0115  *                     21,3732   1 3734 0            TCF     +2
0116  *REF   1              21,3733   1 3707 0            TCF     NEGFIRE            JETS FIRING NEGATIVELY
0117  *REF   4  LAST 1509   21,3734  55'745 1            TS      OLDSENSE           JETS OFF
0118  *REF  20  LAST 1509   21,3735   3 1427 1  SPSSTART  CA      EDOT               OUTER RATE LIMIT TEST
0119  *                     21,3736   0 0006 1            EXTEND
0120  *REF   1              21,3737   7 4766 0            MP      RATELIM1
0121  *REF 542  LAST 1509   21,3740  10 0000 0            CCS     A
0122  *REF   1              21,3741   1 3760 1            TCF     NEGTHRST           OUTER RATE LIMIT EXCEEDED
0123  *                     21,3742   1 3744 1            TCF     +2
0124  *REF   2  LAST 1509   21,3743   1 3647 0            TCF     POSTHRST           OUTER RATE LIMIT EXCEEDED
0125  *REF  21  LAST 1509   21,3744   3 1427 1            CA      EDOT               COAST ZONE TEST
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0126   REF  17  LAST 14[illegible]  21,3745  6 1752 0              AD        E
0127                          21,3746  0 0006 1              EXTEND
0128   REF   2  LAST  213     21,3747  7 1411 0              MP        DKDB            PAD LOADED DEADBAND. FRESHSTART: 1.4 DEG
0129                          21,3750  0 0006 1              EXTEND
0130   REF   1                21,3751  1 3766 1              BZF       TJZERO

0131                          21,3752  0 0006 1              EXTEND
0132                          21,3753  6 3762 1              BZMF      +7
0133   REF  22  LAST 15[illegible]  21,3754  3 1427 1              CA        EDOT
0134   REF   1                21,3755  6 3646 0              AD        RATELIM2
0135                          21,3756  0 0006 1              EXTEND
0136   REF   2  LAST 1510     21,3757  6 3766 0              BZMF      TJZERO
0137   REF  29  LAST 1508     21,3760  4 4736 0  NEGTHRST    CS        HALF
0138   REF   3  LAST 1509     21,3761  1 3650 0              TCF       POSTHRST +1
0139   REF   2  LAST 1510     21,3762  4 3646 1   +7         CS        RATELIM2
0140   REF  23  LAST 1510     21,3763  6 1427 1              AD        EDOT
0141                          21,3764  0 0006 1              EXTEND
0142   REF   4  LAST 1510     21,3765  6 3647 1              BZMF      POSTHRST
0143   REF 320  LAST 1509     21,3766  3 4735 1  TJZERO      CA        ZERO
0144   REF   5  LAST 1510     21,3767  1 3650 0              TCF       POSTHRST +1


0145   REF   5  LAST 1427        4766            RATELIM1 =           CALLCODE        = 00032, CORRESPONDING TO 1.73 DEG/SEC
0146   REF   1                   4767            RATEDB1  =           TBUILDFX         = 00045, CORRESPONDS TO 0.101 DEG/SEC


*** END OF LMDAP    .015 ***
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                  3:15 DEC.  2,1970                PAGE 1511

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H        REFERENCES

.00375A8 17,3736      1469   1 1465        -.1875    20,3227      1496   1 1499        -TPER     E4,1542  =  115    6  306  721
.0125RS      4744  =  1506   1 1500        -.7071    20,3103      1494   2 1489 1495   -UMASK    20,3766     1506   2 1502 1505
.0375AT4 17,3731      1469   1 1467        -AYU      E3,1713       111   1 1147        -UP       00,2620     1063   1 1062
.1AT2    17,3730      1469   1 1467        -AZ       11,2351       821                 -XMIN     16,3062     1431   1 1431
.1AT4    17,3727      1469   1 1465        -AZBIT       4746  =   821   1  821        -XTRANS   17,2147     1443   1 1443
.165...  23,3535      1257   1 1253        -BIT10    06,3004       181   1  177        -0.3D/S   01,2343      296   1  294
.3D      12,3751      1246   1 1218        -BIT12       7741  =   528   1  528        -0.6D/S   01,2342      295   1  294
.5SEC        4774     1096   3  516 1335   -BIT14       7736      1098   2 1423        -1/12     13,3713     1247   1 1237
.5SECB17 33,2176       598   1  598        -CCSPR    01,3132      1113   1 1115        -1/2+2    00,2444     1059   1 1080
.7071    20,3102      1494   2 1488 1495   -COMMAX   07,3745      1331   2 1313 1314   -1/8         7741     1098   3  528 1468
=======================================   -COMMAX-  07,3746      1331   2 1313 1314   -1CHK     43,3273     1287   5 1288 1293
(AT)A    27,2016        39   1  841        -COSB     E5,1644  =   123   1  123        -100MS    16,3615     1441   2 1470
(TBUF)A  27,2020        39   1  841        -DEC103   31,3747       827   1  826        -100MST6  16,3731     1471   3 1470
(TGO)A   32,3760       836   1  839        -DELGMB   E6,1675  =   136  18  914  918   -136MST6  16,3572     1440   2 1437 1440
(1/DV)A  27,2012        38   1  841        -EL       11,2363       821                 -15DEGS   06,2513      170   1  169
=======================================   -ELBIT       4753  =   821   1  821        -150MS    17,3110     1456   1 1453
+AZ      11,2356       821                 -ELR      05,3361       223   1  218        -160MST6  16,3527     1439   1 1439
+AZBIT       4747  =   821   1  821        -ENDERAS     7743      1098   1 1005        -2JETLIM  E6,1475      130   4  130 1437
+DECSGN  40,2303       401   1  400        -ENDVAC      6251      1009   2 1005 1023   -2SEC     10,3570     1382   1 1369
+DEC99   31,3750       827   1  826        -EPSILON     0155  =  1496   5 1488 1489   -30DEG    17,3725     1469   2 1462
+DOWN    00,2610      1063   1 1062        -EPSMAX   20,3104      1494   4 1488        -45DEGSR     7740  =  532   1  531
+EL      11,2370       821                 -FOURDEG  16,3530      1439   1 1438        -50DEGSR  25,2231      532   1  532
+ELBIT       4752  =   821   1  821        -FOURDT   27,2534       772   1  771        -50SC     04,3052     1185   1 1174
+LIMIT   42,3337       422   1  422        -GYROMIN  07,3526      1323   2 1323 1326   -70DEGS   06,2512      170   1  169
+MGA     E4,1652  =    117   5  314  692   -LOKONFG  23,2040       271                 -80DEGSR  25,2232      532   1  532
+ON      40,2413       402   3  402  441   -MAXADRS     4350  =  1286   1 1291        =======================================
+QMIN    17,2252      1445   1 1444        -MUDT     33,2031        44   1  880        /AF/CNST  31,2417      797   1  793
+RMIN    17,2262      1445   1 1445        -MUDTMUN  33,2035        44   1  893        /AFC/     E7,1463  =  140    6  140  819
+TJMINT6 17,3107      1455   4 1446 1454   -MUDT1    33,2033        44                 /BUF+     00,2721     1067   2 1066
+UMASK   20,3770      1506   1 1501        -OCT10       6222      1008   1 1008        /BUF-     00,2715     1066   2 1066
+XMIN    16,3064      1431   1 1431        -OCT630   16,2315      1423   1 1422        /LAND/    E4,1732  =  120   10  119  883
+XCRUIGE 17,2146      1443   2 1442 1443   -ON       40,2433       403   2  402  441   /MPAC+    00,2767     1068   2 1068
+150MST6 16,3612      1441   1 1437        -PHASE1      0752       100   7  214 1301   /MPAC-    00,2763     1068   2 1068
=======================================   -PHASE2      0754       101   8  214  872   /NORM     00,2732     1067   1 1067
*ENTER   36,3044       746   1  745        -PHASE3      0756       101   5  214  865   /NORM2    00,2725     1067   1 1067
*NBSM*   23,3673      1263   6  550  968   -PHASE4      0760       101   9  214 1383   /R/MAG    E4,1700  =  119    5  119  850
*PROCEED 36,3041       746   1  745        -PHASE5      0762       101   2  214  859   =======================================
*SMNB*   23,3671      1263   7  487  966   -PHASE6      0764       101   6  214 1395   ?            6001  =  749
=======================================   -QMIN     17,2256      1445   1 1444        ?GUIDSUB  31,2454      799   1  786
-.0112A8 17,3726      1469   1 1464        -RATEDB   E6,1476  =   130   7  130 1447   =======================================
-.025AT2 17,3732      1469   1 1467        -RMIN     17,2264      1445   1 1445        A            0000  =   92  542  158 1509
-.025AT4 17,3733      1469   1 1465        -RRLIMIT  25,2315       535   2  536        A-PCHK    13,3157     1216   4 1213 1225
-.035/S2 20,3764      1506   6 1498 1505   -SIGNAOS     0164  =  1506  10 1498 1504   AAPFG     E5,1452  =  121    1  121
-.05AT2  17,3734      1469   1 1464        -TJMAX    17,3740      1469   2 1465 1466   AAPFG*    E5,1462  =  121    1  121
-.15AT2  17,3735      1469   1 1464        -TJMIN    17,3742      1469   1 1467        ABCLOAD   41,2616      425   1  409

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE       MD MULTIPLY DEFINED
BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT             XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H      REFERENCES       SYMBOL      DEF    H      REFERENCES       SYMBOL      DEF    H      REFERENCES

ABDELV       1246  =   105    7  105 1495  ACCTHERE  20,3463     1500    1 1500       ADUPTEMP  04,3514     1391    1 1390
ABDVCONV  E7,1513  =   147    5  147  860  ACCWD     E5,1512  =   128    2  386  387  ADVAN     01,3214     1116    2 1110 1287
ABLOAD    41,2703      426    1  409       ACC4-2FL     0307  =    87    2  833  838  ADVANCE   34,3016      642    2  622  627
ABORT        5644  =  1384                 ACC4OR2X     4741  =    87    2  293 1443  AFCCALC1  31,3204      809    1  815
ABORTALM  21,2124      836    2  835  836  ACDT+C12  16,3736     1476    2 1428 1480  AFCCALC2  31,3214      809
ABORTON   21,3067      907    1  907       ACENTRAL  E6,1744  =   132    5 1473 1475  AFCCALC3  31,3230      809    1  809
ABORTS    32,2000  =    34    2  832  836  ACMODBIT     4737  =    68                 AFCCLEND  31,3236      810    1  810
ABORTS1   05,2000  =    29    1  830       ACMODFLG     0040  =    68    3  496  498  AFCSPOT   32,3504      819    2  819
ABORTYZ   16,2771     1430    1 1440       ACOS=0    00,3637     1084    4 1084 1086  AFDUMP    31,2223      793
ABORT2       5654     1383    1 1383       ACOSABRT  00,3723     1086                 AFTERTJ   17,2727     1453    3 1446 1452
ABOUTONE  15,2046      251    2  250  959  ACOSOVF   00,3721     1086    1 1034       AFTRFLTR  30,3215      913    1  912
ABRFG     E5,1416  =   121    2  121  826  ACOSSHR   00,3714     1086    1 1084       AFTRGUID  31,2435      798    1  810
ABRFG*    E5,1426  =   121    2  121  826  ACOSST    00,3625     1084    1 1084       AGAINMM   04,2073      228    1  228
ABRTABLE  36,2112      733    1  836       ACOSST2   00,3642     1084    2 1084       AGSBUFF   E4,1600  =   117   14  117  274
ABRTIGN   36,2531      740    1  733       ACOSZERO  00,3731     1086    1 1084       AGSBUFFE  E4,1615  =   117
ABRTJADR  05,3405      831    1  830       ACOS3     00,3652     1085    1 1086       AGSDISPK  32,2022      207
ABRTJASK  05,3406      831    1  831       ACTCENT   E3,1755      111    2  314  673  AGSEND    32,2122      208    2  208
ABS       00,3226     1076    4  823 1075  ACTIVE    23,2402      697    4  627  697  AGSINIT   32,2005      206    1  274
ABSAOS       0162  =  1506   12 1498 1501  ADDGRAV   15,2740      966    1  966       AGSK      E4,1420      113    6  196  208
ABSEDCTP  E6,1737  =   131    2 1435       ADDITIN   21,3563     1483    1 1482       AGSLIST   05,2407  =   193
ABSTJ     E6,1737  =   131    9 1436 1455  ADDPOS    30,2002      610    1  610       AGSRND1   32,2203      209    2  209
ABTCOF    E5,1550  =   122    5  122  834  ADDRESS      6103     1004                 AGSRND2   32,2211      209    2  209
ABTCONIC  12,3742     1201    3 1186 1199  ADDRWD       0116       96   83  921 1267  AGSUPDAT     0001  =   236
ABTFLGS   13,2000  =    30    1 1384       ADG       E5,1416  =   826    1  809       AGSVCALC  32,2036      207    1  207
ABTRDOT   E5,1574  =   122    2  122  834  ADG2TTF   E5,1426  =   826    1  807       AGSWORD      1324      107    4  208  229
ABVAL     00,3201     1075                 ADIAX     E3,1463      110    1  329       AHEAD5       6433     1016    1 1016
ABVALABS  00,3176     1075    1 1013       ADIAY     E3,1464      110    1  329       AIG       E7,1457      139    9  199  893
ABVEL     E7,1471  =   147    8  147  889  ADIAZ     E3,1465      110    1  330       AIGBANK   26,3332      585    2  579  584
ABVEL*       0130  =   122    3  888       ADRPCHN2     5366     1299    1 1299       AIMER     30,2665      849    1  849
ACADN83   36,3763      763    1  758       ADRRUPT   17,3240     1458    1 1458       AINGOTN   37,2217      376    1  376
ACADN85   36,2055  =   763    1  754       ADRS+1    43,3625     1292                 AINLA     E5,1434  =   128   33  128
ACCDOTQ   E6,1507      132    8  132 1490  ADRSCAN   27,2214      751    1  751       AK        E6,1761      137   21  137 1419
ACCDOTR   E6,1511  =   132    4 1476 1496  ADRSCHK   43,3574     1291    2 1291       AK1       E6,1762  =   137    1 1418
ACCEPTUP  04,3307     1338    2 1339       ADRSDIF1  E6,1746  =   133   12 1461 1469  AK2       E6,1763  =   137    1 1418
ACCEPTWD  41,2027      406    2  406       ADRSDIF2  E6,1744  =   133   11 1461 1468  ALARM        5567     1391   51  164 1458
ACCFCTZ1  E6,1575  =   134    1 1466       ADRS1     43,3244     1286    1  290       ALARM/TB  35,2423      631    1  621
ACCFCTZ5  E6,1576  =   134    1 1464       ADR40400     5742     1384    1 1384       ALARMIT   27,2526      771    1  771
ACCHERE   20,3431     1500    1 1500       ADR77770     5741     1384    1 1384       ALARMMGA  30,3756      924    1  914
ACCOKFLG     0317  =    88                 ADSRAX    E3,1466      110    1  329       ALARM1       5732     1384    1 1086
ACCOMP    11,2516     1230    1 1238       ADSRAY    E3,1467      110    1  329       ALARM2       5571     1381    2 1286 1393
ACCRETRN     0117  =  1506    2 1486 1504  ADSRAZ    E3,1470      110    1  329       ALCGKK    37,2627      385
ACCSOKAY     4751  =    88    3  219 1504  ADSUM     43,3543     1291    2 1291       ALDK      E5,1532  =   128    3  385  386
ACCSW        0122  =  1505    5 1502 1505  ADTIME    35,3236      670    1  670       ALFDK     E4,1422  =   117    1  385
ACCSWU    E6,1547  =   134    3  134 1502  ADUPBFM1  04,3662     1394    2 1390 1391  ALFLT     37,2577      385    1  384
ACCSWV    E6,1550  =   134    1 1502       ADUPBUFF  04,3515     1391    1 1389       ALFLT3    37,2644      385    1  385

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE       MD MULTIPLY DEFINED
BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                3:15 DEC.  2,1970                    PAGE 1513

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES

ALGORTHM 21,3143      1473                   ALTBITS  E7,1741  =  151     5  151  899 AOTEL    E7,1412      138     1  246
ALIGNCOA 37,2311       378     3  378        ALTCALC  22,2131     353     1  352      AOTMARK  07,2000      244     3  942  960
ALIGNOPT 15,3331       975     1  975        ALTCHK   33,2664     878     2  878  879 AOTMARK1 07,2000  =    29     2  244  251
ALTIP    37,2667       386     1  386        ALTCONV  33,2025      42     1  876      AOTMARK2 04,2000  =    28     2  249  983
ALINEX   26,2067       339                   ALTCRIT  33,2677  =  878     1  878      AOTSTALL 07,3712     1329     3  950 1330
ALINEZ   26,2113       340     1  339        ALTDSPLY 20,2226    1414     1 1413      APOPERI  23,2000  =    32     1  695
ALINTIME 43,2401       275     1  262        ALTERYZ  16,3002    1430     1 1430      APSESBIT     4747  =    79
ALK      E5,1446  =    128     6  128  386   ALTIM    E5,1530  =  128     2  384      APSESW       0202  =    79     2 1198 1199
ALKCG    37,2632       385                   ALTIMS   E5,1531  =  128     2  384  385 APSFLAG      0230  =    82     3  773  791
ALKCG2   37,2635       385     1  385        ALTM         0060  =   93     1  899      APSFLBIT     4737  =    82    16  213 1436
ALKLF    37,2676       386     1  386        ALTOUT   21,2240     899     1  898      APSIDES  12,3674     1200     1  695
ALLCOAST 20,2204      1408     4  230  761   ALTRATE  E7,1711  =  151     5  151  899 APSTGO   27,2671      775     1  774
ALLDC/OC 41,3011       427     2  425  426   ALTROUT  21,2167     898                 APSVEX   33,2000       39     3  758  860
ALLJETS  17,3225      1458     2 1457 1458   ALTSAVE  E7,1712  =  151    14  151  900 ARATE    22,2771      364     3  364
ALLOOP   37,2536       384     2  383  384   ALTSCALE     0272  =   85                ARCCOS   00,3612     1084     1 1013
ALLOWGTS E6,1502  =    134     7 1412 1504   ALTSCBIT     4743  =   85     1  884      ARCOMP   21,2176      898
ALLREAD  25,3074       553     1  554        ALTSYST  16,3431    1437     2 1437      ARCONV   21,2000       42     1  898
ALLSET   35,3507       677     1  677        ALXXXZ   37,3076     389     1  383      ARCONV1  33,2027       42     1  877
ALL1S    26,3703       593     1  592        ALX1S    E5,1444  =  128     4  383  389 ARCSIN   00,3610     1084     1 1013
ALL3DEC  42,3573       436     1  434        AM       E6,1735     135     3  352  364 ARCTAN   13,2510     1137     5  478 1134
ALL4BITS 11,2373       822     2  820        AMEMORY  E4,1400  =  113                 ARCTANXX 13,2536     1137     2 1137
ALM/END  43,2120       264    24  262  281   AMG      E7,1460     139     2  570  579 ARCTRGSP 30,3622      922     3  920
ALMCADR      1363  =   108    14  108 1384   AMOVED   11,3627    1243     1 1242      ARCTRIG  23,3320     1251     9  299 1254
ALMCYCLE     4145      446    14  407  447   ANET         0157  = 1506    11 1499 1505 ARET         0161  =  1506     3 1500 1504
ALMNCADR     5734     1384                   ANGLTIME 22,3001     364     1  364      ARG+         7265     1036     1 1036
ALMXIT   35,2040       621     2  641        ANGTERM  E4,1664  =  119     3  119  810 ARGHI    00,3417     1080     2 1081
ALMXITA  35,2036       621     1  638        ANGX     E5,1500  =  128     2  387  388 ARGLO    00,3470     1081     1 1081
ALOAD    41,2732       426     1  409        ANGY     E5,1476  =  128     1  388      ARGZERO      7305     1036     1 1036
ALOADED  13,3150      1216     2 1215 1216   ANGZ     E5,1472  =  128     1  388      ARGZERO2     7302     1036     1 1036
ALPHA        0010  =  1202     4 1174 1176   ANG1CHEK 27,3273     851     1  850      ARG90        5067     1102     1 1102
ALPHAM   E4,1467  =    114    14  114 1236   ANTENBIT     4740  =   85    12  323  596 AROUT1SF 40,2704      419     1  417
ALPHAQ   E6,1424  =    129     6  195 1486   ANTENFLG     0267  =   85                ARTHINSF 40,3076      432     1  431
ALPHAR   E6,1425  =    129     5 1409 1486   AOG      E7,1461     139     7  199  893 ARTIN1SF 40,3111      433     1  431
ALPHASB  E4,1600  =    118     4  118  314   AORBSFLG     0315  =   88                ARTOA    21,2001       42     1  899
ALPHATRY 21,3345      1479                   AORBSYST     4747  =   88     2 1436 1437 ARTOA2   21,2002       42     1  899
ALPHAV   E4,1431  =    114    33  114 1245   AORBTFLG     0310  =   87     1  743      ARTOUTSF 40,2677      419     2  417  418
ALRM503  24,2775       509     1  509        AORBTRAN     4742  =   87     2 1443 1445 ARUPT        0010  =    92    13  153 1458
ALRM514  24,2307       499     1  497        AOSQ     E6,1537     133    29  133 1497 ASCALE   13,3707     1247     1 1232
ALRM525  24,2663       507     1  505        AOSQTERM E6,1545     133     7  133 1427 ASCENT   30,2321      845     3  840  844
ALRM526  24,2305       499     1  496        AOSR     E6,1541  =  133    11  740 1497 ASCFILT  34,2000  =    34     1  843
ALRM527  24,2776       510                   AOSRTERM E6,1546  =  133     6 1409 1427 ASCSPOT  23,2503      867
ALRM530  24,3114       511     1  511        AOSU     E6,1543  =  133     3 1497 1498 ASCTERM  30,2721      850     2  850  852
ALSIGNAG     7544     1043     5  885 1069   AOSV     E6,1544  =  133                 ASCTERM1 30,2731      850     1  850
ALSK     37,3103       389     1  386        AOTAZ    E7,1404     138     5  154  958 ASCTERM2 30,2746      850     1  846
ALT          1124  =   104     6  104 1136   AOTCODE      0735  =  100    12  196  961 ASCTERM3 30,2747      850     4  850

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                        3:15 DEC.  2,1970                      PAGE 1514

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H      REFERENCES       SYMBOL      DEF     H      REFERENCES       SYMBOL      DEF     H      REFERENCES

ASCTERM4  30,2750      850    1  843        ATTSCALE  42,2053      282    1  282        AXO       E3,1715      111    1 1147
ASECXT    E5,1573  =   128                  ATTSTEER  17,2661  = 1452    1 1444        AXT       01,2344     1087    1 1012
ASENT     30,2000  =    34    3   39  854   ATY       E4,1754  =  120    5  120  851   AZ           1347      107    4  108  956
ASENT1    27,2000  =    33    4   38  854   AUG2      07,3577     1325    1 1324        AZEACH    11,2374      822    2  821
ASENT2    07,2000  =    29    1  851        AUG3      07,3550     1324    1 1325        AZEL      14,3744      956    1  956
ASENT3    05,2000  =    29    1  852        AURLKON1  23,2034      271    1  271        AZIDUMMY  E7,1645  =  149    1  149
ASENT4    14,2000  =    31    1  852        AURLOKON  23,2000      271    1  269        AZIMUTH   E5,1400  =  127    5  127  387
ASENT5    30,2000  =    34    1  854        AUTOMANV  26,2166      474                  AZINCR    E7,1556  =  149    4  149  804
ASENT6    33,2000  =    34    1  855        AUTOMBIT     4752  =    86    5  182  605   AZINCR1      1266  =  106    6  106  821
ASENT7    23,2000  =    32                  AUTOMODE     0301  =    86                  AZO       E3,1711      111    1 1146
ASINEX    00,3707     1085    1 1084        AUTRATE1     4753  =    88                  AZCNTRAL  E6,1746  =  132   13 1473 1475
ASKIFNRM  10,2530     1359    1 1358        AUTRATE2     4752  =    88                  ==========================================
ASTAR     15,3067      970    1  970        AUTR1FLG     0321  =    88                  B*RNB*B*  36,2135      733    1  756
ASTNBIT      4740  =    77    1  738        AUTR2FLG     0320  =    88                  BACKHAND  17,2532     1449    1 1449
ASTNCLOK  32,3204      788                  AUXFLAG      0147  =    76                  BACKP     16,2316     1423    1 1471
ASTNDEX      4362  =   789    1  788        AUXFLBIT     4752  =    76    3  861  862   BADDES    25,2623      546    1  546
ASTNFLAG     0154  =    77    4  737  759   AVECTR       0024  = 1148    7 1143 1145   BADEND    07,3662     1328    2  563 1327
ASTNRET   32,3210      788    1  746        AVEGEXIT     1252  =  105    7  105  758   BADRAD    25,3206      555    6  555  558
ASTNRETN  36,3030      746    1  745        AVEGFBIT     4747  =    78    6  186  858   BADROOT   31,3656      825
ASTOK     26,3431      586    1  506        AVEGFLAG     0163  =    78    3  228 1245   BADR2     12,3664     1199    2 1198
ASTREND   27,3170      779    1  779        AVEGOUT   37,3517      859    1  858        BADX      12,2302     1177    3 1175
ASTROMSK  10,3517     1372    1 1368        AVEIT     07,2276      253    1  250        BAILOUT      5634     1382    1 1421
ASTROTIM  04,2672      701    1  702        AVEMDBIT     4753  =    81                  BAILOUT1     5716     1384    7  244 1377
AT        E4,1662  =   119    7  119  849   AVEMIDSW     0225  =    81    3  320 1222   BALLANGS  26,2266      477    4  340  519
AT/RCS    30,2000       39    1  846        AVERAGEG  33,2267      861                  BALLEXIT     1342      107    2  477  478
ATAN=90   13,2543     1137    1 1137        AVERTRN   22,3707      864    1  864        BANKCALL     4616      998  323  207 1486
ATDECAY   36,2012       38    1  841        AVESTAR   07,2241      252    2  252  253   BANKJUMP     4640      998   22  271 1504
ATIGINC   E7,1400      138    4  387  728   AVETOMID  13,3467     1221    1  864        BANKMASK     4350  = 1099    3 1010 1023
ATMAG     34,3642      843    2  749  837   AVFLAG       0050  =    69    7  629  776   BANKRUPT     0016  =   92   13  155 1421
ATMAGAD   32,3765      837    1  834        AVFLAGA   35,2347      629    6  621  728   BANKSET      0165       99   14 1000 1372
ATMAGADR  36,3140      749    1  740        AVFLAGP   35,2354      629    6  621  728   BASEOTP   E4,1537  =  115    2  704  705
ATOPCSM   13,2661     1210    5   37 1243   AVFLBIT      4747  =    69                  BASEOTV   E4,1517  =  115    2  704  705
ATOPLEM   13,2734     1211    4   37 1243   AVGEND    22,3661      863    1  859        BASETEMP     1061  =  232    2  232
ATOPOTH   13,2661  =    37    1  711        AVGEXIT      1252  =  105    7  739  865   BASETHP   E4,1567  =  115    2  704
ATOPTHIS  13,2734  =    37                  AVOUTCAD  37,3535      859    1  859        BASETHV   E4,1504  =  115    2  704
ATP       E4,1760  =   120    4  120  851   AX*SR*T   23,3675     1263    2  601 1262   BASETIME  E4,1513  =  115    3  704  705
ATR       E4,1756  =   120    3  120  849   AXC       01,2351     1087    1 1012        BAWLANGS  26,2000  =   33    2  339  477
ATTACHED  43,3142      297    1  262        AXDSTEM      0147  = 1505    4 1502 1503   BB           0006  = 1300    5 1299 1306
ATTACHIT  43,3147      297    1  297        AXISCTR   E6,1505  =  132   40  132 1509   BBANK        0006  =   92   46  153 1381
ATTCADR      1307      106    6  106 1331   AXISDIFF  17,3722     1469    2 1449 1461   BBSERVDL     5743     1384    1 1383
ATTCHK    15,3553      980    1  965        AXISDIST  E6,1605  =  134    8 1463 1503   BCDU      E6,1676      135   13  135 1331
ATTCK2    42,2035      282    2  281  282   AXISGEN   23,3441     1255    4  942  971   BDDV         7603     1044    2 1011 1044
ATTFLAG      0150  =    76    1  979        AXISGEN1  23,3447     1255    1 1255        BDOT      26,2010       53    1 1143
ATTFLBIT     4753  =    77    3  976  980   AXISGEN2  23,3476     1255    1 1256        BDSU         7062     1029    1 1011
ATTPRTO      1311  =   106    2  369 1331   AXISGEN3  23,3521     1256    1 1256        BDTOK     27,2461      771

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS               J DEFINED BY JOKER OR ERASE ANYWHERE       MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES         SYMBOL      DEF     H        REFERENCES

BEE17     04,3027     1185    1 1196          BITS8/7   21,3076      907    1  907          BNKOPTN   43,3315     1287
BEE19     04,3041  =  1185    1 1193          BITS8,9   16,3617     1441    1 1434          BOOLSMSK  20,2114      293    3  292  293
BEE22     04,3045  =  1185    1 1176          BITS9+7   43,3044      287    1  287          BOOLSTRT  05,3063      218    1  212
BEGDES    25,2573      545    3  510  541     BITS9,11     5014  =  1433    1 1432          BOOP      37,2755      387    1  387
BEGDES29  24,3356      599    2  598  599     BIT1         4753     1095   70   66 1492     BORTENT      5574     1391    2 1383
BELOW1    10,2247     1301    1 1302          BIT1H     32,3533      819    1  818          BOTHABRT     5721     1384    1 1384
BELOW2    10,2254     1301    2 1301          BIT10        4742     1095   53   65 1487     BOTHAXES  20,3320     1498    1 1502
BELOW3    10,2300     1301    1 1301          BIT10+15     6021      516    1  516          BOTHJOBS  10,2665     1361    1 1361
BELOW4    10,2303     1301    2 1301          BIT11        4741     1095   33   43 1476     BOTHLITS  25,3640      612    1  613
BESTI     E5,1755  =   124   13  124  962     BIT11+1   25,2372      537    1  537          BOTHPAD   22,3377      715    1  715
BESTJ     E5,1756  =   124    5  124  940     BIT12        4740     1095   44   65 1499     BOTHPOLY  32,3625      833    1  833
BETAM     E4,1471  =   114    4  114 1245     BIT12,14     7712  =   552    1  551          BOTHSGN   40,2377      402    1  402
BETASB    E4,1602  =   118    3  118  314     BIT13        4737     1095   59   40 1497     BOTHSHIP  22,3336      714    1  715
BETAV     E4,1437  =   114   11  114 1232     BIT13-14     4355  =  1099    6  281 1410     BOV(B)    01,2457     1090    1 1012
BGIM      16,3735     1476    1 1476          BIT14        4736     1095   91   65 1500     BPL       01,2503     1091    1 1091
BGIM23    16,2203     1413    1 1413          BIT14+7   26,2252      475                    BPL/BMN   01,2474     1091    1 1012
BHIZ      01,2452     1090                    BIT14COM  10,2276     1301    1 1301          BRANCH       6723     1025   11  878 1091
BIASCALE  22,3167      367    1  367          BIT15        4735     1095   54   67 1482     BRATE     E6,1725  =   135    3  364  367
BIASFACT  32,3536      820    1 [illegible]   BIT15+6      7734     1098    1 1360          BRNCHCON  40,2600      405    1  405
BIASHI    00,2566     1061    1 1080          BIT15/14  41,3237      437    2  437  439     BRNCHCTR  12,2267     1177    1 1178
BIASLO    00,2270     1054    1 1081          BIT2         4752     1095   55   66 1490     BRSPOT1   31,2617      802
BIASTEMP  E6,1711  =   135                    BIT3         4751     1095   42   66 1431     BRSPOT2   31,2702      804
BIBIBIAS  37,3416      857    1  243          BIT3H     34,3715      844    1  843          BRSPOT3   31,3057      807
BIGAOS    20,3341     1498                    BIT4         4750     1095   57   66 1462     BRSPOT4   31,3243      810
BIGIQ     20,2617     1488    1 1488          BIT4H     30,3030      855                    BRUPT        0017  =    92    4  830 1458
BIGTIME   12,3437     1196    1 1195          BIT5         4747     1095   51   55 1473     BSUBO     26,2016       53    1 1143
BINCON       4363      441    3  441 1099     BIT6         4746     1095   64   66 1465     BUF          0130       96  169   97 1399
BINRFUND  40,3106      432    3  431  433     BIT7         4745     1095   44   66 1442     BUF+      00,2422     1058    3 1057 1060
BIN3         6245  =   563    2  556          BIT7+9PV  23,2273      519    1  519          BUF-      00,2416     1057    3 1057 1060
BITSET       5020  =   907    1  907          BIT8         4744     1095   45   66 1506     BUFNEG    00,2531     1060    1 1057
BITSOFF   41,2674      426    1  426          BIT8,9    17,3111     1456                    BUFNORM   00,2500     1060    1 1060
BITSOFF1  41,2701      426    1  426          BIT9         4743     1095   44   56 1504     BUFPOS    00,2516     1060    2 1057 1060
BITS15+7  10,3522     1372    1 1359          BLANKCHK  10,3132     1366                    BUFZERO   00,2363     1057    1 1060
BITS2-10     5011     1097    1   37          BLANKCON  40,2614      405    2  405  418     BUF2         0133       97   30  244 1382
BITS3&4      5751  =  1331    2 1310 1311     BLANKDEX     4752  =   746    1  735          BURNBABY  36,2126      733    3  754  840
BITS4+10  10,3525     1372    1 1371          BLANKDSP  41,3516      453    2  453          BUSYMASK  10,3527     1372
BITS4&5      4763     1096    3  165  281     BLANKET      5464     1354   12  271 1373     BUTTONS   05,2703      215
BITS4&6      4771  =  1331    5  211 1310     BLANKRET     0114  =    96                    BVECTOR   E7,1524  =   145   24  145 1150
BITS4-5   07,3744     1331    1 1316          BLANKSUB     4255      456    2  439 1366     BVECTR       0032  =  1148    5 1144
BITS4-7   33,3154      883    1  875          BLNKBBNK     4302      456    1  456          BVSU         7036     1028    1 1011
BITS5+11  10,3524     1372    3 1364 1371     BLNKSUB1  40,3505      456    2  456          BYLMATT   15,3545      980    2  976  977
BITS5,8   25,3401      558    2  558          BLNKWAIT  36,3345      756    1  757          BZE/GOTO  01,2467     1091    1 1012
BITS6&15  06,3003      181    1  180          BLOAD     41,2743      427    1  409          B12-1        4356  =   461
BITS7+4   10,3523     1372    2 1358          BLOCKTOP  E6,1547      134   12  134 1505     B12T14       7722  =  1099    1 1014
BITS7&8   06,2777      181    2  164  176     BNKCHK    43,3716     1293                    B14+B2    25,2635      546    1  546

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT             XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF      H       REFERENCES      SYMBOL      DEF      H       REFERENCES      SYMBOL      DEF      H       REFERENCES

B2/A2     13,2504     1136    1 1138         CALLACCS 20,2133     1407    1 1407         CDUSPOTZ     0770  =   101    3  872  911
B2F8      15,3177      972    1  972         CALLCODE     4766    1096    5  279 1510 CDUT         0035  =    92   12  187  606
B2XSC     13,2502     1136    1 1136         CALLDGCH 26,3643      592    4  516  593 CDUTCMD      0053  =    92    2  536  907
B3TOB4    01,2576     1094    2 1093 1094 CALLGMBL     4747  = 1412    3 1428 1483 CDUTEMPX     1155      104    3  870  893
B5OFF         5563    1380   11  299  717 CALLQERR 17,2072     1442    1 1441         CDUTEMPY     1156      104    3  870  893
B5TOB8    01,2465     1090                   CALLRECT 11,3331     1238    4 1237 1238 CDUTEMPZ     1157      104    2  870  872
======================================== CALLRPRT 13,2454     1135    1 1135         CDUTIMEF E5,1436  =   127
C*MM*N1   23,3653     1262    2 1262 1263 CALLRTRP 13,2364     1133    1 1133         CDUTIMEI E5,1434  =   127
C*MM*N2   23,3655     1262    1 1262         CALLT-35 36,2211      734    1  734         CDUTODCM 22,2410      357    3  351  481
C*MM*N3   23,3666     1262    2 1262 1263 CALOOP   14,3340      947    1  947         CDUTRIG  23,3537     1259   11  487  931
CA+ECE    07,3140     1314    1  170         CALOOP1  14,3366      947    2  947         CDUTRIGS 23,3547     1259    3 1259 1262
CADRFLSH      0372     100    6  155 1370 CALSAM   15,2540      962                   CDUWXFR  30,3441      918    1  918
CADRMARK      0373     100                   CALSAM1  15,2537      962    1  961         CDUX         0032  =    92   29  188 1438
CADRMASK  10,3530     1372    1 1363         CAL53A   14,3327      947    1  930         CDUXCMD      0050  =    92    5  174 1419
CADRSTOR      1042     102   13  222 1368 CAM      E6,1733  =   135    4  135  353 CDUXD    E6,1635      134   26  134 1450
CADRTAB   01,2001  =   239    1 1306         CANTR00  04,2065      227    1  227         CDUY         0033  =    92   14  254 1451
CAGESUB   06,2735      180    1  164         CANV37   04,2134      228    1  228         CDUYCMD      0051  =    92    2  174 1418
CAGESUB1  06,2743      180    1  174         CATLOG   14,2346      951   12  938  962 CDUYD    E6,1636  =   134    8  369 1451
CAGESUB2  06,2746      180    1  166         CCALL        6626    1023    1 1011         CDUZ         0034  =    92   17  169 1451
CAGETEST  07,3641     1327    7 1311 1324 CCSHOLE      5705    1383   22  376 1466 CDUZCMD      0052  =    92    2  175 1418
CAGETSTJ  07,3653     1327    5 1310 1319 CCSL         7663    1046    1 1099         CDUZD    E6,1637  =   134    7  369 1451
CAGETSTO  07,3646     1327    3 1317 1318 CD*TR*G  23,3543     1259    1  478         CDUZDLIM 30,3773      925    1  914
CALCDIF   E5,1460  =   127                   CD*TR*GS 23,3555     1260    3 1259 1262 CEARTH       0016  =   936    3  935  939
CALCGA    23,3353     1253    4  374  974 CDELF/2      0016  = 1268                   CENTANG  F7,1620      141    7  198  729
CALCGA1   23,3413     1253    1 1254         CDESBIT      4735  =    85    2  590         CG       E5,1602  =   122   15  122  913
CALCGRAV  33,2730      880    2  867  881 CDESFLAG     0264  =    85    2  271  510 CGCALC   31,3245      810    3  798
CALCGRV1  33,2765      880    1  880         CDHMVR   34,3133      647    2  627  637 CGOTO        6703     1024    1 1011
CALCGTA   23,3247     1244    4  944  971 CDRVE    06,2012      156                   CHAN     E5,1443  =   127
CALCMAN2      0053  =    70    2  364  365 CDU*NBSM 23,3661     1262    5  705  982 CHANDSP  41,2504      416    1  415
CALCMAN3      0052  =    70    1  364         CDU*SMNB 23,3646     1262    3  518  957 CHANGEVB 07,2611      260    1  260
CALCN83   36,3462      758    1  763         CDUANG   E5,1543  =   127                   CHANG1       5122     1103    4  378 1292
CALCN85   36,3376      757    1  732         CDUDANG  E5,1440  =   127                   CHANG2       5126     1103    1 1003
CALCPERR  16,3446     1437    2 1413 1438 CDUFLAG  E5,1461  =   127                   CHANJOB  01,2706     1108    4 1103 1115
CALCPHI   22,2701      362    1  362         CDUINC   10,3660     1398                   CHANLOAD 41,3161      430    1  430
CALCRGVG  31,3003      806    2  798  799 CDUIND   E3,1474  =   110   21  166 1324 CHAN12       0012  =    93   74  165 1490
CALCRVG   33,2776      880    1  861         CDULIMIT E5,1443  =   127                   CHAN13       0013  =    93   25  212 1456
CALCSMSC  10,2030     1265    7  937  981 CDULOGIC 10,3576     1397   15  249 1260 CHAN14       0014  =    93   23  174 1419
CALCTFF   27,3470     1277    1  721         CDUNDX   E5,1536  =   127                   CHAN30       0030  =    93    9  161 1410
CALCTHET  27,2255      765                   CDUREADF E5,1441  =   127                   CHAN31       0031  =    93   21  281 1444
CALCTPER  27,3465     1277    1  721         CDUREADI E5,1442  =   127                   CHAN32       0032  =    93    3  158  862
CALCXY    26,3623      592    1  590         CDUS         0036  =    92    4  196  527 CHAN33       0033  =    93   23  167  895
CALC2BIT      4752  =    70                   CDUSCMD      0054  =    92                   CHAN5        0005  =    93    6  212 1450
CALC3BIT      4751  =    70                   CDUSPOT      0766      101   33  101 1261 CHAN6        0006  =    93    3  212 1413
CALL          6640    1023    1 1091         CDUSPOTX     0772  =   101    3  872  911 CHAR         0117  =    96    5  398  400
CALL/ITA  01,2507     1091    1 1012         CDUSPOTY     0766  =   101    3  872  911 CHARALRM 40,3434      446   17  398  446

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BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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SYMBOL    DEF     H      REFERENCES       SYMBOL    DEF     H      REFERENCES       SYMBOL    DEF     H      REFERENCES

CHARIN   40,2077    398   1 1338          CHKVISFZ 16,2740   1429   1 1428          CNTABTAD 21,2104    830   1  830
CHARIN2  40,2112    398   2  398          CHNL12      0066 = 1476   3 1476          CNTCHK   07,2235    252
CHECKALT 30,2755    850   1  850          CHRPRIO     4355    461   7  158 1392     CNTONDEX    4762 =  745   5  733  747
CHECKB      7750   1302   1 1299          CH31TEMP E6,1443    130   2 1432 1446     CNTRCHK  43,3466   1289
CHECKCTR 12,2644   1183   2 1177 1195     CH5MASK     1262    105  11  190 1505     CNTRCON     4771 = 1286   1 1289
CHECKG   37,2332    378   2  375  376     CH6MASK     1263    105   6  191 1440     CNTRLOOP 43,3467   1289   1 1290
CHECKG1  37,2335    378   1  379          CIRCL    34,2372    636   3  635          COAALIGN 37,2301    378   1  376
CHECKIN  17,2246   1445   1 1444          CIRCULAR 12,3660   1199   1 1198          COARFINE 14,3360    947
CHECKMAX 22,2117    352   1  352          CKIMUSE     5244   1121                   COARS    07,3010   1312   1 1312
CHECKMM     5321   1294   5  735  833     CKMDMORE 43,3740 = 1388                   COARSE   14,3565    952   3  947  974
CHECKNJ  43,3332   1287   3 1287 1292     CKMID2   13,3633   1224   1 1242          COARSERR 07,3110   1314   2 1313
CHECKP   16,3054   1431   1 1431          CKMODCAD 43,2375    274   3  265  273     COARSFET 15,2161    930   1  948
CHECKP22 43,2672    280   1  280          CKRNDBIT 43,2666    280                   COARSTOL 07,3116   1314   1 1314
CHECKRR  43,2662    280   1  280          CK[illegible]FALL  32,2105    208   1  208          COARSTYP 15,2171    931   1  930
CHECKTAB 04,2072    227   1  227          CK4V32   04,3506   1391   3 1390          COARS1   07,3015   1312   1 1312
CHECKUP  16,2041   1411   1 1411          CLEANDSP 10,2454   1357   2  735  746     COARS2   07,3040   1313   2 1313 1314
CHECKYAW 07,2667    851   2  850  851     CLEANEND 10,3233   1367   1 1365          COASCODE 07,2137    247   1  246
CHEKAXIS 27,2137    482   1  482          CLEAR    40,2467    404   1  399          COASTDB  E6,1603 =  134   7 1463 1503
CHEKBITS 16,2000   1410   2 1411 1421     CLEARMRK    5474   1354   2  225 1354     COASTSET 36,3606    761   1  760
CHEKMORE 16,2016   1410   1 1420          CLEAR1   40,2522    404   1  404          COASTTJ  17,3422   1463   4 1463 1469
CHEKSTIK 17,2323   1446   1 1444          CLOAD    41,2760    427   1  409          COATRIM  15,3254    974   1  971
CHEXERR  32,2536    571   1  570          CLOCKCON 10,3543   1373   1 1358          COB         0040 = 1149   4 1143 1144
CHKBIT10 17,2205   1444                   CLOCPLAY 10,2473   1358   2  745          CODE        0124 =   96  15  399  453
CHKBMAG  30,2541    848   1  847          CLOG2/32 30,3102    856   1  856          CODE1TO6 07,2123    246   1  246
CHKCDUS  07,3073   1313   1 1314          CLOKJOB  36,2737    744   1  744          CODE500  32,3254    789   1  789
CHKDATA1 20,2014    292   1  292          CLOKTASK 36,2717    744   4  243  744     CODE7    07,2107    246   2  246
CHKFAIL1    5603   1381   1 1384          CLOSEADR 21,3630   1484   1 1484          COEFCTR     0160 = 1496   7 1494 1495
CHKFAIL2    5607   1381   1 1391          CLOSEOUT 17,3236   1458   4 1454 1484     COEFF    20,3213   1496   4 1494 1495
CHKINGTS 17,2612   1450   1 1450          CLPASHI  40,2505    404   1  404          COEFFQ   E6,1627    134   7  134 1495
CHKLASTY 21,2643    904   1  904          CLPASS      1015    102  13  222  454     COEFFR   E6,1630 =  134   6 1457 1495
CHKLINUS 26,2201    474   2  474          CLRADMOD    6011    516  11  229  838     COF      E6,1670 =  135  45  352  483
CHKLIST  05,3532    392                   CLRMOON  13,2711   1211   2 1212 1239     COFMAXGO 22,2176    353
CHKMINTJ 17,3623   1467   2 1465 1468     CLROVFLW 13,2512   1137   1 1137          COFSKEW  E6,1725 =  135   9  135  355
CHKNOVAC 01,3637   1305   1 1308          CLRXFLAG 30,2716    850   1  851          COGA     E5,1765 =  125  16  125 1198
CHKPOOH  43,2123    264   6  280  290     CLR5     40,2525    404   1  404          COGAFBIT    4750 =   80
CHKPRIO  10,2427   1356   1 1355          CLUPDATE 35,3664    681   1  680          COGAFLAG    0203 =   79   3 1186
CHKRTIME 16,2672   1428   4 1428 1429     CLUPLOCK 04,3361   1339   1 1339          COGAMAX     0016 = 1203   4 1193 1196
CHKSAB   14,3261    946                   CL1/NET+ 20,3462   1500                   COGAMIN     0010 = 1203   3 1194 1196
CHKSB    14,3263    946   1  946          CMNTOVFL 12,2315   1178   1 1178          COGAOVFL 12,2764   1186   2 1186 1198
CHKSD    14,3302    946   1  946          CMOON       0022 =  936   2  935  936     COGLOLIM 04,3062   1185   1 1197
CHKSDA   14,3323    946   1  946          CMOONBIT    4740 =   79   1  213          COGUPLIM 04,3060   1185   2 1194
CHKSDATA 14,3256    946   2  945  951     CMOONFLG    0173 =   79   9   37 1211     COLINEAR 04,3160   1188   1 1188
CHKSRCH  26,3444    588   1  592          CMPONENT 30,2612    848   1  847          COLREG      1117 =  104   7  104 1243
CHKSUPR  43,3646   1292   1 1292          CMPX1    E5,1445 =  128   2  386          COMADRS  43,3533   1290   2 1292
CHKTEMX  37,3641    871   1  871          CNGL     22,2400    357                   COMFAIL  36,2571    742   2  242  862

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COMFAIL1  36,2610        742   1  745           CON2      10,2312       1302   1 1299           CSI/B     34,2125        633   1  641
COMFAIL2  36,2623        742   1  745           COM2ADR      5422       1299   1 1299           CSI/B1    34,2165        633   3  638  641
COMFAIL3  36,2612        742   3  731  733      COPIES    10,2735       1362   1 1355           CSI/B2    34,2176        633   1  640
COMFAIL4  36,2614        742   2  731  732      COPIES2   10,2736       1362   1 1360           CSI/B22   34,2216        634   1  634
COMFLAG      5511       1375   2  743 1375      COPINDEX     0164  = 1373  23 1356 1370         CSI/B23   34,2224        634   1  634
COMMAND   E3,1471  =     110   6 1309 1314      COPMPAC      0157  = 1372   3 1368 1371         CSI/B23D  34,2237        634   1  634
COMMEGS   20,2570       1488   1 1488           COPYCYC   33,2423        867   3  861  868      CSI/B3    34,2330        635   1  635
COMMFX    43,3525       1290   2 1292           COPYCYCL  33,2275        861   1  877           CSI/CDH   35,2000  =      35   3  621  661
COMMINIT  30,2300        841   2  833  841      COPYCYC1  33,2546        876   1  874           CSI/CDH1  34,2000  =      34   1  632
C[illegible]OUT  12,2747  11[illegible]   1 1199   COPYCYC2  33,2627        877                CSI/SOL   34,2737        641   1  640
COMMON    36,2400        738   1  732           COPYNORM  10,2734       1362   1 1359           CSIALRM   E7,1613        141   5  141  641
COMMONLM  12,3426       1195   1 1196           COPYPACS  10,2417       1356   1 1365           CSISTEP   34,2732        640   1  640
COMNEC    07,3117       1314   1 1313           COPYTOGO  10,2415       1356   1 1366           CSMCONIC  13,3066       1214   3  339  589
COMP         7670       1046   4 1013 1076      COREINC   01,3033       1111   2 1107 1111      CSMDKFLG     0305  =      87
COMPCHK   06,3553        333   1  332           CORFOUND  01,2536       1107                    CSMDOCKD     4737  =      87  11  293 1486
COMPDISP  37,3240        705   1  707           CORSCHK2  07,3105       1314   2 1313 1314      CSMINT    24,3274        565   1  565
COMPICK   41,2513        415   1  416           CORSIT    15,3303        974   1  974           CSMMASS      1332        107   7  293 1494
COMP[illegible]AT  13,2237   710                COSCDU       0744  =     100   5  100 1261      CSMPREC   13,3043       1214   6   37  734
COMPMATX  27,2072        481   1  433           COSCDUX      0750  =     100   6  478 1266      CSMSTORE  23,2406        697   1  697
COMPMFSN  27,2151        482   1  482           COSCDUY      0744  =     100   5  478 1266      CSMVEC    43,3054        289   1  263
COMPNUMB     1170  =     104  10  104 1394      COSCDUZ      0746  =     100   7  478 1265      CSS          0016  =     939   1  939
COMPOS    07,3052       1313   1 1313           COSF         0030  = 1204   4 1198 1199         CSSUN     14,2605        936   1  936
COMPTEST  41,2424        414   6  414  427      COSI      26,2000         52   2 1144           CSS33     14,2764        939   2  938
COMPTGO   35,2432        650   1  680           COSINE    00,3517       1082   2 1013 1260      CSS40     14,2762        939   1  938
COMPTST1  41,2426        414   1  415           COSMG        0061  = 1413   3  188  189         CSS5      14,2603        936   2  935  936
COMP12    22,2211        354   1  354           COSPHI/2     0022  = 1247   6 1234 1248         CSTH      E5,1731  =     125  10  125 1199
COMTERM   11,3052       1234   1 1237           COSPHIE   11,3241       1237   1 1234           CSTH-RHO  E5,1735  =     125   4  125 1194
COMZERO   07,3127       1314   2 1313 1314      COSTALIN     0000  =     235   3  235           CSTODAY   05,2023         52   1  985
CONC+S1   43,3241       1286   1 1290           COSTH        0020  =     124  18  299 1253      CSUN         0020  =     936   1  936
CONC+S2   43,3242       1286   1 1290           COSTHET1  E5,1576  =     122   2  122  851      CS359+    35,2415        631
CONICS    12,2000  =      29   3 1173 1189      COSTHET2  E5,1600  =     122   2  122  851      CTHETA       0322  =      99   3  369 1415
CONICS1   04,2000  =      28   4   45 1186      COS1/2DG  25,3067        552   1  550           CTLIST       0334  =     994   6  992
CONST     30,2572        848   1  847           COS15DEG  23,2274        520   1  518           CTRCHECK  21,3676       1509   1 1508
CONTABRT  05,3402        830   1  830           COS60DEG  23,2517  =     593   2  590           CULTBIT      4745  =      71
CONTBL2   01,3665       1306   2 1308           COTROLER  E6,1631        134   6 1412 1472      CULTED    14,2757        939   4  939
CONTDESG  26,3567        590   1  592           COUNT        0143  =      97  12  399  445      CULTFLAG     0065  =      71   4  938  939
CONTDES2  26,3576        590                    COUNT'EM  11,2341        821   1  820           CULTRIX   E5,1706  =     124   1  939
CONTINU   43,3616       1292   5 1291 1292      COUNTPL   E5,1542  =     127                    CURSOR       1236  =     960   4  261  959
CONTMANU  22,3170        367   1  366           COVCNV    42,3677        488   1  488           CURTAINS     5711       1393  11  942  969
CONTSERV  33,2540        875   7  873  889      COZY4     E7,1666        142   4  686  689      CUTOFF    14,2424        853   4  747  853
CONUMNOR  41,3071        429   1  428           CPHI         0321  =      99  11  340 1416      CUTOFF1   14,2436        853   1  853
CONV3     42,3625        487                    CPSI         0323  =      99   5  351 1415      CUTOFF2   30,2777        854   2  853  854
CONV4     42,3636        487   1  487           CREWMANU  43,3015        286   1  262           CVECTR       0010  = 1148   1 1144
CONV5     42,3640        487   1  487           CRITCON   40,2315        401   1  400           CYCLSHFT  43,3475       1290
CON1         5405       1299   1 1300           CSI/A     34,2113        632   1  623           CYL          0022  =      92  24  400 1290

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SYMBOL      DEF     H          REFERENCES      SYMBOL      DEF     H          REFERENCES      SYMBOL      DEF     H          REFERENCES

CYR          0020   =    92   46  232 1305 DAPTREG4  E6,1750   =  137   10  131 1426 DECDSP    41,2523      416    1  408
C1/2         7717      1097    1 1102      DAPTREG5  E6,1751   =  137    5  131 1426 DECDSP3   41,2575      417    2  417
C1MP      E6,1723   =   135                DAPTREG6  E6,1752   =  137    7  133 1426 DECEND    40,2265      400    2  400
C1PP      E6,1721   =   135                DAPT4S    06,3132   =  188    3  159  189 DECON     40,2322      401    1  400
C2MP      E6,1717   =   135                DAPZRUPT  E6,1757   =  137    4 1412 1459 DECOUNT      0117   =   96   27  410  433
C2PP      E6,1715   =   135                DASAMPL   25,3344      558    1  559      DECQTIMR  16,2710     1428    1 1428
C2SQM     E6,1713   =   135                DATAFAIL  25,3461      560    1  556      DECRET       0115   =   96    2  429  430
C2SQP     E6,1711   =   135                DATAGOOD  E7,1733   =  144    5  144  592 DECROUND  40,3261      442    1  441
C3/2         7737      1099    1 1102      DATAOUT   21,2233      899    2  899  900 DECPTIMR  16,2712     1428    1 1428
C33JMP    06,2763       191    1 1[illegible]      DATAPL    F5,1472   =  127   13  375  379 DECTEM       0122   =   96    3  416
C33TEST   06,2374       167    6 1[illegible]  166 DATGDCHK  26,3654      592    1  592      DECTEST   41,2443      415    2  414  415
C5/2         5005      10[illegible]    1 1102      DAXMAX    30,3767      925    2  916  925 DECTOBIN  40,2232      400    1  400
====================================== DAY/2MAX  30,3771      925    2  916  925 DECTWO    34,3641      730    1  724
DACLINIT  20,2432      1419    3 1419      DAZMAX    30,3767   =  925    1  916      DEC17        4361   =  381    3  373  859
DACLOOP   20,2374      1419    1 1419      DB           1346      107    6  212 1506 DEC22     43,2677      280    1  280
DAD          6775      1026    1 1011      DBB1         0143   = 1505    5 1498 1503 DEC227    15,2561      962    2  957  961
DALTRATE  E7,1716   =   151    3  151  898 DBB2         0144   = 1505    3 1498 1502 DEC23     42,2033      275    1  275
DAMPING   17,2345      1446    1 1446      DBB3         0146   = 1505    4 1499 1502 DEC27        4764   = 1096
DANZIG       6061      1003   64  948 1402 DBB4         0145   = 1505    6 1499 1503 DEC29        4765   = 1096
DAPARUPT  E6,1753   =   137    5  137 1458 DBFUN     20,3556     1502    1 1502      DEC45        4772     1096    2 1016 1089
DAPATTER  43,2163       266    1  262      DBONE     20,3365     1499    1 1499      DEC51     04,3253     1332
DAPBITS   05,3501       832    1  831      DBSELECT     4750   =   88    1 1407      DEC58     37,2474      381    1  375
DAPBOOLS     0111   =    86   70  212 1509 DBSELFLG     0316   =   88                DEC585    37,3055      388    1  376
DAPBQRPT  E6,1755   =   137    2 1428 1458 DBVAL1       1346   = 1506    6 1497 1503 DEC66     31,2501      800    2  795  801
DAPDATA1  20,2004       292    1  292      DBVAL2       0114   = 1506    2 1497 1499 DEC70     04,2400      233    1  227
DAPDATA2  01,2233       294    3  294  295 DBVAL3       0115   = 1506    3 1497 1500 DEFUNC7   21,3240     1474    1 1474
DAPDATA3  01,2300       295                DCDU      E6,1635   =  136                DEG.5     15,2467      960    1  958
DAPDATR1     1343       107   10  292  314 DCMCL     30,3232      913    1  919      DEGCOM    40,2663      419    1  418
DAPDAT2   01,2250       294    1  294      DCMTOCDU  22,2654      362    2  365  483 DEGCON1   40,3074      432    1  431
DAPDISP   43,3135       292    1  262      DCOGA        0014   = 1203    4 1195 1196 DEGINSF   40,3010      431    2  431
DAPIDLER  16,2024      1411    2  222 1413 DCOMP        7705     1046    2 1046      DEGINSF2  40,3021      431
DAPLRUPT  E6,1754   =   137                DCOMPTST  41,2437      415    2  414      DEGOUTSF  40,2615      418    2  417  418
DAPS1     16,2000   =    31    4 1410 1476 DCTSTCYC  41,2452      415    2  429  430 DEGREE1   14,3411      948    1  947
DAPS2     17,2000   =    31    4 1404 1460 DDUMCALC  32,3102      787    1  812      DEGTAB    40,2673      419    2  418  419
DAPS3     20,2000   =    31    6   42 1497 DDUMCRIT  32,3261      789    1  787      DEG30     15,2465      960    2  251  958
DAPS4     21,2000   =    31    3 1472 1508 DDUMGOOD  32,3163      788    1  787      DEG359    14,3412      948    1  947
DAPTEMP1  E6,1737       136   29  130 1470 DDV          7577     1044    1 1011      DEG60     15,2471      960
DAPTEMP2  E6,1740   =   136   12  131 1471 DDV/BDDV  00,2353     1057    2  824 1044 DEL       E6,1745   =  132    3 1474 1476
DAPTEMP3  E6,1741   =   136 [illegible]  131 1471 DDVCALL   00,3004     1068    1 1068      DELAYEX      5235     1120    1 1119
DAPTEMP4  E6,1742   =   136    4  131 1447 DEAD      27,2230      751    2  751      DELAYJOB  00,3735     1377   15  208  757
DAPTEMP5  E6,1743   =   136 [illegible]  131 1425 DEBIT        5522     1375    3  743 1375 DELAYLOC     1326      107    6  222 1377
DAPTEMP6  E6,1744   =   136   11  131 1470 DEC-12    12,2016     1101                DELAYNUM     4752   =   37    1 1377
DAPTREG1  E6,1745   =   136    3  132 1509 DEC-6     12,2015     1101                DELCDUX   E6,1640      134    6  134 1421
DAPTREG2  E6,1746   =   136    1 1[illegible]3      DECBRNCH     1000      101   18  399  447 DELCDUY   E6,1641   =  134    3  136 1421
DAPTREG3  E6,1747   =   136    1  133      DECCNTR   33,2366      862    1  862      DELCDUZ   E6,1642   =  134    3  136 1421

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                  3:15 DEC.  2,1970                PAGE 1520

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF      H         REFERENCES        SYMBOL      DEF      H         REFERENCES        SYMBOL      DEF      H         REFERENCES

DELCOMP   22,2527       359    3  364  482 DELVOV    E4,1622       116    5  316  710 DFRNT     40,3364       445
DELDCDU   E6,1640  =    136    2  365  369 DELVREF   E7,1526  =    147    5  147  880 DGBF      20,3077      1494    2 1490
DELDCDU1  E6,1641  =    136    1  369      DELVROD   E7,1766  =    151    5  151  818 DGBITS    25,3147       554    2  554  558
DELDCDU2  E6,1642  =    136    1  369      DELVS     E7,1733  =    151    8  151  902 DGCHECK   25,3442       560    2  556  558
DELDEP    E5,1757  =    125    5  125 1183 DELVSAB   E7,1663  =    142    4  142  765 DGCHECK2  25,3345       558    2  559
DELDV     E7,1611       141   15  141  640 DELVSIN   E7,1655  =    142   16  142  765 DGOOD?    32,2741       604
DELEL     E7,1575  =    141    4  667  670 DELVSLV   E7,1433  =    139    2  198  617 DGOODCHK  25,3000       551    1  551
DELELO       0032  =    661    3  667  670 DELVTEST  27,2252       765                 DIDFLAG      0020  =     67
DELERLIM  30,3771  =    925    1  918      DELVTPF   E4,1747       118    4  198  727 DIDFLBIT     4736  =     67    4  217  907
DELGMBLP  30,3300       914    1  914      DELVTPI   E7,1575       141    7  141  727 DIFEQ+0   11,3466      1241    1 1237
DELINDEP     0014  =   1204    2 1152 1183 DELVX        0324  =     99   12  326  871 DIFEQ+1   11,3472      1241    1 1237
DELLOOP   00,3740      1377    1 1377      DELVY        0326  =     99   10  329  871 DIFEQ+2   11,3503      1241    1 1237
DELLT4    E7,1431       139    8  194  766 DELVZ        0330  =     99    9  329  871 DIFEQCNT  E3,1500       110   25  110 1243
DELM      E5,1550  =    128    5  386      DELX      E5,1642  =    125    6  125 1178 DIFEQCOM  11,3646      1243    2 1241
DELMAX1   34,2105       632    2  640      DEP          0036  =   1204    1 1182      DIFEQTAB  11,3247      1237    1 1237
DELMLP    37,2646       385    1  385      DEPRCRIT  22,3657       827    2  805      DIFEQ0    11,3342      1238    1 1242
DELOK     12,2632      1183    1 1182      DEPREV    E5,1761  =    125    3  125 1182 DIFFALT   E7,1577       141    5  194  648
DELRFLOF     1277       106    5  367 1438 DERCLOOP  31,3605       824    1  824      DIMOBIT      4753  =     71
DELQEROR     1300       106    3  369 1451 DERCOF+1     0153  =     98                 DIMOFLAG     0073  =     71   23  236 1243
DELQFIX   E5,1520  =    121    2  121  885 DERCOF-1     0151  =     98                 DINDX        0063  =    137    6 1419
DELREFCH     1301       106    3  369 1451 DERCOF-2     0150  =     98                 DIRADRES     6106      1004    2 1018
DELRSPL   22,3541  =     37                DERCOF-3     0147  =     98                 DISDVIVC  35,2370       630    2  623  645
DELT      E5,1644  =    125    3  125 1176 DERCOF-4     0146  =     98                 DISGRVER  15,2771       967    1  965
DELTACSM  E3,1572       111    1  585      DERCOF-5     0145  =     98                 DISINDAT  21,2324       900    2  898  899
DELTAH    E7,1664  =    150    6  150  885 DERCOF-6     0144  =     98                 DISPCHNG  36,2376       737    4  731  737
DELTALEM  E3,1644       111    1  585      DERCOF-7     0143  =     98                 DISPCOMN  31,3474       814    2  815
DELTAQ    E7,1546  =    145    8  145 1151 DERCOF-8     0142  =     98                 DISPDEX      1163       104   24  148  831
DELTAR    E4,1702  =    117    5  117  726 DERCOFN      0152  =     98    1  825      DISPEXIT  31,3460       814    3  813  819
DELTATM   E7,1426  =    139    2  511      DERPTR       0141  =     98    3  823  824 DISPGYRO  15,3313       974    1  971
DELTATOK  04,3622      1393    1 1393      DERTABLL  31,3676       825    1  823      DISPLACE  41,3066       428    2  428
DELTAX    E5,1664  =    126   12  126 1156 DESASCNT     0004  =    236    3  235      DISPLAYE  35,3674       682    2  661  662
DELTEE    E7,1611  =    141                DESCBITS  20,2115       822    1  255      DISPLAYS  10,2000  =     29    3 1354 1382
DELTEEO   E7,1605  =    141    4  670      DESCOUNT     1114       103    4  509  546 DISPNCT   36,3012       746    1  745
DELTIME   12,2421      1180    3 1175 1195 DESGLOS   26,3636       592    1  590      DISPNEX   37,3113       703    2  703
DELTTFAP  E7,1425       138    1  802      DESIGBIT     4742  =     85   10  530  876 DISPRSET  21,3053       907    2  898  900
DELTTIME  E4,1704  =    117    3  117  726 DESIGFLG     0271  =     85                 DISTEM       0122  =     96    3  414
DELV         0324        99    9   99  966 DESLOOP   25,2600       546    5  546  593 DIVIDER   16,2304      1422    2 1422
DELVCSI   E7,1573       141   16  141  640 DESRET       1113       103   10  103  543 DKALT     16,3441      1437    1 1438
DELVCTL   E7,1501  =    147    3  758  759 DESRETRN  25,2446       541    1  540      DKDB      E6,1411       129    2  213 1510
DELVEET1  E4,1666       116    5  194  634 DESRTRN   25,2452       541    2  541      DKKAOSN   E6,1405       129    1  213
DELVEET2  E4,1674       116    6  194  649 DETENTCK  16,3071      1432    2 1430 1431 DKOMEGAN  E6,1404       129    2  213 1425
DELVEET3  E4,1765  =    119   18  194  780 DEXDEX       0142  =     98    7 1259 1264 DKTRAP    E6,1403       129    2  213 1425
DELVIMU   E7,1622       142    7  316  763 DEXI         0143  =     98    1 1263      DLAYJOB   00,2000  =     28    1 1377
DELVLVC   E7,1433       139   20  139  709 DEX1         0143  =     98    5   98 1264 DLOAD        6052      1002    1 1011
DELVMID   E7,1575  =    141                DEX2         0144  =     98                 DLOAD*       7733      1098    1 1006

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DLOADCOD     7732     1098   1 1018      DOCKTEST  20,2773     1491   2 1491 1504 DOTSUB        7156     1033   3 1039
DLY2         5212     1119   2 1119 1377 DOCMBASE  37,3144      704   1  707      DOTSWFMX  30,3766      925   1  919
DMENFBIT     4743  =    74               DOCSM     23,3234     1157   1 1156      DOT6RUPT  17,2065     1405   1  154
DMENFLG      0121  =    76   7  575 1157 DOCSM1    23,3237     1157   1 1156      DOUBLK    40,2575      405   2  404  405
DMODE        7332     1038   1 1077      DODAT     07,2074      246   1  246      DOVLOAD       6463     1018   1 1015
DMP          7103     1031  21  400 1266 DODELVZ   37,3570      870   1  871      DOVLOAD*      6466     1018   1 1015
DMPNSUB      7316     1037   1  824      DODES     25,2636      548   1  546      DOW..     11,3705     1245   2 1238 1243
DMPNTEMP     0135  =    97   2 1037      DODFSEND  25,3064      552   1  552      DOW..1    11,3733     1245   2 1245
DMPR         7574     1044   1 1011      DODLOAD       6460     1018   1 1015      DOWNENT2  10,3554     1374   3 1364 1369
DMPSUB       7107     1031  25 1033 1266 DODLOAD*      6144     1006   2 1015 1018 DOWNFLAG      5516     1375  96  208 1366
DMPSUB2      7126     1031   1 1036      DODNADR   05,3524      991               DOWNGTS   20,3706     1504   2 1491
DMP1         7572     1044   1 1011      DODNCHAN  05,3572      992               DOWNTFLM  05,2000  =    29   2  153  991
DNADRDCR 05,3531       992   1  994      DODNPTR   05,3611      993   1  992      DOWNTORK  E6,1513      132   7  132 1470
DNDUMP   05,3722       996   1  996      DODOWNTM  05,3506      991   2  153  154 DO1/NET+  20,3724     1504   2 1500 1501
DNDUMPI  05,3707       996   2  288  996 DOFSTART  05,2474      211   1  218      DP(-22)   27,3760     1283   1 1278
DNDUMP1  05,3735       996   1  996      DOFSTRT1  05,2501      211   2  217  218 DP-.01    35,3741      684   3  680
DNDUMP2  05,3737       996   1  996      DOINT     13,2036      236   2  236      DPAGREE       7255     1036
DNECADR      0336  =   994  15  991  994 DOINT2    13,2060      236   1  236      DPB-14    26,2410      484   2  481  483
DNEDUMP  43,3045       288   2  262  288 DOIT      31,2312      795   1  796      DPBIT14   01,3477     1131   1 1131
DNINDEX      1335  =   107   4  107  559 DOLEM     26,2454      575   1  575      DPDAT1    20,2037      292   1  292
DNLADMM1 04,2500       235   1  231      DONBRD    25,2661      548   1  548      DPDAT3    01,2315      295   1  295
DNLADPOO     4755  =   235   1  229      DONEADR   37,3654      871   1  871      DPHALF    23,2517  = 1100  12  353  771
DNLRALT      1341  =   107               DONEYET   21,3427     1480   2 1480      DPINCOM   40,3131      433   1  433
DNLRVELX     1336  =   107   4  107  196 DOPAXIS   20,3270     1497   1 1497      DPINORM   40,3137      433   1  433
DNLRVELY     1337  =   107   1  107      DOPIF     31,2302      794   1  794      DPINSF    40,3114      433   4  431  433
DNLRVELZ     1340  =   107   2  107  194 DOPROC    40,3601      459   2  458  470 DPINSF2   40,3141      433   1  431
DNLSTADR     0332  =    99               DOROTAT   17,2743     1453   2 1453      DPINSF4   40,3146      433   1  431
DNLSTCOD     0332       99  10   99 1395 DORREPOS  25,2127      529   1  187      DPIPAY    F5,1522  =   128   2  385
DNPHASE1 05,3515       991   2  222  996 DORROUT   25,3017      551   2  551      DPIPAZ    F5,1526  =   128   1  385
DNPHASE2 05,3523       991   1  993      DORSAMP   25,2023      490   1  490      DPL1      30,3722      923   1  923
DNQ          0337  =    99   2   99  994 DORSAMP2  25,2027      490               DPL3      30,3723      923   1  923
DNRRANGE     1333      107   6  107  606 DORSTART  05,2730      215   1  215      DPL5      30,3724      923   1  923
DNRRDOT      1334  =   107   1  107      DOSHIFT   21,3537     1482               DPL7      30,3725      923   1  923
DNTABLE  05,2441       204   1  992      DOSKIP    17,3010     1454   1 1453      DPL9      30,3726      923   1  923
DNTMBUFF     0340  =    99  22  154  996 DOSSHFT   00,2322     1055   1 1055      DPMODE    10,3716     1401   1  701
DNTMEXIT 05,3701       994   6  992  997 DOSTORE       6362     1014   1 1003      DPOSMAX       4732     1095   3  441 1401
DNTMFAST 06,2671       178   1  181      DOSUBLST  05,3665      994   1  993      DPOUT     40,2723      420   3  419
DNTMGOTO     0335  =    99   9   99  997 DOSWITCH  11,3375     1239   2 1237 1238 DPPOSMAX  23,2527     1100   9  299  706
DNTM1        0034  =    93   1  994      DOT           7331     1033   1 1011      DPSBURN   E6,1750  =   131
DNTM2        0035  =    93   1  994      DOTERM    40,3577      459   1  458      DPSFLITE  20,2522     1487   1 1486
DOACCFUN 20,3733      1504   1 1500      DOTICK    22,3441      716   1  716      DPSTHRSH  32,2000       40   1  785
DOALARM      5155  =  1384               DOTINC        0136       97   7   97 1039 DPSVEX    33,2001       39   2  754  833
DOALIGN  15,3121       971               DOTIXBR   01,2424     1088               DPTEST    41,2261      410   4  410  430
DOCKED   20,3105      1494   1 1487      DOTPER    22,3622      721   1  721      DPTEST1   41,2301      411   4  411
DOCKTEMP     0157  =  1496   4 1486 1491 DOTRET        0137       97   2   97 1078 DPZERO    12,2006  = 1246   3  938 1238

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SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES

DP0          0036  =  940                   DSPCADR   16,2211     1413    1 1413        DSPTAB       1023      102   48  156 1382
DP1          0040  =  940                   DSPCNT       0776      101    7  157  222  DSPTEMX      1051  =   102    8  102  702
DP1/12    15,2465  =  251    1  250         DSPCOM1   41,2371      414    3  414  416  DSPTEM1      1045      102   31  102  976
DP1/2     12,2004  = 1136    5 1136 1148   DSPCOM2   41,2405      414    2  414       DSPTEM2      1050      102   12  102  381
DP1/20    33,3025     881    1  880         DSPCOM3   41,2413      414    1  414       DSPV6N79  07,2627      261    3  256  261
DP1/4     12,3755    1246    3 1199 1246   DSPCOUNT     0777      101   66  158 1338  DSPWDRET     0144  =    97    3  441
DP1/4TH   23,2511    1100    6   37 1151   DSPDCEND  41,2566      417    4  417  423  DSP2BIT   41,3416      444    1  447
DP1/8     07,2622     260    1  253         DSPDCGET  41,2527      416    1  416       DSP2CADR  36,3136      749    1  739
DP1MIN    26,2121     341    1  339         DSPDCPUT  41,2537      416    1  417       DSP2DEC   40,3273      442    1  424
DP1OUTSF  40,2710     419    1  417         DSPDCWD1  40,3233      441    4  442       DSQ       00,3174     1075    1 1013
DP2(-3)   27,3762    1283    1 1280         DSPDC2NR  40,3266      442    3  422  443  DSQSUB    00,3300     1078    5 1075 1083
DP2(-4)   27,3764    1283    1 1274         DSPDECNR  40,3262      442                 DSREL        0141  =    97    4  444  445
DP2/3     12,3773    1246    3 1227 1246   DSPDECVN  40,3306      443    4  420  458  DSRUPTEM     0073  =    95    5  157
DP2OUTSF  40,2715     419    2  417         DSPDECWD  40,3226      441    4  417  421  DSRUPTSW     1313      106   10  155  221
DP3OUTSF  40,2717     419    1  417         DSPDELAY  40,3700      703    1  703       DSU          7005     1028    1 1011
DP9/10    04,3050    1185    4 1177 1185   DSPDPDEC  40,2771      424    1  408       DT        E7,1715  =   151    7  151  902
DQUARTER  12,3755  = 1246    2 1232         DSPFLG       1070  = 1372    3 1365 1366  DT/DELT   30,3774      925    1  918
DRDOT     E4,1736  =  120    4  120  848   DSPFMEM   41,3353      440    1  409       DT/TAU    22,3121      366    1  365
DRFDB     20,3652    1503    1 1503         DSPIN     40,3322      444    5  399  445  DT/2      E4,1475  =   114   11  114 1243
DRFTBIT      4735  =   68    3  165 1315   DSPIN1    40,3347      445    2  444  445  DT/2COMP  13,3320     1218    1 1219
DRFTSUB2  06,3474     332    1  336         DSPLAY    06,2047      157    1  157       DT/2MAX   13,3412     1219    2 1218 1219
DRIFT/ON  17,3414    1463    1 1463         DSPLIST      1043      102    6  222  465  DT/2MIN   13,3410     1219    1 1219
DRIFTBIT     4744  =   87    7  740 1509   DSPLOCK      1012      102   12  222 1370  DTDECAY   36,2004       38    1  833
DRIFTDFL     0312  =   87    1  742         DSPLV     41,3413      443                 DTHETASM     1264      105    1  105
DRIFTER      0116  = 1506    3 1497 1498   DSPLYALT     4750  = 1419    2 1414       DUMMYAD   04,2146      229    1  232
DRIFTFLG     0036  =   68    3  863  952   DSPLYMSK  20,2113      293    1  292       DUMMYJOB  01,3206     1116    2  213 1115
DRIFTI    E5,1504  =  128    1  375         DSPLYTOT  20,2252     1415    1 1415       DUMPCNIC  27,3426     1272
DRIFTO    E5,1502  =  128    1  377         DSPLY58   34,3502      727    1  727       DUMPCNT      0333       99    2  211  996
DRIFTSUB  06,3454     332    3  328         DSPLY81   34,3505      727    1  727       DUMPLOC      0336  =    99    5  996
DRIFTT    E5,1442  =  128    1  376         DSPMM     04,2636      457    1  468       DUMPRPRA  27,3464     1274
DRIVEON   21,3425    1480    1 1480         DSPMMJB   40,3534      458    2  457 1294  DUMPTFF1  27,3547     1273
DSALMOUT     0011  =   93   36  171 1396   DSPMMJOB  40,3534  = 1294    1 1294       DUMPTFF2  27,3644     1270
DSEXIT       0114  =   96    3  444  445   DSPMMTEM     0140  =   97    2  458       DUNFVLIM  30,3764      925    1  919
DSKYFBIT     4735  =   73    1 1338         DSPMSK       4757  =  444    1  443       DV/SC        7636     1045    2 1045
DSKYFLAG     0113  =   73                   DSPOCTIN  40,3412      445    1  443       DVBYCCSM  30,3600      921    4  920
DSLV      40,3376     445    2  445         DSPOCTWD  41,3363      443    3  408  440  DVCNTR    E7,1515  =   147   54  147 1384
DSMAG        0142  =   97    2  445         DSPOFF    05,3274      221    1  221       DVCNTR1   E7,1570  =   864    2  862
DSMSK     40,3400     445    2  445         DSPOPTN   15,3430      976    3  976  977  DVCNTSET  33,2323      861
DSPA      41,2365     414    1  408         DSPOUT    06,2063      157    2  156       DVECTR       0010  =  1148    1 1145
DSPAB     41,2360     414    1  408         DSPOUTSB  06,2024      157    2  157  160  DVLOS     E4,1702  =   117    5  117  675
DSPABC    41,2353     414    1  408         DSPRND    40,3215      441    1  441       DVMAX1    34,2063      632    1  634
DSPAB[illegible]     4227     455    3  455         DSPRRLOS  40,2000      299    1  299       DVMAX2    34,2065      632    1  634
DSPALARM  40,3420     446    6  408  431   DSPSCAN   06,2032      157    2  157       DVMON     33,2314      861
DSPB      41,2373     414    1  408         DSPSFNOR  41,2562      417    1  417       DVMONCON  36,2550      740
DSPC      41,2400     414    1  408         DSPSIGN   40,3200      441    4  441  442  DVNORM    00,2505     1060    3 1059

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DVNORMCT     0137   =    97    6 1057 1068 EARTHPAD 22,3367      715    1  714       ELVDUMMY E7,1647  =  149    3  149  150
DVOVF     00,2405      1057   11 1059 1070 EARTHR   37,2420      380    1  380       ELVIRA      1265  =  106    5  106  820
DVOVSUB   20,2776      1492    5 1489 1495 EARTHR*  37,2447      380    4  375  388 ENABLET6 17,2052     1404    1 1404
DVPREV    E7,1575   =   141    4  638  639 EBANK        0003  =   92   86  212 1486 END-ALIG E7,1630  =  148    3  148  152
DVSIGN       0136   =    97   10 1057 1074 EBANKSAV     1070     103    3 1356 1372 END-E3   E3,1777  =  112
DVTHRUSH     1251   =   105    7  105  861 EBANKTEM     1072     103    6  211 1372 END-E4   E4,1757  =  119
DVTOTAL   E7,1507   =   147    6  147  861 EBANK3       5007  = 1099    3  223  890 END-E5   E5,1774  =  128
DVXSC        7430      1041    2 1040      EBANK4       4741  = 1099    5  276  892 END-E6   E6,1771  =  137
DWNRPTBB     4062       154    1  153      EBANK5       5014    1097   13  388 1433 END-E7   E7,1777  =  152
DXCOMP    12,2155      1175    1 1175      EBANK6       5015  = 1099   10  212 1486 END-E7.0 E7,1745  =  152
DXCRIT       0124   =    98    2  823  825 EBANK7       5016    1097   15  387  957 END-E7.1 E7,1747  =  152
DXCRIT+1     0125   =    98                EBUF2        1167  =  104   10  370  371 END-E7.2    4000  =  152
DXERROR   E6,1446       130    4  130 1435 ECC       E5,1751  =  125    3  125 1200 END-E7.3 E7,1630  =  152
DYDOT     E4,1740   =   120    4  120  848 ECDUW     E6,1646  =  136    3  136  925 END-E7.4 E7,1777  =  152
DYERROR   E6,1450   =   130    7  130 1448 ECDUWL   30,3761      925    1  910       END-E7.5 E7,1655  =  152
DYNMDISP 36,3361        757    2  756  757 ECDUWUSP E6,1646  =  136    3  136  918 END-IN/M E7,1672  =  142
DZDOT     E4,1742   =   120    3  120  849 EDOP         0023  =   92   14  439 1290 END-UE      1357  =  108
DZERROR   E6,1452   =   130    7  130 1448 FDOT      E6,1427  =  133   23  130 1510 ENDALL   40,2263     400    2  400  401
D1/1024  04,3044       1185    1 1194      EDOTP     E6,1427  =  130    4 1434 1438 ENDALM      4153     446    1  452
D1/128   04,3032       1185    3 1178 1189 EDOTQ     E6,1436     130    5  130 1473 ENDBALL  26,2346     478
D1/16    04,3040       1185    2 11[illegible]1 1198 FDOTR     E6,1437  =  130    2  130 1441 ENDBLFF     4303  =  456    1  460
D1/256   04,3046       1185    3 1179 1185 FDOTSQ    E6,1737  =  133    3 1462 1463 ENDBSUB1 40,3534  =  457    1  458
D1/32    04,3042       1185    7 1185 1236 EDRIVEX   E6,1764     137    5  137 1419 ENDCHKG  37,2366     379
D1/4     04,3036       1185    4   37 1198 EDRIVEY   E6,1765  =  137    1 1418      ENDDAPT4    5270  =  189
D1/64    04,3034       1185    5 1174 1200 EDRIVEZ   E6,1766  =  137    1 1418      ENDDOT      7205    1033    1 1078
D1/8     04,3030       1185    1 1200      EE       13,2506     1136    1 1136      ENDDPDEC 40,3007     424    1  431
D21      E6,1705   =   135                 EGRESS    E5,1772  =  126    6  126 1221 ENDDPUSH    6550    1020    1 1020
D29.9SEC 36,3142        749    2  734      FIGHT        4750  = 1099                ENDECVN  40,3322  =  443    1  444
D6OR9BIT     4752   =    71                FIGHTEEN 33,2437      868    1  867      ENDEXT      5472  = 1372   44  207 1396
D6OR9FLG     0072   =    71   10  236 1243 EJSCAN   01,3120     1113    2 1110 1113 ENDEXTVB    5472  =  264    5  268  273
========================================== EJ1      01,3171     1115    7 1113 1114 ENDFIND     5160    1105    4 1107 1111
E         E6,1752   =   133   17 1435 1510 EJ2      01,3201     1115    1 1115      ENDHMSS  42,3606  =  436
E/BKCALL 04,2576        370                EL           1350  =  108    1  316      ENDIDLE     4207     455    1 1368
E/CALL   04,2615        371                ELCALC   35,3004      667    1  670      ENDIMU   07,3631    1327    3 1311 1316
E/JOBWAK 04,2631        372                ELEACH   11,2375      822    2  821      ENDINST     4217     455    6  402 1367
E/PROG   04,2000   =     28    2  370  372 FLEPS    35,3737      684    1  667      ENDINT   13,2632    1210    1  236
E/SWITCH 04,2613        370                ELEV      E4,1656     116   10  194  670 ENDIT    10,3353    1369    1 1366
EARSPH   11,3355       1238    1 1237      ELEVEN       4760    1095    4  467 1471 ENDJASK  17,3241    1458    1 1458
EA[illegible]  14,2522        935                FLEX     35,3261      670    1  667      ENDJBCAD 37,3537     859    1  857
EARTHGON 22,3527        717    1  717      FLIDUMMY E7,1644  =  149    2  149  150 ENDJOB1  01,3103    1113    1 1105
EARTHL   06,3753       1147    2 1140 1142 ELINCR    E7,1554  =  149    4  149  804 ENDLLJCB 31,3476     814    2  814  815
FARTHLOC 06,2000   =     29    1 1147      FLINCR1      1267  =  106    5  804  821 ENDLRH   34,3744     893
EA[illegible]J 27,2022         44    1  780      ELOOPFIN 43,3437     1289    2 1289      ENDLRV   33,3660     893    1  893
EARTHMX  26,3743       1146    2 1140 1142 ELRCODE  04,3377     1340    1 1339      ENDMANUV 26,2174     474
EARTHMXX     0051   =  1148    4 1143 1146 ELRCODE1 40,2156      399    1  398      ENDMANU1 26,2175     474    2  473  475

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES

ENDMARK      5472     1354    2  253 1372  ENDTNON   06,2266     164    1  164        EPS1      27,2405     766    2  766  776
ENDMARKS  07,2317      253                 ENDTNON2  06,2306     165    1  164        EPS2      27,2407     767    2  766  776
ENDMAXDV  00,2624     1063    2 1063 1065  ENDTPUSH     6552    1020    2 1020 1077   ERAD      04,2000      45    1 1139
ENDMODE   07,3706     1328    2 1328       ENDTSLC   00,2212    1052    1 1052        ERADFBIT     4737  =   67
ENDMUNDO  41,3346      439    1  439       ENDVDAT   33,3514  =  889    3  888  891   ERADFLAG     0021  =   67    5  657 1139
ENDNMTST  40,2247      400    2  400       ENDVLOAD     6511    1019    2 1021        ERADM     E7,1672  =  144    5  144 1139
ENDNUM    40,2257      400    1  400       ENDVPUSH     6540    1020                  ERASCHK   43,3337    1288    1 1287
ENDNVBSY  04,2655      464                 ENDVXV       7000    1026    4 1026 1043   ERASCON1  43,3232    1286    1 1288
ENDNVSB1  41,3612      454    1  467       ENDW      E5,1642  =  121    3  122  126   ERASCON2  43,3233    1286    1 1288
ENDOFJOB     5155     1105  159  228 1486  END2DEC   40,3305     442                  ERASCON3  43,3234    1286    1 1288
ENDOUT    10,3312     1369    2 1370       END29DOD  32,2770     604    1  604        ERASCON4  43,3235    1286    1 1288
ENDPASTE     4143      439                 ENEMA     05,2765     216    2  632 1383   ERASCON5  43,3243    1286    1 1289
ENDPINBF     4512  =   465                 ENGINOFF  36,3545     760    1  760        ERASCON6     5007  = 1286    3 1288 1289
ENDPINS1  40,3674  =   471                 ENGINOF1  36,3555     760    1  229        ERASER    10,3471    1372    1 1365
ENDPINS2  41,3731  =   469                 ENGINOF2  36,3551     760    1  853        ERASID       5011  =   37    1  996
ENDPRCHG  01,2765     1109    2 1108 1115  ENGINOF3  36,3564     760    1  733        ERASLOOP  43,3367    1288    4 1288 1289
ENDP76    13,2333      711    2  709       ENGINOF4  36,3561     760    1  742        ERASZERO     0007  =  193    2  193
ENDRADAP  25,3546      563    2  537  546  ENGOFF    14,2355     852    1  846        ERCNT        0117  =   96    7  467  471
ENDRDLO   40,2770      421    1  424       ENGOFFDT  E7,1644  =  152    3  152  853   ERCOM     40,3655     471    1  471
ENDRELDS  40,3505  =   450    1  456       ENGOFF1   14,2410     853    2  853        ERCOMP    E5,1563  =  128    8  376  380
ENDRET    10,3335     1369    5 1364 1371  ENGOFTSK  36,3542     760    3  241  762   ERCON     40,3670     471    1  470
ENDRMODF     4616  =   525                 ENGONBIT     4745  =   74    6  174  915   ERCOUNT      1365  =  108    3  108 1286
ENDROLL   22,3226      369                 ENGONFLG     0123  =   74                  ERESTORE     1360  =  108   11  108 1289
ENDRQDAT  41,2316      411                 ENTER     41,2002     406    2  399  446   EREXIT1   32,2542     571    1  569
ENDRQWT   41,3515      448    1  452       ENTERDAT  07,2073     246                  ERMINUS   40,3647     470
ENDRRD29  24,3475      606    4  605  606  ENTERJMP  40,2157     399    1  399        ERPLUS    40,3652     471    1  470
ENDRSTRT  05,2641      213    2  217       ENTERQR   17,2416    1447                  ERROR     40,3603     470    1  398
ENDRTOUT  41,2616  =   417    1  425       ENTERUV   17,2451    1448    3 1447        ERRORS    43,3257    1286    1 1286
ENDRUTIN  41,3230  =   431    1  437       ENTEXIT      0136  =  406   10  407  447   ERRTEST   17,3327    1462
ENDR03    01,2244      294    1  294       ENTMID1   13,3576    1223    1 1223        ERTHR     37,2431     380    1  380
ENDSAM    14,2570      936    1  935       ENTMID2   13,3572    1223    1 1223        ERTHRVSE  37,2401     380    2  383  388
ENDSCALE  40,3043      432    3  431  432  ENTPASHI  41,2012     406                  ERVECTOR  E5,1404  =  127    5  127  380
ENDSCAL1  40,3056      432    2  432  433  ENTPASO   41,2035     407    3  406  454   ESCAPE       0136  =   97    4 1084 1085
ENDSPF    41,3362      440    1  443       ENTRET       0136  =   97    6  402  453   ESCAPE2      0137  =   97    2 1084 1085
ENDSPMIN  42,3451      424    1  434       ENTSET    41,3570     453    2  453        ESTICADR  37,2116     374    2  374
ENDSPMM   04,2646      457    1  464       ENTTIM2   04,3005     702    1  702        ESTIMS    37,2500     383    2  374  377
ENDSPCCT  40,3415      445                 EOURPERM  E7,1670  =  150    1  150        ETPIBIT      4745  =   69
ENDSTATE  11,3577     1242    1 1241       EPHEM     15,2000  =   31    1  985        ETPIFLAG     0046  =   69    6   69  670
ENDSTEER  36,3646      761                 EPHEM1    05,2000  =   29    2   51  987   EXBRAK    31,3352     812    1  799
ENDSUMS   43,3131      291    1 1292       EPSFOUR   35,3743     684    1  673        EXDSPRET  10,2620    1360    5  207  281
ENDS40.9  27,2725      776                 EPSILN1   34,2075     632    1  640        EXECBANK     5163    1105    8 1103 1105
ENDT(X)   27,3753     1282    1 1282       EPSILON      0155  = 1496    5 1488 1496   EXECTEM1     0061  =   95    6 1103 1111
ENDTASK      5236     1121    4  220 1128  EPSILONL  E5,1763  =  125    3  125 1195   EXECTEM2     0062  =   95    4 1106 1111
ENDTEST1  37,2270      377    3  373  388  EPSILONT  E4,1576     115    2 1176        EXGSUB    31,3331     811    1  799
ENDTFF    27,3641     1279    3 1279 1281  EPSSMALL  27,2723     776    1  776        EXIT         6743    1025    1 1003

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SYMBOL     DEF     H        REFERENCES     SYMBOL     DEF     H        REFERENCES     SYMBOL     DEF     H        REFERENCES

EXITEM      0114  =    96    7  428  429 FAZB1    23,3073      1155                FINALFLG    0047  =    69    9  623  727
EXITVR   30,2763      851    1  851      FAZB2    23,3121      1155    1 1155      FINDCDUW 30,3113      910    5  771  910
EXITVR1  30,2774      851    1  852      FAZB5    23,3126      1155    1 1155      FINDGIMB 27,2160      483    2  481  482
EXNORM   31,3360      912    1  799      FAZC     23,3134      1155    2 1155      FINDKEY  07,2365      254    1  254
EXOVFLOW 31,3441      813                FBANK       0004  =    92   30  455 1377 FINDTIME 01,3601     1304    2 1304
EXSPOT1  31,3316      911                FBANKMSK    4350  =  1010    2 1111      FINDVAC     5105     1103   45  211 1392
EXTLOGIC 31,3313      811    2  810      FBIASSUB 06,3644       336    3  334  335 FINDVAC2 01,2601     1106    2 1103 1105
EXTVBACT    1044      102   18  222 1380 FBR3     11,2476      1229    1 1243      FINE     01,2340      295    1  294
EXTVBCHK 07,2006      244    1  244      FC       E7,1615  =   149    3  149  793 FINEK2   43,2347      273
EXTVB1   23,2000  =    32    1  271      FCADRMM1 04,2403       233    1  232      FINEONLY 14,3370      947    1  947
EXTVERBS 43,2000  =    36    7  262 1388 FCDUW    30,2000  =    34    1  910      FINETIME    4102      381    3  379 1336
EXVERT   31,3436      813                FCODD    E7,1465  =   140    4  140  794 FINIMUDD 37,2320      378    1  374
E0       E7,1676  =   145                FCOLD    E7,1620  =   149    5  149  800 FIREDB   E6,1601  =   134   10 1462 1503
E01      E4,1630  =   116    1  116      FCOMPSET 31,2267       794    1  794      FIREFCT  E6,1741  =   133    7 1438 1469
E02      E4,1634  =   116                FDAIX    E4,1744       118    2  305  478 FIREP    16,3041     1431
E1       E7,1700  =   145                FDAIY    E4,1745       119                FIREQR   17,2225     1444
E134567B 43,3350     1288    1 1289      FDAIZ    E4,1746       118                FIRSTIMF 12,2606     1182    1 1182
E2       E7,1702  =   145    1  145      FDOT     26,2006        52    1 1143      FIRSTTME 27,3171      779
E2DPS    E7,1621  =   149    3  785  826 FDPS     36,2000        38    1  754      FIVE        4756     1095   26  223 1430
E3       E7,1704  =   145                FEEDBACK 17,3051      1455    1 1454      FIXCLPAS 40,2402      402
E3J22R2M    1352      108    1 1248      FETCHZNB 30,3223       913    1  913      FIXDELAY    5221     1119   16  499 1313
E32C31RM    1353      108    1 1236      FETCH2WD 05,3653       994    2  991  992 FIXLOC      0120       96   63  246 1506
E7OVERLA E7,1471  =   140    3  140  147 FEXTRA      4737  =   797    1  794      FIXMIN   20,3743     1505    1 1501
======================================== FFTAG1      4000  =    28    3 1294 1375 FIXRANGE 40,2652      418    1  418
F        E7,1734      143    7  143  774 FFTAG10     4000  =    28    1  155      FIXROOT  00,3453     1080    3 1079
F(MASS)  20,2540     1487    3 1437      FFTAG11     4000  =    28                FIXY     27,2441      769    1  769
FACEREG     0154  =  1373    2 1363 1364 FFTAG12     4000  =    28                FLAGGON  22,3310      714    1  714
FAIL-    20,3545     1501    1 1501      FFTAG13     4000  =    28                FLAGOFF  35,3576      679    1  678
FAILOOP  17,3205     1458    2 1458      FFTAG2      4000  =    28    2 1304 1306 FLAGON   35,3531      678    2  678
FAILREG     0375      100   15  211 1382 FFTAG3      4000  =    28    1 1309      FLAGOODW E6,1651  =   136    6  136  919
FAIL3       5613     1381    1 1381      FFTAG4      4000  =    28    2 1354 1379 FLAGORGY 32,3017      785
FAKEPRET    5104     1105    2 1103 1113 FFTAG5      6000  =    28    3   40  593 FLAGS    13,3755     1385    1 1383
FALTOF      4370      461                FFTAG6      6000  =    28    4  516 1459 FLAGWRD0    0074  =    65   33  165 1414
FALTON      4364      461   11  231 1396 FFTAG7      4000  =    28    2 1381 1382 FLAGWRD1    0075  =    66   33  217 1315
FAPS     36,2006       38    2  758  775 FFTAG8      4000  =    28    1  439      FLAGWRD2    0076  =    68   32  165 1385
FASTCHNG 31,3740      826    9  794  911 FFTAG9      4000  =    28    1 1404      FLAGWRD3    0077  =    70   22  206 1385
FAZA     23,2771     1153    1 1155      FHNM     25,3577       567    1  566      FLAGWRD4    0100  =    71   34  222 1374
FAZAB    23,3146     1156    1 1157      FIFPSDP  34,2101       632    1  640      FLAGWRD5    0101  =    73   30  157 1453
FAZAB1   23,3174     1156    1 1156      FIFTYFPS 34,2663       640    1  639      FLAGWRD6    0102  =    75   15  186  980
FAZAB2   23,3200     1156    1 1156      FIGTIME  35,3046       668                FLAGWRD7    0103  =    77   33  186 1391
FAZAB3   23,3207     1156    1 1156      FILDELV  E5,1460  =   128    1  128      FLAGWRD8    0104  =    78   15  258  972
FAZAB4   23,3217     1156    1 1157      FILLED   01,3371      1126    1 1125      FLAGWRD9    0105  =    80    6  739  850
FAZAB5   23,3226     1157    2 1157 1222 FILLER   E7,1622  =   149    1  149      FLAP        0216  =    81    3  833  841
FAZA1    23,2775     1154                FINALBIT    4746  =    69                FLAPBIT     4744  =    81
FAZB     23,3070     1155    1 1154      FINALDV  00,2625      1064    3 1057 1063 FLASHH?  21,2025      829

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FLASHOFF     4433       462    6  274 1366 FRANDRES 05,2000  =    29    2   43  211 GCOMPSW   E3,1477      110   10  326  333
FLASHON      4427       462    4  407 1368 FRCS2    36,2016       38    2  756  773 GCOMP7ER  06,3701      336    1  966
FLASHSUB  10,3260      1366    3 1366 1367 FRCS4    36,2014       38    1  755      GCOMP1    06,3540      333    1  333
FLASHV?   21,2033       829    1  829      FREEFBIT     4751  =    66    1  965      GCTR      E5,1736  =   123   10  123  966
FLAT      E6,1555  =    134    6 1[illegible]3 1503 FREEFLAG     0014  =    66   12  942  986 GDESELCT  07,3626     1326    1 1321
FLAT[illegible]         0151  =   1506    6 1497 1503 FREERET      0144  =    97                GDT/2        1236      105   19  105  973
FLATOUT   31,2370       796    1  741      FRSTPAS  34,2644      639    1  639      GDT1/2    E7,1562  =   147    5  147  883
FLATOUT1  31,2277       794    1  794      FRSTZERO 20,2746     1490    1 1490      GDUMP1    31,3453      813
FLATOUT2  31,2301       794    1  794      FSPASBIT     4742  =    65                GEADDR       6136     1005    1 1005
FLATVAL   20,37[illegible]3      150[illegible]    1 1497      FSPASFLG     0005  =    65    3  510      GEFF      E4,1714  =   120    4  120  849
FLESHLOC  10,2000  =     29    1 1265      FSUBO    26,2014       53    1 1143      GENDDV    00,2570     1062    2 1061 1065
FLESHPOT  10,2037      12[illegible]    2  861 1265 FTHROT   31,2000  =    34    2   40  793 GENMARK   10,3021     1364
FLGWRD10     0106  =     82   24   81 1486 FT99999  30,2057      611    2  610      GENMASK      0162  =  1373    4 1356 1369
FLGWRD11     0107  =     83   38  229  893 FUELNEED E7,1666  =   150                GENPL     E5,1434  =   127   27  127  128
FLGWRD12     0110  =     85    2   85  884 FULLAPS  05,2000       43    1  212      GENRET       1143      104    4  513  519
FLGWRD13     0111  =     87    1   86      FULLDSP  41,3654      467    1  467      GENSCL    00,2346     1056    2 1056
FLIP         4606       525    2  829      FULLDSP1 41,3655      467    1  467      GENSCR    00,2277     1055    4 1054 1076
FLOGSUB   30,2000  =     34    1  856      FULLTIME 17,3465     1464    6 1465 1469 GENSHFT2  00,2224     1053    1 1053
FLPASSO   E7,1623  =    149    [illegible]  149  811 FUNCTION E6,1751  =   132   16 1474 1482 GENSHIFT  00,2214     1053    1 1044
FLPAUTNO  E6,1652  =    136    4  136  915 FUNCT2   21,3247     1475    2 1474      GENTRAN      5544     1379    4  297 1502
FLPC         0212  =     80    2  847      FUNCT3   21,3252     1475                GECCOMPS  E5,1562  =   128    3  384  385
FLPCBIT      4740  =     80                FUNNYDSP E7,1666  =   150    5  150  315 GEOIMUTT  37,2004      373
FLPI         0213  =     80    3  838  849 FUNTEM       0157  =  1506    2 1497 1498 GEOM      04,3130     1188    2 1186 1193
FLFI[illegible]      4741  =     80                FV       E4,1461  =   114   15  114 1245 GEOMSGN   E5,1672  =   125   11  125 1194
FLRCS        0214  =     80    4  832  853 FVACCADR 01,3773     1308    1 1305      GEORGEJ   37,3107      389    2  387  388
FLRCSBIT     4742  =     80    2  850      FWCOMP   31,2335      795    2  795      GEORGEK   37,3111      389
FIT SUB   30,3503       919    2  912      FWEIGHT  E7,1610  =   149    7  149  813 GEOSTRT4  37,3025      388
FLUNDBIT     4742  =     79    3  739  850 FXADRS   43,3757     1291    2 1292      GET.LVC   06,3733      692    3  653  766
FLUNDISP     0175  =     79    4  742  833 FXFX     43,3543     1291    1 1292      GET+MGA   06,3717      692    1  680
FLVR         0210  =     80    4  834  851 F2DPS*11 11,2000  =    29    1  820      GETABVAL  33,2217      860    1  860
FLVRBIT      4736  =     80                F2DPS*31 31,2000  =    34    3   39  822 GETADSUV  20,3242     1497
FMAXODD   31,2002        40    1  794      F2DPS*32 32,2000  =    34    3   40  785 GETAZEL   14,3734      956    3  955  956
FMAXPOS   31,2003        40    1  794      ===================================== GETCADR   01,3516     1132    1 1132
FORCEONE  20,2034       292    1  292      G(CSM)   E4,1716  =   120    4  120  882 GETCOMP   41,2515      416    5  414  416
FORCEV25  42,3603       436    2  436      G+N,AUTO 26,2255      475    3  474  748 GETDAT    07,2063      246    4  244  252
FORMULA1  17,3503      1465    1 1464      GACC     E5,1706  =   123    4  965  966 GETDT     36,3735      763    2  759  762
FORMULA2  17,3513      1465    1 1464      GAINAPPR E5,1466  =   121    1  121      GETECC    12,3710     1200    1 1200
FORMULA3  17,3616      1467    1 1466      GAINBRAK E5,1432  =   121    2  121  810 GETERAD   13,2466     1136    1 1139
FORTYONE  13,3452      1220    1 1213      GAINFLTR 30,3762      925    1  919      GETGOBL   27,3177      780    1  779
FORVEL    E7,1701  =    150    2  150  904 GAMCOMP  11,2650     1231    3 1230 1231 GETINFEL  40,2324      401    4  399  404
FORVMETR  E7,1677  =    150    2  150  900 GAMMA    E7,1477  =   145    5  145 1153 GETLMATT  15,3541      980    1  976
FOUR         4751  =   10[illegible]   47  211 1472 GAMPREV  E7,1607      141    7  142  640 GETMAXDT  13,3345     1219    1 1218
FOURSECS  27,2536       772    1  771      GAMRP        0010  =  1138    3 1134 1138 GETMKS    07,2202      252    3  248  261
FOURTEEN     4317  =   1073    2  562 1070 GCOMP    E3,1471      110   24  110  952 GETNEWNM     5427     1300    1 1299
FP        E7,1467  =    140    5  793  795 GCOMPSUB 06,3425      331    6  329  330 GETPART2  01,3541     1303    1 1308

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                3:15 DEC.  2,1970              PAGE 1527

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES

GETPRIO      5423     1299    2 1299 1302 GOCH56    17,2063     1404    2 1404      GOPERFS   10,2625     1360
GETRANS   36,3656      761    1  761      GOCLOSE   21,3625     1484                GOPERF1   10,2623     1360   10  497 1335
GETROOT   21,3303     1475                GOCUTOFF  36,3062      747    2  731  733 GOPERF1R  10,2703     1362
GETRRSV   11,2622     1231    1 1231      GODSP     10,2443     1357                GOPERF2   10,2630     1360
GETRVN    37,3326      706    2  704  707 GODSPALM  41,2351      412   20  406  453 GOPERF2R  10,2710     1362    2  473  511
GETRVN2   37,3363      707    1  706      GODSPR    10,2451     1357    3  474  944 GOPERF4   10,2633     1361    2  493  655
GETULC    26,3333      585    3  576  586 GODSPRET  10,2446     1357    4  756  950 GOPERF4R  10,2713     1362    2  928  975
GETVRVG1  27,3113      779    1  779      GODSPRS   10,2637     1361    8 1355 1362 GOPIN     43,2121      264   23  265  298
GETVRVG2  27,3115      779    1  779      GODSPRS1  10,2641     1361    1 1357      GOPLAY    10,3070  = 1372    1 1360
GETX      12,2767     1189    3 1186 1199 GODSPR1   10,2452     1357                GOPOODOO     5665     1383    1  242
GET22/32  21,2552      903                GODSPR2   10,2453     1357    2 1355 1358 GOPOOFIX  04,2024      224    2  224  242
GET45     35,3634      680    3  680      GODSP2    10,2444     1357                GOPOST    36,3047      746    2  731  732
GFACTM    20,3101     1494    1 1489      GOESTIMS  37,2113      374    1  374      GOPROG    05,2667      215    2  153  154
GIMBLBTS  20,3073     1494    2 1490      GOEXTVB   43,2000      262    1  408      GOPROG2   05,2770      216    2  230  288
GIMLOCK1  23,3431     1254    1 1253      GOFLASH   10,2476     1358   44  225  977 GOPROG2A  05,2771      216    1  216
GI+NOATT  40,3672      471    1  470      GOFLASHR  10,2635     1361    5  724  759 GOPROG3   05,2775      216    2  216
GLAMPTST  06,2507      170    1  170      GOFLASH2  10,2500     1358   15 1355 1361 GOQ       41,3025      428    1  428
GLINVERT  06,2500      170    1  170      GOGOMARK  10,2405     1356                GOQTRIMG  21,3115     1472    2 1472 1494
GLM       35,2000  =    35    1  652      GOGOPROG  04,2224      230    1  231      GOREADAX  37,3436      857    1  859
GLOCKCHK  06,2441      169    2  169      GOINT     35,3462      677    2  670      GOSERV    33,2274      861
GLOCKMON  06,2434      169    1  167      GOLOADLV  43,2361      274    6  262  263 GOSHOSUM  43,3100  =  290    1  263
GLOCKOK      5270  =   181    4  170      GOLOC        0705  = 1308   30 1303 1308 GOSLEEPS  10,2754     1363    3 1360 1371
GLOKFAIL     0056  =    70    2  374 1254 GOMANUR   07,3750     1331    1  474      GOTANGLS  32,2627      601    1  601
GLOKFBIT     4736  =    70                GOMARK    10,2330     1354    1 1372      GOTO         6646     1023   13 1024 1091
GMBDRBIT     4742  =    76    1  781      GOMARKF   10,2334     1355   12  207 1372 GOTOERS      6662     1023    1 1023
GMBDRVSW     0137  =    76    2  781  782 GOMARKFR  10,2353     1355    5  271 1372 GOTOGE       6675     1024    1 1023
GMBLBITA  21,3633     1484    1 1483      GOMARKR   10,2350     1355    1 1372      GOTOGTS   17,2607     1450    1 1442
GMBLBITB  21,3635     1484                GOMARK2   10,2337     1355                GOTOPOOH     6001      224   68  217 1337
GMERGE    07,3500     1323    1 1326      GOMARK2R  10,2356     1355                GOTOV56      6022      593   14  475  515
GMODE     E4,1501  =   114    1  114      GOMARK3   10,2342     1355    1  208      GOUT      E5,1714  =  123    3  964  966
GN/CCODE     5001     1096                GOMARK3R  10,2361     1355    1  295      GOVNUPDT  40,3317      443    1  412
GNUFAZE5  37,3531      859    2  857  858 GOMARK4   10,2345     1355    2  252  277 GOXDSP    10,2330  = 1372
GNUR      E7,1656  =   150    4  885  890 GOMARS    10,2331     1355                GOXDSPF   10,2334  = 1372   13  268 1390
GNURVST   33,3534      889    2  886  889 GOMIDAV   36,2200      734    1  734      GOXDSPFR  10,2353  = 1372    3  292  295
GNUTFAZ5  37,3525      859    2  857  859 GOMUD     04,2220      230    1  231      GOXDSPR   10,2350  = 1372
GNUV      E7,1656  =   150    1  889      GOMOVE    23,2111      485    1  485      GPMATRIX  06,3132      188    1  188
GOABORT   32,3540      832    1  241      GONXTBNK  43,3662     1292    3 1292      GRABGRAV  15,2731      966    1  966
GOAGIN    10,3050  =  1372                GOODARG   21,3460     1481    2 1481      GRAVEL    15,2603      964    1  964
GOALMCYC  41,2350      412    1  431      GOODEND   07,3665     1328    4  245 1328 GREED     15,2724      966    1  966
GOANIDLE  10,3141     1366    1 1366      GOODEPS1  20,2604     1488    1 1488      GRP2OFF   21,2150      872    3  872
GOBAC     13,3463     1220    2 1220      GOODEPS2  20,2630     1489    1 1488      GRP2PC    04,3244     1226   26  493 1242
GOBACK    35,3773      748    2  748      GOODMANU  22,3234      369    1  363      GRP2SVQ   E5,1711  =  126    3  126 1226
GOBAQUE   11,2774     1233    3 1235 1242 GOODNEG   20,3020     1493    1 1492      GRP4OFF   32,3704      835
GOBB         4054      154    1  153      GOODRAD   25,3253      556    1  558      GSAV      F4,1630      116   10  116  982
GOBLTIME  E7,1511  =   147    3  147  780 GOPERFRS  10,2705     1362                GSCALE    22,3651      827    2  809  818

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GSELECT   07,3433    1322    3 1321       HANG20    06,2071     157    1  156       HLIGHT    25,3630     612    2  612
GSHIFT       7621    1044    1 1011       HAPO      E4,1716 =   117    5  117  653  HLITE        4747 =   613    2  612  829
GTMP         0026 =   987    5  985  987  HAPOX     E4,1517 =   114    4  114  720  HMEAS     E7,1654 =   149    7  149  893
GTS       21,3077    1472    1 1450       HAVEGUES  11,2002     686    1  776       HMSIN     42,3452     434    1  431
GTSCADR   17,2624    1450    1 1450       HAVENORM  04,3162    1188    1 1188       HMSOUT    42,3230     421    1  417
GTSFIN    42,2147     305    1  430       HAVEQUOT  21,3203    1474    1 1474       HOLD         0165 =  1506    2 1504
GTSFINLC  41,3157     430    1  430       HBAD      34,3745     894    1  893       HOLDQ     E6,1745 =   133    2 1461 1465
GTSFOUT   42,2141     304    1  417       HBEAMANT  33,2002      41    1  896       HOLDW     F5,1734 =   126    7  126 1155
GTSFOUTL  41,2564     417    1  417       HBEAMNB   E4,1672 =   119    2  884  896  HPER      E4,1720 =   117    3  314  653
GTSGO+ON  21,3113    1472                 HCALC     E7,1534 =   147    9  147  885  HPERMIN   E4,1600 =   115    6  115  721
GTSQAXIS  21,3133    1473    1 1473       HCALC1    E7,1774 =   151    3  315  876  HPERX     E4,1521 =   114    2  314  721
GTSQRT    21,3441    1481    1 1482       HDOTDISP  E7,1473 =   147   11  120  883  HRCON     42,3536     435    2  434
GTSTEMPS  E6,1737 =   132   13  132       HEADTJET  16,3505    1438    1 1438       HRCON1    42,3277     422    1  421
GUESS     37,2020     373                 HFAIL     33,3560     890    2  685       HSCAL     33,2010      41    1  884
GUESSBIT     4752 =    68                 HFLSHBIT     4753 =    85    2  612  613  HSTILBAD  34,3755     894    2  893  894
GUESSW       0034 =    68    3  686 1194  HFLSHFLG     0263 =    85    2  885  890  HUGEQUOT  21,3200    1474    1 1473
GUESS1    37,2255     377                 HH        E6,1747 =   133   15 1464 1467  =====================================
GUIDDURN  32,3257     789    1  786       HIASCENT  E6,1400     129    4  212 1487  IBNKCALL     4674    1000   63  165 1497
GUIDINIT  23,2432     841    2  786  838  HIDESCNT  20,2002      43    1 1487       IC        E7,1655 =   143    6  776  779
GUIDSUB   31,2460     799    1  812       HIDPHALF  23,2517 =    37    6  483 1251  ICDUFAIL  06,2703 =   180    1  181
GUILDEN   31,2467     800                 HIDP1/4   23,2511 =    37    1 1283       ICORK2    43,2214     268
GUILDRET  31,2601     801    3  799  801  HIENERGY  12,3422    1195    1 1195       IDADDTAB  42,2650     314    2  304
GVDETER   15,2563     963    2  965  980  HIGATASK  33,2447     873    1  875       IDADDTEM     0142 =    97
GWAKE     07,3374    1320    1 1320       HIGATCHK  33,2515     874    1  874       IDAD1TEM     0150      97    4  304  429
GWAKE2    07,3334    1319    1 1320       HIGATJOB  33,3670     895    1  873       IDAD2TEM     0151      97    2  304
GYCDARS   14,3164     944    1  931       HIGHCRIT  E5,1507 =   121    1  121       IDAD3TEM     0152      98
GYRCDR    15,3044     969    1  969       HIGHESTF  22,3647     827    1  809       IDLEADR   05,3346     222    1  219
GYROAGRE  07,3346    1319    1 1319       HIGH4        7742    1098    3 1006 1023  IDLEFBIT     4745 =    78    4  760  865
GYROBUSY  07,3367    1320    1 1319       HIGH9        7744    1098    8  246 1006  IDLEFLAG     0161 =    78    7  740  853
GYROCMD      0047 =    92    6  175 1325  HIMINCON  42,3376     423    1  423       IDLEMASK  10,3010    1364    1 1368
GYROEXIT  07,3537    1324    1 1324       HINJECT   32,3756     836    1  841       IDLERADR  16,2155    1413    1 1413
GYROFRAC  07,3627    1326    2 1323 1326  HIPRIO    10,2522    1358    1 1358       IDLERET1  10,3301    1368
GYROTRIM  15,2774     968    1  974       HIRTHROT     4737 =    40    1  760       IDLESLEP  10,3534    1373    1 1363
GYTOBETQ  E5,1462 =   127                 HISCALAR     0003 =    93    2  381 1026  IERASTST     6125    1005    1 1005
G21       E6,1707 =   135                 HISCALIM  25,3441     559    1  559       IFAILINH  05,3350     222    1  216
======================================    HISECON   42,3375     423    1  422       IFAILJMP  06,2755     181    1  162
H         E4,1477 =   114    8  114 1243  HITEMIN      0123 =    96    3  434  435  IFAILOK   07,3234    1317    1 1316
H*GHCR*T     0131 =   122    2  794       HITEMOUT     1007 =   101    4  421  424  IFLAGC    13,3074    1214    1 1215
HAFPA1    E7,1603 =   141    3  634  636  HITEST    33,2476     874    2  878       IFLAGP    13,3051    1214    1 1214
HALF         4736 =  1099   29  334 1510  HIUNITX   23,2517 =    37    1  488       IFLEGAL   10,2561    1359    1 1359
HALFARG   E6,1747 =   132    4 1482 1484  HIUNITY   23,2515 =    37    2  488       IG        E6,1725 =   135
HALFDP    12,2004 =  1101    3  938 1232  HIUNITZ   23,2513 =    37    4  488  518  IGC       E5,1741 =   123    3  123 1254
HALFREV   06,3715     692    2  692       HI10      04,3374    1340    1 1339       IGNALG    32,3031     785
HALFSEC   24,3117     511    1  509       HI5          4350     461   10  157 1292  IGNALGRT  32,3202     788
HANDADR   17,2573    1449    1 1448       HI6ZEROS  23,2521 =    37   16  299 1283  IGNALOOP  32,3070     786    1  788

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IGNAOSQ   E6,1412       129    1   740          IMUZERO   07,2714      1310    3  208   378 INITABIT     4752  =     80    2  971   972
IGNAOSR   E6,1413       129    1   740          IMUZEROA  07,2724      1310    1 1310         INITALGN     0205  =     80    4  971   980
IGNFLAG      0153  =     77    3   737   759    IMUZEROK  43,2133       265    1  265         INITBY    15,3126        971    1  971
IGNFLBIT     4737  =     77    2   738   747    IMUZERO2  07,2757      1311    1 1310         INITCDUW  30,3104        910    2  734   832
IGNITE    36,3102       747    1   746          IMUZERO3  07,2766      1311                   INITDSP   10,3037       1364    1 1303
IGNITE1   36,3116       747    1   747          IMUZERR   37,2325       378    1  373         INITREAD  25,3114        554    6  553
IGNITION  36,2426       738    2   241   747    IMU2      37,2000  =     36    2   44   373   INITST    34,2061        632    2  633   639
IGNYET?   36,2421       738    1   738          IMU4      37,2000  =     36    1  383         INITV     12,3506       1197    3 1195  1196
IGRET     E7,1675  =    145    2   584          IM30INIF  05,3362       223    1  212         INITVEL   11,2000        686    3  652   766
IGSAMEX   27,2125       482    1   482          IM30INIR  05,3363       223    1  216         INITVELX  11,2255        690    1  690
IMEDIATE  01,3620      1305    4  1304  1307    IM33INIT     5026  =    223    2  213   222   INITVEL1  11,2026        686    1  686
IMMEDRET  10,3367      1370                     INBOUND   27,3550      1278    1 1277         INITVEL2  11,2062        687    1  689
IMODES30     1302       106   67   161  1332    INCAZ     15,2310       957    1  959         INITVEL3  11,2105        687    2  687
IMODES33     1303       106   51   158  1410    INCORPEX  E7,1674  =    144    5  144  1136   INITVEL4  11,2137        688    1  688
IMPLBURN  36,3522       759    1   740          INCORP1   23,2531      1149    1  586         INITVEL5  11,2163        689    1  698
IMPULBIT     4743  =     69    2   740   762    INCORP2   23,2743      1153    1  586         INITVEL6  11,2225        689    1  689
IMPULSW  [illegible] =   69    5   759   774    INCOR1    23,2565      1150    1 1150         INITVEL7  11,2230        689    1  688
IMUATTCK  43,2707       281    1   262          INCOR1A   23,2574      1150    1 1150         INITWMX6  26,3231        583    1  583
IMUBACK   37,2005       373                     INCOR1B   23,2623      1150    1 1150         INJTARG   32,3623        833    1  835
IMUBAD    07,3637      1327    5   165  1327    INCOR1C   23,2631      1150    2 1150         INLINK       0045  =     92    2  222  1339
IMUCADR      1304  = [illegible] 4 208  1327    INCOR2    23,2672      1151    2 1151  1158   INLUNCHK  11,3276       1237    1 1238
IMUCAGE   06,2565       174    1   181          INCOR2AB  23,2722      1152    1 1152         INREL        0137  =     97   23  400   405
IMUCHK    15,3652       983    2   950   975    INCOR3    23,2726      1152    1 1152         INRELTAB  40,2330        401    2  401   404
IMUCOARK  43,2205       268    1   267          INCR      01,2406      1088    1 1012         INT-ABRT  11,3017       1233    1 1233
IMUCOARS  07,3000      1312    5   268   965    INCRDCDU  22,3035       365    2  366   367   INT/W     13,3536       1222    2 1221
IMUCOARV  43,2226       268    2   268   269    INDEP     E5,1765  =    125    4 1182  1183   INTBANK   13,3042       1213    1 1213
IMUCOMP   06,2000  =     29    1   326          INDERASE     6206      1006    1 1006         INTBITAB  13,3466       1220    2 1219  1220
IMUFAIL   06,2703  =    180    1   181          INDEX        6146      1006    1 1004         INTBIT15     0115         96    7   96  1006
IMUFINE   07,3210      1316    6   273  1331    INDEXES   17,3105      1455    3 1454         INTB15+      0114         96    7   96  1506
IMUFINED  07,3232      1316    2  1316  1321    INDEXI    23,3763      1264    1 1263         INTEGRV   13,3134       1216   13  236  1224
IMUFINEK  43,2330       273    1   262          INDEXLOC     0130  =     97   12 1006  1089   INTEGRVS  13,3107       1215    7  656   788
IMUFINEV  43,2360       273    1   273          INDEX2       6164      1006    1 1006         INTEGRV1  13,3136       1216    2 1214
IMUFIN20  07,3210  =   1331                     INDJUMP      6274      1011    6 1005  1008   INTEGRV2  13,3141       1216    1 1243
IMUGOOD   07,3636      1327                     INDWORK      6204      1006    1 1006         INTEXIT   13,3225       1217    3 1218  1219
IMUMON    06,2172       161    2   159          INDXYZ    16,3572  =   1440    1 1429         INTFLAG      0227  =     82
IMUOP     06,2622       176    1   181          INERCONA  20,3041      1493    1 1488         INTFLBIT     4736  =     82    2  215  1220
IMUOP2    06,2643       176    1   176          INERCONB  20,3057      1494    1 1488         INTGRATE  11,3333       1238    2 1238  1239
IMUPULSE  07,3323      1319    7   273  1400    INERCONC  20,3060      1494    1 1487         INTGRCAL  26,3242        584    7  575   583
IMUSE        0007  =     66    7   231  1335    INFINAPO  12,3737      1200    2 1200         INTIME    E7,1607  =    142    6  663   726
IMUSEBIT     4744  =     66    3   165   208    INFINBIT     4745  =     79                   INTINIT   13,2000  =     30    4   46  1221
IMUSEFLG     4744  =   1331    1   176          INFINFLG     0200  =     79    4 1186  1195   INTINT    35,3466        677    6  622   675
IMUSLLLG  37,2315       378    3   374   388    INFINITY  12,3205      1192    5 1189  1192   INTINT2C  34,3062        644    2  636   637
IMUSTALL  07,3716      1330   15   208   969    INFLIGHT  23,2000  =     32    2  324  1249   INTINT3P  34,3071        644    2  627
IMUSUPER  37,2000  =     36    1   290          INGTS     E6,1633  =    134    8 1412  1504   INTLOOP   35,2604        662    1  662
IMUVAR    26,3435       586    2   581   582    ININDEX   E6,1744  =    132    5 1431  1482   INTLZE    21,2365        900    1  900

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                        3:15 DEC.  2,1970              PAGE 1530

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF     H        REFERENCES       SYMBOL       DEF     H        REFERENCES       SYMBOL       DEF     H        REFERENCES

INTMCTBS 41,2116       408    2  407         ISSWON    06,2726       180    1  179         JAMTERM      4231       455    1 1367
INTOTHIS 13,2300       710                   ISSZERO   06,2361       166    1  174         JAPFG*    E5,1464  =   121    1  121
INTPRET      6037     1002  242  207 1392    ISWCALL      4700      1000                   JBRFG*    E5,1430  =   121    2  121  826
INTPRETX 31,3677       825    3  807  810    ISWRETRN     4707      1000    3  612  760    JDG2TTF   E5,1430  =   826    1  807
INTPRET1 23,2000  =     32    1 1100         ITCTR     E7,1616  =   142    4  686  689    JETRATE   E6,1745  =   132    5  132 1425
INTPRET2 12,2000  =     30    1 1101         ITEMP1       0061        95   71   95 1416    JETRATEQ  E6,1746  =   132    3 1423 1471
INTRPVP  34,3605       730    2  726         ITEMP2       0062        95   32   95 1480    JETRATER  E6,1747  =   132    3 1423 1471
INTRSM       6050     1002    1 1110         ITEMP3       0063        95   30   95 1479    JETSALL   16,3554      1440    1 1440
INTSTALL 13,3414      1219   38  229 1392    ITEMP4       0064        95   17   95 1326    JETSOFF   16,3442      1437    7 1431 1440
INTVAL   37,3065       389    2  383  385    ITEMP5       0065        95   50   95 1300    JETSON    17,3402      1463
INTVEC   E5,1462  =    128                   ITEMP6       0066        95    9  180 1478    JOBSLEEP     5133      1105    8  374 1377
INTVEL   11,2000  =     29    1  686         ITERATOR  12,2536      1182    1 1195         JOBSLP1   01,2776      1110    1 1105
INTWAKE  13,3425      1220    4  297 1217    ITERCTR      0026  =  1204    5 1174 1246    JOBSLP2   01,3007      1110    1 1112
INTWAKEC 04,3216      1226    1 1226         ITISMASK  10,3266      1368    1 1367         JOBWAKE      5137      1105   13  372 1378
INTWAKEM 04,3213      1226    1 1225         ITRPNT1   32,3354       817                   JOBWAKE2  01,3023      1111    1 1105
INTWAKEU 04,31[illegible]      1225    1 1394         ITRPNT2   32,3510       819                   JOBWAKE3  01,3035      1111    2 1111
INTWAKEX 04,3230      1226    1 1226         ITR0         6370      1014                   JOBWAKE4  01,3027      1111    1 1111
INTWAKE0 13,3423      1220    2  495 1226    ITR1         6357      1014                   JOBXCHS   10,2774      1363    2 1359
INTWAKE1 13,3445      1220    4  711 1220    ITR10        6142      1005                   JOIN      10,3552      1374    1 1374
INTWAKLM 04,3226      1226    1 1226         ITR11        6202      1006                   JSWCHBIT     4736  =    65
INTWAKUP 04,3232      1226    1 1225         ITR12        6134      1005                   JSWITCH      0001  =    65    5 1238 1243
INTWAKUQ     1167  =  1225    3 1225 1226    ITR13        6213      1007    1 1006         JTLST     17,3114      1456    2 1437 1455
INTWAK1Q     1167  =   104    1 1225         ITR14        6237      1008                   JUMPDSP   16,2206      1413    1 1410
INTY     E5,1470  =    128    6  385  386    ITR15        6123      1005                   JUNCTN1   34,3375       725    1  725
INTYPBIT     4750  =     71                  ITR7         6261      1009                   JUNCTN2   34,3430       726    1  726
INTYPFLG     0070  =     71   19  493 1224   ITSAJOB   01,3635      1305    1 1304         JUSTOA    15,2042       250    1  251
INTZ     E5,1474  =    128                   ITSAJOB2  01,3746      1308    1 1306         JUSTOUT   16,3157      1433    1 1434
INVERT   20,3700      1504 [illegible]4 1438 1504    ITSATBL   01,3651      1305    1 1303         JUSTTRIM  15,3027       968    1  972
INVFLAG  36,2645       743    1  743         ITSAVAR   01,3551      1303    1 1303         JUSTZY    15,2011       250    1  251
INVRSEQN 12,3127      1191    1 1191         ITSAWAIT  01,3570      1304    1 1304         J2REQSQ   13,2022        46    1 1235
IRETURN  E4,1502  =    114    8  114 1217    ITSEVEN   01,3752      1308    1 1305         J4REQ/J3  13,2012        46    2 1235
IRETURN1 E7,1744       143    6  152 1225    ITSINDIR     5436      1304    1 1304         ======================================
IRIGCOMP 06,3330       328                   ITSLGCL1     5445      1306    2 1306 1307    K.01      24,3666       657    1  657
IRIGX    06,3356       329    2  328  334    ITSLGCL2  01,3707      1307    1 1307         K(AT)     32,3762       836    1  833
IRIGY    06,3373       329    2  328  334    ITSLIKEB  01,3622      1305    1 1303         K(1/DV)   27,2014        39    1  833
IRIGZ    06,3410       329    2  328  335    ITSLNGCL  01,3734      1307    1 1303         KALCMAN3  22,2004       351    1 1331
IRIG1    06,3353       328    3  326  337    ITSNOVAC  01,3645      1305    1 1305         KALCMON1  22,2000  =    32    4  351  365
ISCADR+0     4220      455    2  455  464    ITSWBIT      4735  =    77                   KALCMON2  22,2000  =    32    1  356
ISITAUTO 26,2262       476    1  365         ITSWICH      0151  =    77    5  627  667    KALEBCON  07,3772      1331    1 1331
ISITN00  10,3155      1366    1 1366         ITSWTLST  01,3741      1307    1 1306         KAOS      16,2623      1427
ISITPRIO 10,3240      1367    2 1368         ITURNON   06,2533       172    1  181         KCENTRAL  E6,1741  =   132    8 1473 1475
ISLIST+0     4224      455    2  455  464    ITURNON2  06,2556       173    2  172  176    KDPNDX    E6,1702  =   135    3  135  367
ISSERVON 04,2107       228    1  227         ====================================== KEEP-2    E7,1560  =   149    1  149
ISSUP    06,2321       165                   JACCUV    20,2642      1489    1 1488         KEEPPRIO  10,2544      1359    2 1365 1369
ISSWOFF  06,2716       179                   JAMPROC      4243       456                   KEEPVR    14,2347       852    2  852

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS               J DEFINED BY JOKER OR ERASE ANYWHERE       MD MULTIPLY DEFINED
BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES

KEEPVR1   14,2351      852   1  851       K1VAL     27,2000       38   1  773       LASTTIME  01,3501     1132
KEL       E4,1630  =   116  12  360  482  K2        E6,1711  =   135                  LASTTPIP  E7,1757  =   151   4  151  818
KEPCONVG  12,2333     1178   3 1176 1177  K2.       34,2561      638   1  638       LASTXCMD     0113  =    96   1  530
KEPC1        0042  =  1202   3 1174 1190  K2CNTRAL  E6,1742  =   132  22 1474 1483  LASTYCMD     0112  =    96   8   96  535
KEPC2        0044  =  1202   3 1174 1190  K2THETA   E6,1737  =   132  12 1473 1483  LAT          1120  =   104   8  104 1135
KEPLERN   12,2023     1174   2 1228       K2VAL     27,2002       38   1  774       LAT-LONG  13,2351     1133   3  657  933
KEPLOOP   12,2166     1176   1 1177       K3        E6,1717  =   135                  LATAZCHK  37,2021      373
KEPPREP   11,2376     1227   3 1217 1233  K3S1      22,2370      357                  LATFWDV   21,2562      903
KEPRTN    E4,1512  =   114   3 1178 1228  K3VAL     27,2004       38   1  774       LATITUDE  E5,1402  =   127   6  127  380
KEPZERO   12,2006  =  1185   3 1175 1199  K4        22,2372      357                  LATLONG   13,2000  =    30   1 1133
KEYCOM    04,3303     1338                K4SQ      22,2374      357                  LATVEL    E7,1700  =   150  18  150  906
KEYRPTBB  [illegible]  154   2  153  154  ======================================  LATVMETR  E7,1676  =   150  13  150  907
KEYRUPT   [illegible] = 28   1 1338       L            0001  =    92 311   93 1509  LATVNEG   21,2766      906   1  905
KEYRUPT1  04,3274     1338   2  153  154  L*WCR*T      0130  =   122   2  794       LATVPOS   21,2761      906   1  905
KEYTEMP1     0073  =    95   4  154 1339  L,PVT-CG  E6,1527      133   1 1489       LAXIS     E4,1702  =   119   5  120  851
KEYTEMP2     0734  =   100   2 1339       LADQSAVE  E7,1714  =   151   5  151  907  LBUF2     00,2470     1059   2 1083 1095
KIGNV/B4  E5,1504  =   121   2  121  787  LAG/TAU   E5,1542  =   122   2  122  819  LCHAN        0001  =    93  19  158 1437
KIGNX/B4  E5,1[illegible] = 121  3  121  787  LAGSLIST     4753  =   209   1  208       LDANZIG   00,3713     1085   1 1084
KIGNY/B8  E5,1502  =   121   2  121  787  LALOTORV  13,2422     1135   1  933       LDATALST     0334       99   2   99  994
KILCLOCK  35,3651      680   2  680  681  LAMBERT   12,3212     1193   2 1246       LDLOOP72  04,3673     1394   1 1394
KILLAOT   07,2060      246   4  246  261  LAMBLOOP  12,3330     1194   3 1195 1197  LDNDUMP   05,3720      996   1  996
KILLBB       6036      750   1  750       LAMENTER  12,2701     1184   1 1197       LDNDUMPT  43,3050      288   1  288
KILLCLOK  36,2733      744   1  744       LAMPTEST  06,2766      181   2  170  171  LDNDUMP1  05,3721      996   1  996
KILLDEAD  27,2242      751   1  751       LAND      E7,1634  =   149  19  149  812  LDNPHAS1  05,3351      222   1  219
KILLMON   41,3314      438   2  438       LANDALT   E5,1712  =   123   3  317  933  LDNPHAS2  05,3640      993   1  991
KILLTASK     6027      750  11  510  746  LANDCNST  22,2000  =    32   1  827       LDPOSMAX  12,2017  =  1202   1 1200
KILLTSK2  27,2200      750   2  750       LANDISP   21,2154      898   4  829  830  LEADTIME  E7,1426      138   1  808
KILL2     04,2254      231   3  231       LANDJUNK  31,2144      791   1  233       LEFT      00,2342     1056   1 1053
KILMONON     4204      454   4  446  468  LANDLAT   E5,1706  =   123   4  123  933  LEFT-     00,2336     1056   1 1053
KLEENEX   10,2333     1355                LANDLONG  E5,1710  =   123   4  123  933  LEFTNCOM  40,3156      433   1  433
KONMAT    05,2001       51   5  985  987  LANDTEMP  E7,1544  =   149   9  149  805  LEFT5        4331      460   5  414 1292
KPIP      33,2020       41   1  860       LARGE     00,3065     1070   1 1070       LEGAL?    21,2110      835   2  830
KPIP1     33,2021       41   5  917  887  LARGE2    00,3112     1072   2 1070 1071  LEGALTST  40,2527      404   2  404
KPIP1(5)  21,2004       42   3  901  902  LARGE3    00,3074     1072   1 1070       LEMALONE  01,2271      295   1  294
KPIP2     33,2023       41   1  882       LARMENT      5601     1381   1 1384       LEMCONIC  13,3100     1214   5  339  954
KQ        E6,1504      132   4  132 1490  LASINEX   00,3631     1084   1 1084       LEMGEOM   13,2000  =    30   1  320
KRDAP     E6,1506  =   132   1 1490       LAST      16,3325     1435   2 1435       LEMMASS      1331      107  21  194 1495
KSPNDX    E6,1701  =   135   6  135  367  LASTBIAS  06,3663      336   1  857       LEMONM       0056  =    93
KT        E7,1575  =   141   5  666  729  LASTCHG   17,3142     1457   1 1457       LEMPREC   13,3057     1214  13   37  976
KT1       33,2200      855   1  846       LASTLADW  E7,1745  =   151                  LEMSTORE  23,2376      697   1  697
KV1       E6,1703  =   135   4  135       LASTLRDT  25,3535      562   1  561       LEMVEC    43,3051      288   1  263
KV2       E6,1711  =   135   4  135       LASTNEGY  21,2712      905   2  904       LENGTHOT  E5,1412  =   127   9  127  388
KV3       E6,1717  =   135   4  135       LASTOK    21,2662      904   2  904       LESCHK    05,3352      222   1  222
K1        E6,1703  =   135                LASTPOSY  21,2674      905   2  904       LETABBIT     4743  =    81   3  739  835
K10RK2    34,2542      638   1  638       LASTSEG   07,3530     1324   1 1324       LETABORT     0215  =    81   3  791  854

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                        3:15 DEC.  2,1970                  PAGE 1532

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SYMBOL      DEF     H       REFERENCES          SYMBOL      DEF     H       REFERENCES          SYMBOL      DEF     H       REFERENCES

LETITLIV 27,2221       751    1  751           LMLSAL01 05,2127  =   202    1  202           LOCSKIRT 22,2744  =   364    7  353  355
LGCLCADR 01,3772      1308    1 1307           LMLSAL02 05,2136  =   202    1  202           LODESCNT 20,2003        43    1 1487
LGCL2CDR     5307     1131    1 1131           LMLSAL03 05,2145  =   202    1  202           LODMIXNN 42,2121       304    1  304
LGCOMP   06,3531       333    3  326  336      LMLSAL04 05,2154  =   202    1  202           LODNLV   42,2137       304    1  304
LGCUPDTE 26,3401       586    4  577  582      LMLSAL05 05,2157  =   202    1  202           LODNNLOC 41,2113       408    8  407  427
LGRET    E7,1675  =    145    4  145  586      LMLSAL06 05,2170  =   202    1  202           LODNNTAB 42,2103       304    1  408
LGWAKE   07,3404      1320    2 1320 1321      LMLSAL07 05,2276  =   202    1  202           LODPHALF 12,2004  =    37    3  322 1199
LGYRO        1314      106    9  222 1324      LMLSAL08 05,2224  =   202    1  202           LODPMAX  12,2017      1101    3   37 1202
LGYROBIN 43,2356       273    1  273           LMLSAL09 05,2226  =   202    1  202           LODPMAX1 12,2021      1101    1   37
LIGHTSET 05,3070       218    2  215  216      LMOMEGAN E6,1407       129    2  213 1425      LODP1/4  04,3036  =    37    1 1137
LIM(-22) 27,3756      1283    1 1278           LMONLY   16,2462      1425    1 1425           LODSAMPT     4400      462    3  438 1339
LIMALARM 26,3675       593    2  591           LMOONBIT     4741  =    79    1  213           LOENERGY 12,3442      1196    1 1195
LIMITCOM 42,3334       422    1  422           LMOONFLG     0174  =    79    5   37 1212      LOGSUB   30,3036       856    1  847
LIMITS       4734  =  1095   10  923 1473      LMORBMDL 05,2066  =   194    1  204           LOKONBIT     4747  =    66    1  551
LIMITSUB 30,3727       924    7  914  919      LMORBM01 05,2127       194    4  194  202      LOKONSW      0012  =    66    5  271  510
LINEAT   17,2344      1446    2 1446 1447      LMORBM02 05,2136       194    6  194  204      LOLIM    12,3503      1197    2 1194
LINRATP  16,3135      1433    1 1434           LMORBM03 05,2145       195    6  194  204      LOMAT    35,3447       677    2  674  675
LINUS        5464  =  1373    2  474  511      LMORBM04 05,2154       195    6  194  204      LONG         1122  =   104    7  104 1135
LINUSCHR 10,3374      1370    2 1358 1359      LMORBM05 05,2157       195    6  194  204      LONGBASE     1151      104    2 1301 1307
LITIT    25,3650       613    1  613           LMORBM06 05,2170       195    3  194  202      LONGCADR     1147      104    2 1131 1132
LMAGSIDL 05,2407  =    204    3  193  204      LMPOS    E4,1751  =   119    4  119  565      LONGCALL     5277     1130    5  374 1308
LMAGSI02 05,2136  =    204    1  204           LMRENDDL 05,2232  =   198    1  204           LONGCLCL 01,3727      1307    2 1307
LMAGSI03 05,2145  =    204    1  204           LMREND01 05,2127  =   198    1  198           LONGCYCL 01,3466      1131    2 1131 1132
LMAGSI04 05,2154  =    204    1  204           LMREND02 05,2136  =   198    1  198           LONGEXIT E3,1434       109    4 1131 1132
LMAGSI05 05,2157  =    204    1  204           LMREND03 05,2145  =   198    1  198           LONGGYRO 07,3543      1324    1 1323
LMCSTADL 05,2172  =    196    2  193  204      LMREND04 05,2154  =   199    1  198           LONGPOCH 01,3521      1132    2 1131
LMCSTA01 05,2127  =    196    1  196           LMREND05 05,2157  =   199    1  198           LONGRTRN 01,3506      1132    1 1132
LMCSTA02 05,2136  =    196    1  196           LMREND06 05,2224  =   199    1  198           LONGTIME     1153      104   13 1130 1307
LMCSTA03 05,2145  =    196    1  196           LMREND07 05,2276       199    2  198  202      LOOKANGL E7,1667  =   150    1  807
LMCSTA04 05,2154  =    196    1  196           LMTRAP   E6,1406       129    2  213 1425      LOOPCT   E7,1605  =   141    5  633  641
LMCSTA05 05,2157  =    196    1  196           LMVEL    E4,1757  =   119    4  119  565      LOOPER   17,3005      1454    3 1449 1455
LMCSTA06 05,2224       196    4  196  202      LNCHTM   E7,1660  =   148    3  143  495      LOOPMX   34,2057       632    1  633
LMCSTA07 05,2226       196    2  196  202      LNGCALL2 01,3452      1131    1 1131           LOOPRATE 16,3670      1470    2 1470 1471
LMDSASDL 05,2303  =    200    1  204           LOADDAP  20,2000  =    31    1  292           LOOPSIN  22,2417       357    1  358
LMDSAS02 05,2136  =    200    1  200           LOADDAP1 01,2000  =    28    2   43  293      LOOP1    23,3716      1264    1 1263
LMDSAS03 05,2145  =    200    1  200           LOADITIS 10,3461      1371    1 1368           LOOP2    23,3715      1263    1 1264
LMDSAS04 05,2154  =    200    1  200           LOADLV   41,2775       427   10  406  435      LOOP3    20,2730      1490    2 1490
LMDSAS05 05,2157  =    200    1  200           LOADLV1  41,2001       406    1  274           LOOSE    37,2730       386    1  387
LMDSAS06 05,2170  =    200    1  200           LOADSTAT     1014      102    4  427  458      LOSCALAR     0004  =    93    4  381 1454
LMDSAS07 05,2341       200    1  200           LOADTIME 10,3573      1397   35  207 1224      LOSCMBIT     4740  =    68    4  552  604
LMDSAS08 05,2355       201    1  200           LOASCENT 20,2001        43    1 1487           LOSCMFLG     0041  =    68   10  496  598
LMDSAS09 05,2224  =    201    1  200           LOC          0164       99   46  371 1373      LOSCOUNT E7,1456       139   39  183  612
LMINT    24,3264       565    1  565           LOCCTR       0064  =    95   31  372 1367      LOSDESRD E7,1711  =   144    6  144  592
LMKAOSN  E6,1410       129    1  213           LOCKANGL 22,2402       357    1  351           LOSSM        1101  =   604    3  598  600
LMLSALDL 05,2357  =    202    1  205           LOCSAM   14,2506       935    3  935  962      LOSVDT/4 E3,1760  =   604    5  598  600

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LOSVEC    E5,1413   =   127   3  127   387 LRHMAX    E7,1420      138   2  885       LRWVX     E5,1532   =   122   1  122
LOSVEL    E3,1760       112   6  112   604 LRHTASK   21,2130      872   1  829       LRWVY     E5,1531   =   122   1  122
LOS1      E5,1444   =   127                LRINH        0254   =   84   2  272       LRWVZ     E5,1530   =   122   2  122   888
LOS2      E5,1452   =   127                LRINHBIT     4744   =   84   2  885   888 LRXCDU    E4,1654   =   116   5  116   894
LOTEMIN      0124   =    96                LRLCTR    E7,1670   =  150   5  150   896 LRXCDUDL  E4,1734   =   119   3  119   892
LOTEMOUT     1010   =   101   1  424       LRMCTR    E7,1672   =  150   5  150   896 LRYCDU    E4,1655   =   116   2  116   886
LOTHRUST  33,2352       862   1  [illegible]61       LROFF     43,2325      272   1  262       LRYCDUDL  E4,1735   =   119   1  119
LOUNITX   12,2004   =    37                LRON      43,2322      271   1  262       LRZCDU    E4,1656   =   116   4  116   894
LOUNITY   12,2002   =    37                LRPOSALM  33,2536      875   1  874       LRZCDUDL  E4,1736   =   119   3  119   892
LOUNITZ   12,2000   =    37                LRPOSBIT     4746   =   86   1  561       LSDISP    14,2462       933   1  933
LOUPE     21,3621      1484   1 1483       LRPOSCAL  43,2641      279   2  276       LSORIENT  04,3013       983   2  932   976
LOWCRIT   E5,1506   =   121   3  121   794 LRPOSCAN  25,3543      562   1  561       LSPOS     15,3664       985   4  935  1237
LOWFCOLD  31,2272       794   1  794       LRPOSCHK  25,3220      556                LSR22.3   26,2412       575   2  506   585
LOWIDCOD  05,2065       193   1  997       LRPOSFLG     0275   =   86                LSR22.4   26,3200       583   1  575
LOWLOAD   10,3526      1372   1 1368       LRPOSNXT  25,3512      561   2  561   562 LSTBNKCH  43,3723      1293   1 1292
LOWSUPER  30,2000   =    34   8  210   555 LRPOSOUT  40,2635      418   1  417       LSTLIM       4747   =   751   1  751
LOWVERB   41,2034       407   1  407       LRPOS2    25,3471      561   2  265   895 LSTPTR       0144   =    97
LOW10        5012      1097  21  232  1291 LRPOS2K   43,2151      265   1  262       LST1      E3,1400       109  48  154  1303
LOW11        4356       461   7  156  1014 LRP2ALM   43,2160      265   1  265       LST2      E3,1410       109  41  220  1128
LOW2         6245   =  1099   1 1053       LRRCTR    E7,1671   =  150   4  150   896 LST2CCN   41,2145       408   1  408
LOW3         4757   =  1099   2  232  1050 LRSCK     25,3417      559   1  559       LST2FAN   43,2002       262   2  262   466
LOW4         4762      1095   3  745  1375 LRSCTR    E7,1673   =  150   4  150   896 LS21X     E3,1757       112   4  499   565
LOW5         4346       461  14  399  1339 LRS22     32,2000   =   34   2   41   569 LTHVACA   05,3355       222   4  221
LOW7         6074      1003  14  228  1371 LRS22.1   32,2366      569   1  505       LUNABIT      4740   =    70
LOW7+2K      5013      1097   1 1009       LRS22.1X  E7,1737   =  146   6  146   573 LUNAFLAG     0060   =    70   9  656  1139
LOW8         4357       461  21  191  1394 LRS22.2   24,3333      572   1  505       LUNDESCH  25,2421       539   1  322
LOW9         5004      1096  12  245  1113 LRS24.1   26,3442      588   2  516   592 LUNG      15,2670       965   2  963   964
LO6ZEROS  12,2006   =    37   5  248  1185 LRS24.11  26,3471      589                LUNLANAD  17,2025       741   1  741
LPS20.1   24,3255       565   5  496   570 LRUPT        0011   =   92                LUNLAND   31,2462       799   1  741
LPS20.2   25,3565       566   1  496       LRVEL     25,3107      553   1  892       LUNPOS    15,3664   =   985   2  487  1238
LRADRET   E7,1650   =   149   4  149   897 LRVELBIT     4744   =   86                LUNRSALN     0005   =   236   2  235
LRADRET1  E7,1656   =   150   2  895   896 LRVELFLG     0273   =   86                LUNSFCHK  24,2667       507   9  492   516
LRALPHA   E5,1522   =   121   3  122   896 LRVELX    25,3101      553   1  491       LUNSPH    11,3360      1238   1 1237
LRALPHA2  E5,1524   =   122   1  122       LRVELY    25,3077      553   1  491       LUNVEL    15,3775       987   1 1239
LRALT     25,3073       553   2  491   893 LRVELZ    25,3075      553   2  491   553 LV           0044   =    93   2 1070  1072
LRALTBIT     4747   =    86   1  612       LRVF      E5,1527   =  122   3  122   888 LVBUF        6273      1010   1 1034
LRALTFLG     0276   =    86                LRVJOB    33,3616      892   1  889       LVELBIAS  25,2000        41   1  556
LRBETA1   E5,1523   =   122   1  122       LRVMAX    E5,1526   =  122   3  122   888 LVLIMITS  21,2730       905   4  904
LRBETA2   E5,1525   =   122   1  122       LRVTIMDL  E4,1737   =  119   2  200   892 LVMINLM   21,3020       906   6  905   906
LRBYBIT      4735   =    83   7  229   874 LRVTIME   E4,1652   =  116   7  116   894 LVSQUARE     0042   =    93   2 1070  1075
LRBYPASS     0245   =    83   1  785       LRWH      E7,1421      138   1  885       LVWTLIST     5215      1119   1 1123
LREGCHK   04,3000       702   1  701       LRWVFF    E5,1536   =  122   2  122   889 LXA       01,2354      1087   1 1012
LRESC     20,2667      1489   1 1488       LRWVFX    E5,1535   =  122   1  122       LXC       01,2360      1087   1 1012
LRHEIGHT  25,3272       557   1  556       LRWVFY    E5,1534   =  122   1  122       L14/OUT   40,2711       419   1  419
LRHJOB    34,3716       893   1  872       LRWVFZ    E5,1533   =  122   2  122   888 ==================================================

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT           XX MISCELLANEOUS TROUBLE
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SYMBOL       DEF     H         REFERENCES       SYMBOL       DEF     H         REFERENCES       SYMBOL       DEF     H         REFERENCES

M/SCON1   42,3377       423   1  422           MARKPERF  10,2440      1357   1 1367           MDOTIDPS  36,2002        38   1  333
M/SCON2   42,3400       423   1  422           MARKPLAY  10,2377      1356   4 1356 1372      MD1           4362       461   4  458 1391
M/SCON3   42,3402       423   4  422           MARKRET   10,3413      1370   1 1369           MEASINC   23,2000  =    32   1 1149
M/SLIMIT  42,3326       422   2  422           MARKRUPT  07,2332       254   2  153  154      MEASINC1  23,2000  =    32   1 1153
M/SNORM   42,3342       422   7  422  423      MARKSTAT      1312      106  34  222  261      METHOD1   22,2242       354   1  354
M/SOUT    42,3303       422   1  417           MARKTEST  26,2504       576   1  575           METHOD2   22,2216       354
MAGSUB        4512      521   9  523  544      MARKTYPE  07,2514       258   5  255  260      METHOD3   22,2266       355   2  354
MAGVEC2   E5,1717  =    125   6  125 1157      MARKWAKE  10,3023      1364   1 1371           MFI       E4,1630  =   116  12  351  353
MAINENG   30,2425       846   1  846           MARK2PAC      1073      103   2 1364 1365      MFISYM    E6,1703  =   135  12  353  355
MAINLINE  30,2704       850   2  851           MARK3MSK  10,3505      1372   2 1355           MFREF     15,3462       978   2  981  982
MAINRTNE  34,3434       726   1  729           MARK4MSK  10,3506      1372   1 1355           MFS       E4,1630  =   116   5  116  351
MAINRTN1  34,3460       727   1  727           MARSLEEP  10,3454      1371   1 1356           MGARET    30,3275       914   1  924
MAJ+      07,3467      1323   1 1322           MASKREG   E5,1534  =    127                    MGC       E5,1743  =   123   3  123 1253
MAJ-      07,3607      1326   1 1322           MASS          1244  =    105  18  105 1495      MGLVFBIT      4752  =    75
MAKEACCS  37,3515       859   2  858           MASSCTR       0161  =   1496   5 1494 1495      MGLVFLAG      0130  =    75   2  692
MAKECADR      4645      999  16  271 1486      MASSFIX   20,2513      1487   3 1487           MG2       07,3726      1330   1 1330
MAKEGEN   10,3537      1373   1 1361           MASSMON   33,2233       860                    MIDAVBIT      4752  =    81
MAKEMARK  10,2364      1355   1 1359           MASSMULT  31,2400       796   2  793           MIDAVFLG      0224  =    81   3 1224 1242
MAKEMAX   20,3027      1493   1 1493           MASS1     E7,1570  =    147   5  147  864      MIDDGIM   06,2000  =    29   1  692
MAKEPLAY  10,2546      1359   3 1358 1373      MATINC        0140       97   9   97 1039      MIDFLAG       0002  =    65   5 1218 1245
MAKEPRIO  10,2512      1358   1 1359           MATMOVE   14,3377       948   7  944  975      MIDFLBIT      4737  =    65
MAKERUPT      7754     1459   2 1458 1459      MAX           0016  =   1204   4 1182 1183      MIDOPLST  17,3131      1457   1 1456
MANFLAG   16,2202      1413   1 1412           MAXANG    22,2364       357   1  352           MIDTOAV1  13,3557      1223   1  734
MANMODE   16,3027      1430   1 1430           MAXCHECK  12,2625      1183   1 1183           MIDTOAV2  13,3553      1223   1  758
MANUCALL  22,3177       367   1  367           MAXCHK    22,3636       721   6  617  720      MID1FBIT      4751  =    81
MANUFBIT      4736  =    77                    MAXCOGA   12,3302      1194   2 1194           MID1FLAG      0223  =    81   4 1223 1225
MANUFLAG      0152  =    77                    MAXDB     05,3067       218   1  212           MID2      13,3652      1224   1 1224
MANUOFF   22,3113       366   1  366           MAXDT     13,3341      1219   2 1218           MID5          4347       461   1  428
MANUSTAL  22,3067       366                    MAXDV     00,2642      1065   1 1061           MID7          4144       439   4  439 1372
MANUSTAT  22,3122       366   1  365           MAXDVSW       0140  =     97   6 1057 1072      MIMRET    17,2307      1445   1 1445
MANUSTOP  22,3213       369   1  366           MAXFORCE  E5,1546  =    122   2  122  819      MIN           0010  =  1204   4 1182 1183
MANUVER   26,2000  =     33   1  473           MAXJETS   17,3340      1462   1 1462           MIN+      07,3464      1323   1 1322
MANUVER1  26,2000  =     33   1  483           MAXNM     22,3645       721   3  721           MIN-      07,3604      1326   1 1322
MARKCHEX  07,2216       252   2  252  261      MAXPLUS   20,3035      1493   2 1492 1493      MINABDV   33,2204       855   1  843
MARKCNTR  E7,1550  =    145  13  145  261      MAXRA     27,3461      1274   2 1274           MINADR    17,2317      1446   1 1445
MARKCOP   10,2413      1356   1 1356           MAXTEST   00,2565      1061   4 1060 1074      MINANG    22,2362       357   1  352
MARKCTR   E7,1462  =    139   5  496  711      MAXTFF    27,3651      1280   1 1279           MINB12        7741  =   994   1  992
MARKEBAN      1071      103   1 1372           MAXTFF1   27,3650      1280   1 1277           MINB1314  05,3560       992   1  992
MARKEND   10,2326      1354   1 1354           MAXTRIES  24,2310       499   2  509  510      MINCHECK  12,2571      1182   1 1182
MARKFLAG      1071  =  1372   1 1356           MAXTRYS   25,2474       542   1  543           MINCOGA   12,3320      1194   1 1197
MARKFMSK  10,3031      1364   2 1355           MAXVBITS  21,2005        42   8  904  906      MINCON    42,3540       435   1  434
MARKFORM  10,2340      1355                    MAX250    35,3733       684   1  667           MINCON1   42,3275       422   1  424
MARKNV        0370      100   5 1356 1365      MCTOMS    25,3071       552   2  548  551      MINCON2   42,3273       421   2  421
MARKOCT   10,3532      1373   1 1363           MDOT      E7,1736  =    143   2  143  774      MINCSM        4741  =    43   1  294
MARKOVER  10,3421      1371   1 1354           MDOTAPS   36,2010        38                    MINDEX        0774       101   4  228  232

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SYMBOL     DEF      H         REFERENCES         SYMBOL     DEF      H         REFERENCES         SYMBOL     DEF      H         REFERENCES

MINFORCE  E5,1544  =  122     2  122  819  MNKEYIN      0015  =   93     2  218 1338  MOREIDLE  16,2157     1413     3 1410 1411
MINIMP    43,3001     284     1  263       MODABORT  07,3741     1330     2 1330       MORNUM    40,2312      401     2  400
MINIRECT  11,3455    1240     3  495 1222  MODDONE   12,2124     1175     3 1175       MOVATHIS  13,2747  =   37     1 1222
MINLMD    01,2000      43     1  294       MODE         0163       99    37  326 1373  MOVEACSM  13,2674     1211     3 1157 1211
MINMINLM  01,2001      43     1  294       MODEA        1107  =  103     4  323  539  MOVEALEM  13,2747     1212     4   37 1212
MINPERE   22,3365     715     2  714  717  MODEB        1111      103     4  103  542  MOVEPCSM  13,2723     1211     3 1157 1211
MINPERM   22,3363     715     1  717       MODECADR     1304      106    10  106 1330  MOVEPLEM  13,2770     1212     3 1156 1212
MINQR     17,2266    1445     2 1445       MODEEXIT  07,2755     1311     8 1310 1330  MPAC         0154       99   921   98 1506
MINRTN    17,2273    1445     1 1446       MODEGOOD  07,3731     1330     1 1330       MPAC+     00,2437     1059     2 1058
MINTIMES  16,3621    1441     1 1437       MODESLP   07,3735     1330     1 1330       MPAC+6       0162  =  420     7  420  462
MINTIME2  05,3525     991     1  992       MODESW    07,2000  =   29     1 1310       MPAC-     00,2433     1058     2 1058
MINUS1       7747  = 1099     2 1323 1371  MODE2CHK     4550      523     2  522  544  MPACSHR   00,2033     1047     2 1055 1076
MINUS2       7746  = 1308     3  219 1303  MODE70    05,3476      832     1  831       MPACSRND  00,2050     1048     1 1047
MIS       E6,1546     134    19  135  483  MODE71    05,3500      832                  MPACTST   42,3554      435     1  434
MISCJUMP     6334    1012     1 1009       MODNGDEL  12,2600     1182     2 1182       MPACVBUF     7532     1043     5  601 1262
MIXADR    41,2260     410     1  410       MODPSDEL  12,2636     1183     2 1183       MPAC2SAV     0165  = 1372     2 1356 1365
MIXBACK   40,3047     432     1  432       MODREG       1011      101    25  212 1388  MPERFMSK  10,3520     1372     2 1355
MIXBR        0140  =   97    13  304  433  MODROUTB  04,2040  =  447     1  447       MPTEMP       0135       97    64   97 1086
MIXCON       4771  =  304     1  304       MONADR    40,3440      446     1  446       MR.KLEAN  05,2643      213     2  212 1383
MIXNN1    41,2234     410     1  410       MONBACK   41,3350      439     1  439       MRKIDBIT     4735  =   72
MIXNN2    41,2246     410     1  410       MONBUSY   41,3351      439     1  438       MRKIDFLG     0074  =   72
MIXNOUN   41,2221     410     1  407       MONDEL    41,3320      438     1  438       MRKNVBIT     4743  =   72     1 1355
MIXTEMP      0125  =   96     3  404  410  MONDO     41,3321      438     1  438       MRKNVFLG     0102  =   72     1 1366
MKABORT   07,2044     245     1  244       MONITOR   41,3230      437     7  408  409  MRUPTBIT     4747  =   73
MKALARM   07,2325     253     1  252       MONIT1    41,3232      437                  MRUPTFLG     0106  =   73
MKDEX     E7,1552  =  145     9  145  261  MONIT2    41,3245      437     2  437       MSKDATR1  20,2021      292     1  292
MKOVBIT      4751  =   73     2 1357 1364  MONREF    41,3347      439     1  439       MSTORE1   01,2367     1087     2 1088 1091
MKOVFLAG     0110  =   73                  MONREPOS  06,3115      187     1  187       MS100        7727  = 1413     2 1412 1421
MKREJ     07,2461     257     1  254       MONREQ    41,3275      438     2  438       MU(P)        0032  = 1247
MKRELEAS  07,2047     245     1  253       MONSAVE      1020      102     7  222  439  MU/A      E7,1720  =  143     4  143  777
MKRUPTBB     4061     154     1  153       MONSAVE1     1021      102    12  222  465  MUASTEER  E7,1716  =  143     5  143  778
MKTIME    E7,1754  =  146     8  146  893  MONSAVE2     1022      102     4  437  452  MUCHTIME  01,3511     1132     2 1131
MKVAC     07,2014     244                  MOONBIT      4740  =   65                  MUEARTH   13,2006       46     8  687 1245
MKVACEND  07,2031     244     5  244       MOONCNTR  14,2543      935     1  935       MULBUSH   21,3467     1481     1 1481
MKVB52    07,2620     260                  MOONFLAG     0003  =   65    31  656 1247  MULTEXIT     5624     1382     3 1381 1382
MKVB53    07,2617     260                  MOONGON   22,3516      717     1  717       MULTFAIL     5630     1382     1 1381
MKVB54    07,2616     260     1  260       MOONMX    24,3720     1143     2 1140 1142  MUM       13,2004       46
MKVB54*   07,2621     260     1  252       MOONMXA   25,3671     1144     1 1144       MUM(-37)  27,2024       44
MLOSV     E3,1766     112     6  548  604  MOONOTH      0173  =   37     2  297       MUNFLAG      0141  =   76     8  229  867
MMADREF   41,2033     406     1  406       MOONPAD   22,3373      715     1  714       MUNFLBIT     4744  =   76     4  186  865
MMATRIX      0024  = 1148     8 1140 1234  MOONRATE  27,2026       44     1  842       MUNG?     37,3377      707     1  703
MMCHANG   41,3430     447     2  406  409  MOONSPOT  33,2254      860     1  860       MUNGRAV   33,3130      883     7  734  885
MMDSPLAY     5315    1294     1  217       MOONTHIS     0174  =   37     6  297 1221  MUNRETRN  33,2461      874     1  883
MMNUMBER     0775     101    10  227  835  MORECADR  20,2445     1420     1 1420       MUNRVG    33,3066      882
MMTEMP       1060  =  232     3  232       MOREDES   25,2627      546     2  546       MUSCALE   E7,1766  =  143     2  777

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MUTABLE   04,2004       45    6  690 1193  NEGATE    21,3323     1476    1 1476       NEWDEL    12,2634     1183    2 1182 1183
MWAITBIT     4741  =    72                 NEGCHECK  21,3655     1508    1 1509       NEWDELHI  22,3003      365    1  368
MWAITFLG     0100  =    72                 NEGCOS    13,2532     1137    1 1137       NEWDELX   12,2260     1177    3 1177
MX        E7,1676  =   145    6  145  580  NEGDRIVE  21,3573     1483    1 1483       NEWIBIT      4737  =    79
MXMYMZ    26,2757      579                 NEGEDOT   17,3266     1461    1 1461       NEWIFLG      0172  =    79    3 1215 1219
MXM3      22,2312      356    4  351  482  NEGFIRE   21,3707     1509    1 1509       NEWJOB       0067       95   22  221 1293
MXV          7334     1038    1 1011       NEGFNCT1  21,3232     1474    1 1474       NEWLIST   05,3536      992    2  991  992
MY        E7,1704  =   145    5  145  586  NEGFNCT2  21,3244     1475    1 1474       NEWLOAD   30,2160      839    1  839
MZ        E7,1712  =   145    3  145  580  NEGLMLV   21,2775      906    1  905       NEWLOC       0065  =    95    9 1103 1111
M11       E6,1414      129    9  154 1438  NEGMAX       4735  = 1099   13  367 1493  NEWMODE      6060     1003    6 1019 1398
M21       E6,1415      129    4  189 1451  NEGONE       7747     1098   15  219 1505  NEWMODEA     5314     1294    2  232  377
M22       E6,1417      129    7  188 1451  NEGOUT    13,2540     1137    1 1137       NEWMODEX     5311     1294    7  373 1394
M31       E6,1416      129    4  189 1451  NEGP      12,3417     1195    3 1194 1195  NEWOPS       6070     1003    1 1002
M32       E6,1420      129    5  189 1451  NEGPROD   27,3146      779    1  779       NEWPAR    14,2733      939    1  939
=======================================    NEGSGN    40,2374      402    1  399       NEWPHASE  31,2421      798    1  802
NARROWDB  20,2150     1407    1 1407       NEGSHAFT  25,2570      544    1  544       NEWPOS    E7,1652  =   148    4  148  495
NAVKEYIN     0016  =    93    6  213  255  NEGTFF    27,3645     1280    2 1279       NEWPRIO      0063  =    95   12  232 1361
NBDONLY   06,3555      334    1 1121       NEGTHRST  21,3760     1510    1 1509       NEWSTATE  12,2653     1184    1 1186
NBDX      E3,1460      109    6  326 1121  NEGTORK   16,3732     1471    1 1470       NEWTN     34,2702      640    2  640
NBDY      E3,1461      109    2  328  335  NEGTORKU  E6,1516  =   133                 NEWVEL    E7,1644  =   148    3  148  495
NBDZ      E3,1462      109    2  328  335  NEGTORKV  E6,1520  =   133                 NEWZCOMP  22,3711     1157    1 1151
NBD2      06,3602      334    1  336       NEGTOTKP  E6,1514  =   132                 NEXTCDU   07,3060     1313    4 1313 1314
NBD3      06,3606      334                 NEGTOVFL  12,2330     1178    1 1178       NEXTCOL   11,3552     1242    2 1243
NBPOSFL   37,2012      373                 NEGUQ     E6,1501      132   11  132 1483  NEXTCORE  01,2674     1107    2 1106
NBRANCH   11,3232     1237    4 1234 1247  NEGUR     E6,1503  =   132    4 1411 1476  NEXTES    35,3213      670    1  669
NBUSMASK  10,3513     1372    1 1360       NEGUSUM   21,3566     1483    3 1476 1483  NEXTIME   E6,1706  =   135    3  367  368
NB1NB2    23,2513  =    37                 NEGVMAXY  21,2720      905    2  905       NEXTINCL  05,3543      992    1  992
NB2CDUSP  30,3533      920    1  914       NEG0         4754     1095   30  157 1457  NEXTINSL  05,3656      994    1  991
NCDU      E6,1703  =   135    3  365  366  NEG1         7747  = 1099    5  326 1099  NEXTLINE  22,3507      717    1  717
NCOARSF   14,3602      952    4  944  974  NEG1/2       4734     1095    6  220 1128  NEXTP     E6,1472      130    7  130 1430
NCSMVEL   E7,1664  =   148    2  495       NEG1/3    21,3243     1475    2 1475       NEXTU     E6,1473  =   130    5 1405 1443
NDCMPTST  41,2436      415                 NEG100       5172     1116                 NEXTV     E6,1474  =   130    5 1405 1444
NDXCDUW   E6,1650  =   136    6  136  919  NEG12     00,3733     1086    3 1054 1076  NGUIDSUB  E7,1647  =   150    3  799  812
NDXCHNGE  12,2240     1177    2 1176       NEG180    40,3066      432    1  432       NICKELDP  34,2077      632    1  635
NDXCTR    E5,1414  =   127    7  127  376  NEG2         7746     1098   10  230 1481  NIGNLOOP  E7,1646  =   150    3  786  812
ND1          4361      461    6  381  892  NEG3         7745     1098    7  890 1443  NINE         4320  = 1099    2 1502
NEARONE   27,3770     1283    4  846 1280  NEG4         6112     1004    2 1008 1286  NJETSBIT     4735  =    67
NEEDLBIT     4750  =    66    1 1415       NEG5      41,2115      408                 NJETSFLG     0017  =    67    1  755
NEEDLER   20,2322     1418    1 1414       NEG7         5660  =   232    2  246  955  NN        E7,1466      140    8  198  724
NEEDLER2  20,2353     1418    1 1418       NETNEG    20,3740     1504    1 1504       NNADTAB   42,2154      305    1  304
NEEDLES   20,2373     1419    1 1419       NETZERO      6121     1005                 NNADTEM      0146       97    8  304  430
NEEDLES3  20,2362     1418    1 1418       NEWAGS    32,2014      207    1  207       NNTYPTAB  42,2320      308    1  304
NEEDLE11  20,2334     1413                 NEWANGL   22,3007      365    1  364       NNTYPTEM     0147       97    5  304  429
NEEDLFLG     0013  =    66    2  266       NEWANGLE  25,3743     1145    4 1143 1146  NO.CORES  01,2634     1106    2 1106 1111
NEG          6741     1025    4 1025       NEWDATA   21,2313      900    1  899       NO.PJETS  E6,1521      133    3  133 1470

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SYMBOL      DEF     H       REFERENCES        SYMBOL      DEF     H       REFERENCES        SYMBOL      DEF     H       REFERENCES

NO.UJETS  E6,1522   =  133     3  133 1470  NORBACK   40,3051      432     1  432       NOTWCSM   26,2444      575     1  575
NO.VJETS  E6,1523   =  133                  NORDSTAL  25,2456      541     3  539  542  NOTWLEN   26,2476      576     1  576
NO.WDS       6244     1008     5 1008 1077  NOREASON  33,3243      885     1  884       NOULLAGE  36,2653      743     4  740  760
NO.9      36,3663      762     1  761       NORESET   07,3430     1321                  NOUN      40,2370      402     1  399
NO-ATT    30,2657      849     1  849       NORFINAL  13,3300     1218                  NOUNADD      0145   =   97    29  410  460
NO-INT    13,2063      236     1  236       NORLITE   33,3572      890     2  890       NOUNCADR     1017      102     9  407  460
NOADJUST  42,3723      488     1  488       NORMADR   42,3401      423     1  422       NOUNREG      1002      101    15  222  458
NOAOS     20,3453     1500     1 1500       NORMAL    01,2337      295     1  294       NOUNTEN      0122   =   96     3  410
NOATTCNT  30,3750      924     3  912  915  NORMBNCH  10,3061     1365     1 1371       NOUNTEST  41,2460      415     2  425  426
NOATTOFF  07,3266     1317     4  165 1316  NORMEX    E7,1463      140    19  140  697  NOUPDOWN  43,3056      289     1  288
NOBITS    E5,1442   =  127                  NORMEXIT  32,2531      571     1  571       NOUPFBIT     4746   =   67     1  505
NOCHG     35,3572      579     1  579       NORMGAM   E4,1503   =  114     7  114 1158  NOUPFLAG     0030   =   67     2  289
NODDOT    26,2004       52     1 1143       NORMLIZ   23,2000   =   32     1  866       NOUT         1016      102     9  157  467
NODESNB   25,2533      543     1  543       NORMLIZE  23,2461      867     2  242  857  NOUTCON      4760   = 1099     1  222
NODESSM   25,2471      542     2  539  542  NORMLIZ1  33,2415      867     1  867       NOUVEAU   04,2310      231     1  229
NODIC     26,2012       53     1 1143       NORMLIZ2  33,2420      867     1  867       NOVAC        5072     1103    32  158 1411
NODOBIT      4753   =   70     3  227 1385  NORMLOP   37,2604      385     1  385       NOVACADR  01,3775     1308     1 1305
NODOFLAG     0054   =   70     6  207 1337  NORMRET   10,3427     1371     2 1369       NOVAC2    01,2625     1106     1 1103
NODSPOUT  06,2130      160     2  157       NORMSBIT     4742   =   77                  NOVAC3    01,2630     1106     1 1107
NODSPY    06,2152      160     1  160       NORMSCL   16,3614     1441                  NOVRWRT   35,3424      675     1  676
NODVMON1  33,2342      862     1  851       NORMSW       0156   =   77     8  697 1189  NOV37MM   04,2477      235     1  227
NODVMON2  33,2346      862     1  851       NORMTEM1     1045   =  102     3  946 1362  NOWMATX   32,2257      496     1  494
NOEBANK   43,3362     1288     1 1289       NORMTEST  00,3512     1081                  NPTRAPS   E6,1433   =  129     4 1412 1425
NOEND     25,3262      556     1  556       NORMT4    06,2007      155     2  155       NQTRAPS   E6,1434   =  130     4 1412 1426
NOGIMLOC  22,2744      364     1  364       NORMUNIT  10,3726     1401    11  339 1401  NRMAG        0040   = 1268     4 1271 1278
NOGIMLUN  06,2462      170     2  169       NORMUNX1  10,3724     1401     3  585  776  NRMIDBIT     4737   =   72
NOGO      22,2732      363     3  363  365  NORMWAKE  10,3333     1369     1 1371       NRMIDFLG     0076   =   72
NOGOBL    27,3212      780     1  780       NORMZI       0044   = 1158    12 1157 1159  NRMNVBIT     4744   =   72
NOGUESS   12,3467     1196     1 1194       NOROTAT   17,2777     1454     3 1453 1458  NRMNVFLG     0103   =   72     1 1366
NOIBNKSW     6063     1003     1 1044       NORPGMON  06,3132   =  189     7  183  187  NRTERM       0020   = 1268     2 1277
NOINT     13,2653     1210     1 1209       NORRMBIT     4750   =   75     2  186  220  NRTRAPS   E6,1435   =  130     4 1412 1427
NOKILL    43,3115      290     1  291       NORRMON      0126   =   75     9  270  514  NRUPTBIT     4750   =   73
NOLITE    33,3607      891     2  890       NOR29FLG     0061   =   70     2  850  863  NRUPTFLG     0107   =   73
NOLOKON   23,2026      271     1  271       NOR29NOW  33,2570      876     6  596  876  NR29&RDP     5014   =  595     1  876
NOLEFBIT     4742   =   84     2  872  884  NOSHIFT   10,3770     1402     6 1401       NR29FBIT     4741   =   70     3  220  605
NOLRREAD     0252   =   84     1  895       NOTALLOW  21,3417     1480     2 1479       NSAMP        1111   =  103     3  554  556
NOMDNLST  05,2172   =  193                  NOTBIT12  40,3673      471     2  470  471  NSRCHPNT  E7,1736   =  144     5  144  592
NOMINIMP  43,3006      285     1  263       NOTHRBIT     4740   =   74     1  739       NSTEER    36,3672      762
NOMORE    25,3174      555     2  555  560  NOTHROTL     0116   =   74     3  754  785  NTARGBIT     4751   =   76
NOMTPI    E4,1716   =  117        627  677  NOTTIME   13,3662     1225     2 1223 1224  NTARGCHK  35,3550      678     1  678
NONAVKEY  05,3102      218     2  215  218  NOTMIN    17,3032     1454     2 1454       NTARGFLG     0146   =   76     3  678
NOPIF     35,3350      673     1  673       NOTMUCH   20,3432     1500     1 1498       NTP/2     34,2376      636     2  636
NOQBESM      5274     1129     1 1428       NOTPLAN   15,2523      961     1  961       NUCHANG2  01,3011     1110     1 1116
NOQRSM       5272     1129     1 14[illegible]       NOTP20    25,3041      552     1  551       NUDIRECT  01,3225     1116     1 1116
NORATES   30,2502      847     1  847       NOTSHIFT  24,3321      565     1  565       NULLCLOK  36,3015      746     3  746  747

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NUM       40,2175      399   9  398  399 N45PROC   35,3654      681   1  680      OCT217       5714     1383
NUMBERT   E6,1743 =    131  19 1429 1469 N49DSP    24,2644      507   1  506      OCT220    04,3273     1333   1 1332
NUMGRPS      4756 =    223   2  216  217 N49FLAG   E7,1746 =    145   5  152  507 OCT23        4360 =   1099   2  747 1008
NUVCSM    E3,1600      111   1  578      N89DISP   14,2446      933   2  932  973 OCT23146  21,3327     1478   1 1479
NUVLEM    E3,1552      111   1  578      N99LOOP   31,2034      608   1  608      OCT24        6007      224   7  231  867
NVBNKTEM     1040      102   1  452      ===================================== OCT24100  10,3254     1368   1 1356
NVBUSMSK  10,3516     1372   1 1367      OANB      04,2536      249   3  248  953 OCT25        4362 =   1099
NVCADR    10,3507     1372   1 1368      OBLATE    11,3022     1234   2 1230 1231 OCT26     04,2326      232   2  230
NVCOM     40,2357      402   1  402      OCCOS     14,2575      936   2  935      OCT27     12,3775     1246   1 1231
NVDSP     10,3070     1365   2 1366 1372 OCCULT    14,2740      939   2  938  939 OCT272    06,2776      181   1  174
NVDSP1    10,3117     1365   1 1365      OCTAL27   05,3477      832   1  831      OCT27470  05,3356      223   1  220
NVMONOPT     4155      452   1 1365      OCTAL3       6245     1008   1 1099      OCT30000     4355 =    218
NVQTEM       1037      102   2  452      OCTBACK   41,3411      443   1  445      OCT30001  05,3360      223   1  219
NVSAVE       0371      100   3  211 1371 OCT00010     4750 =    232              OCT30002     6471 =   1099
NVSBBBNK     4201      452   2  452      OCT00012  24,2311      499   1  493      OCT305    04,2325      232   1  231
NVSBCOM      4164      452   1  464      OCT00240  21,3440     1480   1 1479      OCT31        6010      224   4  209 1480
NVSBENDL  40,3441      446   2  446  448 OCT02100  06,3131      187              OCT32001  05,3354      222   1  220
NVSBWAIT     4445      464               OCT05776  06,3033      183   1  182      OCT32002  06,3127      187   1  186
NVSBUT1      4455      464   1  464      OCT10000     4737 =    218              OCT33        4764     1096   3  224 1096
NVSUB        4154      452   3  263 1372 OCT10001     7663 =   1099   1  182      OCT34     07,2624      260   1  254
NVSUBB    41,2000      406   1  452      OCT10002  33,2250      860   1  876      OCT34BAR  42,3600      436   2  436
NVSUBCOM     4170      452               OCT10200  10,3540     1373   1 1359      OCT3400   10,3512     1372   1 1362
NVSUBEND     4202      452   4  446  454 OCT11        4320 =   1095              OCT34300  10,3521     1372   1 1355
NVSUBSY1  04,2647      464   1  464      OCT1103      5710     1383              OCT35        4765     1096   3  745 1383
NVSUBUSY     4442      464   2  464 1368 OCT11276  21,3634     1484   1 1482      OCT37667  04,2367      233   1  228
NVSUB1    41,3544      453   2  406  452 OCT120       4775 =   1099   2  230  231 OCT37737  06,2162      160   1  170
NVSUB2    41,3571      453   1  453      OCT13     15,2217      931   1  931      OCT37766     7727     1098   2  155 1413
NVTEMP       0123 =     96   9  452  464 OCT14        5751     1384   7  181 1487 OCT37771  37,3540      859   1  858
NVWORD       0367      100   6  745 1371 OCT140       4776 =   1099   1  255      OCT37774     7730     1098   1  832
NVWORD1      1067      103   3  745 1367 OCT1400      5007     1096  12  460 1429 OCT37776     7731     1098   3  159 1369
NV50DSP   10,3120     1365   3 1357 1367 OCT14000     5024 =   1300   2 1299 1300 OCT40001     6107     1004   2 1099 1122
NWAITBIT     4742 =     72               OCT15        4761     1095   4  179 1073 OCT40010  07,3207     1315   2 1315 1317
NWAITFLG     0101 =     72               OCT15000     5025 =    181   1  179      OCT40072  04,2370      233   1  228
NXAX      15,2420      959   1  958      OCT16        4317 =   1073   1 1073      OCT40200     7735     1098
NXPOSVEL  31,2137      609   1  610      OCT1601   37,3054      388   1  388      OCT40201  01,3370     1125   1 1122
NXTBLK    43,3633     1292   2  290 1293 OCT1720   06,3000      181   1  177      OCT40400     5542     1383   3 1358 1384
NXTFL33   06,2432      168   7  177  178 OCT176    00,2126     1050   2 1056      OCT40420  10,3536     1373
NXTIBT    06,2420      168   3  168      OCT177       6074 =   1308   1 1305      OCT41000  43,2321      270   2  269  270
NXTIFAIL  06,2225      162  11  171  176 OCT17770     5030     1097   2 1298 1300 OCT50        4771     1096   4  304 1371
NXTIFBIT  06,2213      162   3  162      OCT20        4747 =    749              OCT500    04,2324      232   3  230  231
NXTRR1AX  25,2252      534   1  534      OCT20002  06,3130      187   1  187      OCT501PV  24,3204      514   1  514
NXTRST    05,3030      217   1  217      OCT201    24,2306      499   1  497      OCT51     43,3204      298   1  297
NXTSUPR   43,3660     1292   1 1292      OCT20100  10,3542     1373   1 1358      OCT523    33,3720      895   1  895
NXT6ADR   E6,1465      130   5  219 1456 OCT203    26,2253      475              OCT54     06,2774      181   1  165
NZACCDOT     0063 =   1478   3 1479      OCT205    24,3205      514   1  513      OCT55000  41,3730      469   1  468

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BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                     3:15 DEC.  2,1970                    PAGE 1539

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SYMBOL      DEF      H          REFERENCES       SYMBOL      DEF      H          REFERENCES       SYMBOL      DEF      H          REFERENCES

OCT60000     4101   = 1099     2 1300 1369 OLDPMIN   E6,1460     130     4 1412 1431 OPTCADR      1305   =  106     1  222
OCT62        4774   = 1335     1 1335      OLDPRIO      5402    1299     1 1302      OPTCOARV 43,2226   =  269     1  269
OCT63     17,2320     1446     1 1445      OLDQRMIN  E6,1461     130     4 1412 1445 OPTIONVN 22,3316      714     1  713
OCT67777  10,3535     1373                 OLDSENSE  E6,1745   = 1509    4 1508 1509 OPTIONX      1051   =  102    13  271  714
OCT7         4757   = 1374     3 1298 1303 OLDTIME   32,3724     835     1  835      OPTION1      1144      104     8  305 1362
OCT700    04,2371      233     2  229  230 OLDXFORP  E6,1440     130     5  130 1423 OPTION2      1145      104    17  493  980
OCT740    06,3001      181     1  175      OLDYFORP  E6,1441   =  130    2 1423      OPTION3      1146      104
OCT74160  05,3357      223     1  220      OLDZFORQ  E6,1442   =  130    3 1412 1424 OPTNBIT      4745   =   69
OCT75     06,2775      191     1  180      OMEG/MS   37,2000      44     1  380      OPTNREG  E5,1463   =  127
OCT77000  06,3002      191     1  174      OMEGA     E7,1502   =  145    9  145 1153 OPTNSW       0046   =   69     3  725  726
OCT7777   05,3057      218                 OMEGAD    E7,1734   =  144    3  316  515 OPTN1    34,3344      725     1  725
OCT77770     5660     1383     5  232 1384 OMEGAM1   E5,1712   =  126    3  126 1154 OPTN2    34,3424      726     1  726
OC24100   43,2127      264     1  263      OMEGAM2   E5,1720   =  126    3  126 1154 OPTSTALL 07,3712   = 1330     1  942
OC40010   06,2773      181     1  180      OMEGAM3   E5,1726   =  126    3  126 1155 OPT4     15,2105      928     1  928
OFFCALC   26,3561      590     1  592      OMEGAP    E6,1421     129    15  129 1438 ORBCHG0  24,2007      493     1  493
OFFROT    27,3307      851     1  851      OMEGAPD   E6,1643     134    12  134 1433 ORBCHG1  24,2021      493     1  493
OFFSTFAC  26,3706      593     1  590      OMEGAQ    E6,1422   =  129   13  732 1447 ORBCHG2  24,2033      493     1  493
OFFTUNIT  10,3756     1402     1 1402      OMEGAQD   E6,1644   =  134    7  369 1441 ORBCHG3  32,2217      493     1  493
OGC       E5,1737   =  123    14  123 1244 OMEGAR    E6,1423   =  129    8 1411 1447 ORBITAL  11,2000   =   29     1 1227
OGCPI     37,2475      381     1  388      OMEGARD   E6,1645   =  134    7  369 1441 ORBITAL1 12,2000   =   29     1 1246
OGCT      E5,1747   =  124     2  124  971 OMEGAU    E6,1426     129    12  129 1452 ORBITAL2 13,2000   =   30     2   46 1247
OGF       E6,1717   =  135                 OMEGAV    E6,1427   =  129    2  130  133 ORBMANAD 32,3767      837
OHWELL1   04,3422     1389     5 1389 1390 OMEGCALC  26,3610     591                 ORBMANUV     0003   =  236     5  235  837
OHWELL2   04,3445     1390     4 1389 1391 OMEGDISP  E7,1734   =  144    3  144  591 ORBWFBIT     4746   =   71
OKDESNB   25,2507      543     1  543      OMEGMOON  13,2000      46     1 1213      ORBWFLAG     0066   =   71     3 1221 1243
OKDESSM   25,2412      539     1  542      ONE          4753   = 1099  183  157 1509 ORDERBIT     4746   =   79
OKEXIT    24,3347      572     1  572      ONE/SP    25,3576     566     1  566      ORDERSW      0201   =   79     3 1182 1183
OKMAX     35,3167      669     1  669      ONEB-2    24,2313     499     1  494      ORIG     E4,1515   =  115
OKPHI     22,2722      362     1  362      ONEBASE   37,3403     707     1  703      ORIGCHNG 11,3401     1239     1 1239
OKTHETA   22,2702      362     1  362      ONEBIT    04,3056    1185     1 1196      ORIGEX   E4,1512   =  114     4  114 1239
OKTOCOPY  10,2536     1359     2 1359 1364 ONEDPP    37,3063     389     1  378      ORIGIN   E5,1773   =  126
OKTOENT   10,3311     1369     1 1371      ONEOCT    26,3710     593     1  590      OTHCONIC 37,3211      704     1  707
OKTOGRAB  13,3460     1220     1 1219      ONEORTWO     5370    1299     1 1301      OTHERS   13,3476     1221     1 1222
OKTOPLAY  10,2577     1360     3 1359 1360 ONESEK    22,3165     367     4  366  368 OTHERV   34,3615      730     1  730
OKU12     22,2256      354     1  354      ONESTO2S  30,3743     924     3  918  922 OTHINT   37,3222      705     1  707
OKU21     22,2232      354     1  354      ONETENTH  20,2434    1419     1 1419      OTHPREC  13,3043   =   37     3  701  714
OKU31     22,2302      355     1  355      ONETHTH   34,2107     632     1  635      OTHSHIP  22,3333      714
OK2DELAY  00,3752     1377     1 1377      ONLITES   25,3656     613     2  612      OURPERMS E7,1621   =  149     2  149
OLDATAGD     1113   =  103     4  554  560 ONULLAGE  36,2657     743     1  737      OURRCBIT     4740   =   87     6 1432 1446
OLDDATA   21,2272      899     2  899      OP/INERT  43,2174     267     2  265  267 OURRCFLG     0306   =   87
OLDESBIT     4753   =   66     2  596  598 OPJUMP       6077    1003     1 1003      OURTEMPS E7,1544   =  149     1  149
OLDESFLG     0016   =   66                 OPJUMP2      6247    1009     1 1003      OUT      13,2332      711     1  711
OLDPIPAX  E7,1763   =  151     5  151  817 OPJUMP3      6263    1010     1 1009      OUTGOAVE 22,3707   =  864
OLDPIPAY  E7,1764   =  151     3  151  817 OPONLY    06,2347     166     1  164      OUTHERE      0161   = 1373     3 1369 1371
OLDPIPAZ  E7,1765   =  151     4  151  817 OPTAXIS   07,2142     248                 OUTLINK      0057   =   93

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OUTOFLIM  24,3166      513    2  513  514 PDB2      E6,1562  = 1505    1 1503      PHSNAME1  F3,1436      109    5 1300 1305
OUTOFPLN  F5,1626  =   122    3  122  788 PDB3      E6,1564  = 1505    1 1503      PHSNAME2  F3,1440      109    1  826
OUTROUTE      1260  =   105    3  228  864 PDB4      E6,1563  = 1505    1 1503      PHSNAME3  E3,1442      109    1  826
OUTSNUFF  43,3224      298    1  262      PDDL          6523     1020    1 1011      PHSNAME4  F3,1444      109
OUTO          0010  =    93    5  156  160 PDSPFBIT      4740  =    72    2  474  475 PHSNAME5  E3,1446      109    2  890
OUT22.1   32,2534      571    2  571      PDSPFLAG      0077  =    72    3  475  519 PHSNAME6  E3,1450      109
OUT22.2   24,3352      573    1  572      PDVL          6557     1021    1 1011      PHSPAFT2  01,3763     1308    1 1308
OVERFFIX  37,2275      378    2  376  380 PDXCHNGE  12,2274     1177    2 1177      PHSPRDT1      1054      102    5 1299 1307
OVERFLOW      7017     1028    3 1027 1051 PEGI      16,3300     1435    2 1435      PHSPRDT2      1056      102    3  229  829
OVERFLWY      7014     1028    4 1026 1051 PERFCHEK  10,3135     1366                PHSPRDT3      1060      102    1  232
OVERFLWZ      7011     1028    4 1026 1051 PERFDLAY  E5,1574  =   128    1  374      PHSPRDT4      1062      102    1  232
OVERSUB   16,2310     1422   12 1424 1441 PERFERAS  37,2772      387    1  385      PHSPRDT5      1064      102
OVERSUB2  20,2435     1419    3 1415 1416 PERFMASK  10,3475     1372    2 1360 1362 PHSPRDT6      1066      102
OVF+      00,2414     1057    2 1057      PERF2MSK  10,3501     1372    2 1360 1362 PHS2CADR  01,3770     1308    1 1303
OVFIND        0121       96   13  813 1109 PERF4MSK  10,3503     1372    1 1362      PI/16     27,3754     1283    2 1279 1281
OVFLCLR   12,3210     1192    1 1192      PERIAPO   23,2326      695    1  634      PICAPAR   14,2611      937    1  937
OVFLOWCK  E5,1576  =   128    3  373  388 PERIAPO1  23,2316      695    5  617  727 PICBXT    14,3013      940    1  940
===================================== PERIODCH  12,2112     1175    1 1175      PICEND    14,2766      939    1  938
P         E5,1737  =   125   14  125 1200 PERROR    E6,1464      130    8  154 1438 PICGXT    14,2772      940    1  940
P-RATE    16,2510     1425                PFAILOK   07,3254     1317    1  166      PICKANG1  27,2147      482    1  482
P-RHCCTR      0043  =    92    4 1434      PFAILOK2  07,3247     1317    1 1317      PICKAXIS  27,2170      483    2  481
PACCFUN   E6,1557  = 1505    2 1498      PFLITEDB  20,2142     1407    3  754  840 PICKX     26,2372      483    2  483
PACKOPTN  15,3411      976    2  975      PFRATBIT      4750  =    69    1  927      PICNSWP   14,3011      940    1  940
PACTIVE   05,3036      217    1  217      PFRATFLG      0051  =    69    4  769  944 PIC1      14,2646      938    3  938
PARAM     04,3064     1186    3 1186 1200 PGUIDE        1247  =   105    6  105  882 PIC2      14,2651      938    1  938
PARAM30   35,2017      614                PHASCHNG      5353     1298  120  228 1395 PIC3      14,2661      938    5  938  939
PASSIVE   23,2412      697    4  622  697 PHASETAB  10,2000  =    29    2 1294 1300 PIC4      14,2664      938    1  938
PASTEOPT      4132      439    1  439      PHASE1        0753      101    3  217 1302 PIF       F7,1612  =   149   11  149  813
PASTEVB       4124      439    3  439  446 PHASE2        0755      101    2  761  858 PIFPSET   F7,1606  =   149    5  149  796
PASTIT    07,2211      252    1  260      PHASE3        0757      101    1  737      PINACT    05,3043      217    1  217
PAUTNO    30,3164      912    2  911      PHASE4        0761      101    1  862      PINBALL1  40,2000  =    36    2  299  398
PAXADIDL  16,2204     1413    1 1412      PHASE5        0763      101    1  737      PINBALL2  41,2000  =    36    1  406
PAXDIST   E6,1565  = 1505    2 1503      PHASE6        0765      101    1  742      PINBALL3  42,2000  =    36    3  281  421
PAXFILT   16,2647     1428    1 1422      PHASJUMP      5363     1299    1 1298      PINBALL4  04,2000  =    28    1  457
PAXIS     16,2213     1421    2 1413 1506 PHEXIT    13,3176     1216    1 1216      PINBRBIT      4746  =    73
PAXISADR  20,3765     1506    1 1491      PHI           0024  =   520                PINBRFLG      0105  =    73    1 1365
PBIASX    E3,1452      109    2  109  800 PHIV      E4,1445  =   114    6  114 1241 PINBRNCH  10,3050     1364    7  227 1372
PBIASY    E3,1454      109    1  800      PHSBB1    E3,1437      109                PINIDMSK  10,3347     1369    1 1369
PBIASZ    E3,1456      109    1  800      PHSBB2    E3,1441      109                PINMASK       7740  = 1372    1 1365
PBIT          4742  =   131    4 1432 1435 PHSBB3    E3,1443      109                PINSUPBT      4201  =   452    5  274  456
PBODY     E4,1430      113   18  114 1245 PHSBB4    E3,1445      109                PINSUPER  40,2000  =    36    1  274
PCLOOP    05,2776      216    1  217      PHSBB5    E3,1447      109                PINTEST   43,2002  =   466
PCONS     E4,1744  =   120    3  120  849 PHSBB6    E3,1451      109                PIPABIAS  E3,1452  =   109    1  326
PDA           0026  =   124                PHSCHNGA      5357     1298    1  228      PIPACHK   37,2126      375    1  374
PDB1      E6,1561  = 1505    1 1503      PHSCHNG2  10,2224     1300    1 1299      PIPAGE        1257  =   105    6  105  871

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE       MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL        DEF  H      REFERENCES     SYMBOL        DEF  H      REFERENCES     SYMBOL        DEF  H      REFERENCES

PIPASC    37,3077    389   1  385      PLENTY    25,3211    555   1  555      POSNV     E5,1520 =  128   2  386  387
PIPASCF   E3,1453 =  109   1  326      PLUSFIRE  21,3713   1509   1 1509      POSTAND   37,3734   1336   2 1335 1336
PIPASCFX  E3,1453    109   1  109      PLUSX     27,2423    769               POSTBURN  36,3223    754   4  241  760
PIPASCFY  E3,1455    109               PMINE     34,2073    632   2  641      POSTCDH   E7,1603    141   3  141  641
PIPASCFZ  E3,1457    109               PMINM     34,2103    632               POSTCOM   37,3763   1337   2 1337
PIPASR    37,3541    869   4  334  962 PMMASK    10,3514   1372   1 1360      POSTCSI   E7,1601    141   2  634  641
PIPATASK  37,2151    375   2  375      POINTER      0156 = 1308   7 1306 1308 POSTHRST  21,3647   1508   5 1509 1510
PIPATMPX     1160    104   4  817  901 POINTVSM  E7,1772 =  146   7  152  956 POSTJUMP     4635    998  61  165 1402
PIPATMPY     1161    104   4  817  901 POLISH       0117     96  39   96 1094 POSTORKP  E6,1513 =  132   1  195
PIPATMPZ     1162    104   4  817  902 POLLEY       5051   1102   2 1102      POSTORKU  E6,1515 =  132   5  194  204
PIPAX        0037 =   92  15  305 1318 POLY         7222   1034   7  856 1282 POSTORKV  E6,1517 =  133
PIPAY        0040 =   92   6  383 1318 POLYCNT      0140 =   97   4 1034 1035 POSTTPI   E7,1605    141   5  141  727
PIPAZ        0041 =   92   9  383 1318 POLYCOEF  12,3031   1189   1 1191      POSUPDAT  33,3165    884
PIPCTR       1056 =  829   4  598  858 POLYCOM      7232   1034   1 1034      POSVMAXY  21,2703    905   2  905
PIPCTR1   E7,1714 =  829   2  829  898 POLYLOOP     7242   1035   1 1035      POS1/2       4736 = 1099   2 1122
PIPFAIL   06,2650    177   1  181      POLYRET      0141 =   97   3 1034 1035 POS1/4    12,3755 = 1246
PIPFREE   07,3310   1318   1  863      POLYTEMP  E6,1741 =  131  10 1430 1458 POS1CHK   33,2531    875   1  874
PIPFREE2  07,3305   1318   1 1318      POLY2        7245   1035   1 1035      POS2CHK   33,2502    874
PIPINDEX  E5,1415 =  127   6  127  379 PON       37,2251    376   1  376      POWERDB   20,2152   1408   1 1407
PIPJOBB   37,2166    375   1  375      PON2      37,2240    376               POWFLITE  23,2000 =   32   1 1259
PIPSDONE  37,3451    858   1  871      PON4      37,2245    376   1  376      POWFLIT1  23,2000 =   32
PIPSRINE  37,3544 =  962   2  966      POODOO       5652   1383   8  244 1360 POWRSERS     7215   1034   2  824
PIPTEM    E4,1657 =  119   7  119  894 POODOO1      5726   1384   2 1079 1132 PQRBIT    16,3134   1433   1 1433
PIPTIME      1234    105  26  195 1222 POOFIZZ   04,2257    231   1  230      PRATE     E4,1750 =  120   7  120  848
PIPTIME1  E7,1560 =  147  11  147 1224 POOH      04,2163    229               PRDTTAB   01,2000 =  239   3 1306 1308
PIPUSE    07,3273   1318               POOKLEAN  05,2647    214   1  230      PREBJUMP     5316   1294
PIPUSE1   07,3277   1318   1  336      POSALARM  33,3703    895   2  895      PREC/TT   34,3554    729   2  725  726
PITCH     E4,1764 =  120   2  316  840 POSALPH   21,3371   1479   2 1479      PRECIBIT     4744 =   71
PITCHANG  E4,1600 =  118   7  118  488 POSCHECK  21,3673   1509   1 1508      PRECIFLG     0064 =   71   6  236 1219
PITCHOFF  27,3260    782   2  781      POSCODE      1242 =  960   6  316  960 PRECSET   23,2360    697   6  622  729
PITFALL   11,2275    820   2  154      POSDEL    12,2620   1183   1 1182      PREDOT       7154   1033   2 1038 1041
PITTIME   E6,1402    129   2  314  781 POSDELX   12,2246   1177   1 1176      PREDSPAL  40,3416    446   1  417
PJETCTR   E6,1767    137   4  137 1428 POSDRIVE  21,3575   1483   2 1473 1483 PREGUIDE  31,2425    798   1  804
PJETSLEC  16,3356   1436   5 1431 1439 POSEC     42,3414    423   2  423      PREMM1    04,2441    234   2  228  232
PLANET    15,2472    961   7  942  970 POSFNCT1  21,3230   1474   1 1474      PREMON1   11,2316    820   1  821
PLANTIN   24,2000 =   32   1 1141      POSGMBL   37,2064    374               PREMON2   11,2317    820   1  820
PLANTIN1  26,2000 =   33   2 1140 1146 POSGN     40,2407    402   1  398      PRENVBSY     4437    464   1  464
PLANTIN2  26,2000 =   33   1   52      POSGOOD   33,3675    895   1  895      PREPOS29  25,3601    597   1  596
PLANTIN3  25,2000 =   32   1 1144      POSITA    15,3700    985   1  986      PREREAD   37,3410    857   1  737
PLANVEC   E7,1553 =  145   5  145  951 POSITB    15,3703    985   1  986      PRERRORS  43,3246   1286   3 1287
PLAST     E6,1454    130   5 1424 1434 POSITD    15,3722    986   1  987      PRESINE   00,3526   1082   2 1082
PLAYJUM1  10,2515   1360   3 1365 1372 POSITE    15,3770    987   1  986      PRESTAND  37,3657   1335   1 1335
PLAYTEM1     0155 = 1373  28 1354 1363 POSITF    15,3743    986               PRESTORE     6421   1016   1 1016
PLAYTEM3     0157 = 1373   3 1362 1370 POSITON   E5,1416 =  127   6  127  331 PRETIMCK  16,2667   1428   2 1427
PLAYTEM4     0160 = 1373  11 1354 1370 POSMAX       4733   1095  46  171 1506 PRIOBORT  10,2575   1360   2 1358 1368

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS              J DEFINED BY JOKE, OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H      REFERENCES     SYMBOL      DEF     H      REFERENCES     SYMBOL      DEF     H      REFERENCES

PRIOCHNG    5146      1105  16  275 1369  PROCEEDE 06,2075      158               PUTSFNOR 41,3206      430   1  430
PRIOCH2  01,3072      1112   1 1105       PROCKEY  40,3452      449   1  158      PUTXY    41,2714      426
PRIODBIT    4736  =     72   1 1365       PROCTNON 06,2242      164   1  164      PUTXYZ   41,2632      425
PRIODFLG    0075  =     72                PRODUCT  21,3525     1482               PVALVEST    1276      106   7  191  212
PRIODSP  10,2507      1358   2  505  507  PROGLARM    5621     1382   1 1381      PWRCNT      0140  =    98   2  824
PRIODSPR 10,2504      1358   2  515 1382  PROGRAV  15,2654      965   1  965      PWRPTR      0117  =    98   4  823  824
PRIOENT     5575      1381   2 1382 1384  PROG20   24,2000      492   2  234  492 POOHCHK  13,3351     1219   2 1218 1219
PRIOLARM 10,3562      1382   7  496  895  PROG20A  24,2040      495   3  493  495 P05P06   37,2000  =    36   1 1335
PRIOOCT  10,3531      1373   2 1356 1363  PROG21   24,3505      655   1  234      P06      37,3655     1335   1  234
PRIOPLAY 10,2616      1360   2 1356 1359  PROG22   24,2000  =   492   1  234      P12      30,2000  =    34   1  838
PRIORITY    0167        99  34  221 1361  PROG25   24,2404      502   1  234      P12A     23,2000  =    32   1  841
PRIOTIME    1165       104   2 1359 1369  PROG52   15,2050      927   1  233      P12ADRES 30,2320      841   1  839
PRIO1       4742  =   1099                PROJ        0022  =   150               P12IGN   36,2521      740   1  731
PRIO10      4737  =   1099   5  284  781  PROJMAX  31,3754      827   1  812      P12INIT  30,2254      840   3  835  838
PRIO11      5022      1097                PROJMIN  31,3755      827   1  812      P12LM    30,2061      838   1  234
PRIO12      4644       998   3  211  760  PROK     30,2553      848   2  848      P12LMB   30,2122      839
PRIO13      5023      1097   2  746  966  PRONVBIT    4745  =    73               P12RET   30,2220      840   1  849
PRIO14      5024      1097   3  503 1303  PRONVFLG    0104  =    72   1 1366      P12SPOT  36,2146  =   733   1  731
PRIO15      5025      1097   5  181 1371  PRSHRTMP    4415      462   4  419  421 P12TABLE 36,2022      731   1  841
PRIO16      5026      1097   6  181  741  PRT2CADR 01,3771     1308   1 1305      P20FLGON 35,2361      629   7  621  728
PRIO17      5027      1097   4  735  853  PSEUDO55 E7,1614  =   149   3  149  795 P20LEMA  24,2111      496   3  496  509
PRIO2       4741  =   1099                PSTV     E4,1453  =   114   3  114 1241 P20LEMB  24,2117      496   6  496  497
PRIO20      4736  =   1099   7  269  858  PSKIPADR 16,3623     1441               P20LEMB1 24,2163      497   1  513
PRIO21      5031      1097   4  328  857  PSTHIBIT    4741  =    83   2  874  884 P20LEMB2 24,2166      497   1  497
PRIO22      7710      1097   6  290  876  PSTHIGAT    0251  =    83               P20LEMB3 24,2170      497   2  497  498
PRIO23      7711      1097   2  255  895  PTBAD    05,3054      217   3  216      P20LEMB4 24,2205      498   1  497
PRIO24      7712      1097   1  552       PTIGINC  E7,1402      138   2  666  723 P20LEMB5 24,2135      497   1  505
PRIO25      7713      1097   4  490  862  PTOACSM  13,2705     1211   1 1216      P20LEMB6 24,2153      497   2  497
PRIO26      7714      1097  10  368  605  PTOALEM  13,2760     1212   2  297 1216 P20LEMB7 24,2130      496
PRIO27      7715      1097   5  192 1411  PULSEFLG    0303  =    87               P20LEMC  24,2217      498   3  505  507
PRIO3       5015      1097  13  252 1099  PULSEIMU 10,3705     1400   1  380      P20LEMC1 24,2244      498   3  240  499
PRIO30      4355  =   1099  12  174 1371  PULSEM   14,3230      945               P20LEMC2 24,2261      499   1  498
PRIO31      7716      1097   4  336 1441  PULSES      4735  =    87   5  284 1444 P20LEMC3 24,2211      498   3  497  509
PRIO32      7720      1097   4  372 1367  PURGENCY 16,3463     1438   4 1430 1435 P20LEMC4 24,2216      498   1  500
PRIO33      7721      1097   1 1359       PURRS4   10,2715     1362   2 1361 1362 P20LEMD  24,2264      499   1  498
PRIO34      7722      1097   2  996 1099  PUSH     00,3247     1077   1 1013      P20LEMD1 24,2270      499   2  499
PRIO35      7723      1098   1 1121       PUSHLOC     0166       99  38  252 1103 P20LEMD2 24,2277      499   1  499
PRIO36      7724      1098                PUSHUP      6215     1008   1 1004      P20LEMF  24,2231      498
PRIO37      7725      1098   8  232 1404  PUTADD   41,2332      411   3  411      P20LEMWT 24,2232      498   5  496  519
PRIO4       4740  =   1099   4  274  489  PUTCOM   41,3075      429   8  425  427 P20LEM1  24,2063      496   2  496  516
PRIO5       5017      1097  10  229 1209  PUTCOM2  41,3155      430   4  429  432 P20LMWT1 24,2241      498
PRIO6       5020      1097   4  536 1429  PUTDCSF2 41,3207      430   1  430      P20REG   04,2327      232   1  231
PRIO7       5021      1097   7  275  717  PUTDECSF 41,3174      430   2  429  430 P20S     24,2000  =    32   8  492  655
PRLIMIT  33,2202       855   2  848       PUTDPCOM 41,3130      429   1  430      P20S1    25,2000  =    32   3  526  566
PROCEED  10,3411      1370   1 1368       PUTNORM  41,3137      429   1  429      P20S2    25,2000  =    32

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                     3:15 DEC.  2,1970                PAGE 1543

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF      H        REFERENCES        SYMBOL      DEF      H        REFERENCES        SYMBOL      DEF      H        REFERENCES

P20S3     26,2000    =    33    1  575        P33/P73F  35,2325       628    1  628        P41SPOT   36,2151       734    2  732  733
P20S4     32,2000    =    34    1  493        P34       35,2545       661    1  234        P41TABLE  36,2053       732    2  749  763
P21       E6,1703    =   135                  P34/P74A  35,2550       661    2  651  662   P42ADRES  36,3135       749    1  757
P21ALT    E7,1715    =   148    2  317  657   P34/P74B  35,2572       661    1  661        P42IGN    36,2541       740    4  732  740
P21BASEP  E7,1675    =   148    3  148  656   P34/P74C  35,2574       661    1  663        P42LM     36,3410       757    1  233
P21BASEV  E7,1703    =   148    3  148  656   P34/P74D  35,2635       662    1  662        P42SPOT   36,2146    =  733    1  732
P21CONT   24,3550        655    1  655        P34/P74E  35,2640       662    1  662        P42STAGE  36,3420       757    1  732
P21DSP    24,3625        656    1  656        P35       35,2725       666    1  234        P42TABLE  36,2061       732    1  749
P21FLAG      0004    =    65    2  655  656   P35/P75A  35,2734       666    1  666        P47BOD    36,3504       759    1  759
P21FLBIT     4741    =    65    1  217        P35/P75B  35,2741       666    1  666        P47BODY   36,3513       759    2  758  759
P21GAM    E7,1713    =   148    3  148  656   P38       34,3271       724    1  233        P47LM     36,3436       758    1  233
P21CFIG      1163    =   148    2  656        P39       34,3521       728    1  233        P50S      15,2000    =   31    5  250  964
P21PROG1  24,3515        655    1  657        P39/P79A  34,3532       728    1  728        P50S1     14,2000    =   31    2   45  933
P21TIME   E7,1762    =   146    7  143  657   P39/P79B  34,3541       729    1  727        P51       14,3427       950    3  233  951
P21VEL    E7,1711    =   148    4  148  656   P39/79SW     0176    =   79    4  726  729   P51B      14,3461       950    1  950
P21VSAVE  24,3571        656    1  656        P39P79    34,3456       727    1  727        P51C      14,3472       950    1  951
P22ONE    24,2312        499    1  493        P39SWBIT     4743    =   79                  P51D      14,3510       951    1  950
P25FLAG      0006    =    66    3  287  785   P40/RET      1142       104    4  746  754   P51E      14,3530       951    1  951
P25FLBIT     4743    =    66    2  228  502   P40A/P    35,3751       748    1  748        P51G      14,3552       951    1  951
P25LEMWT  24,2435        503                  P40A/PMD  35,3775       748    1  748        P52A      15,2060       928    2  928
P25LEM1   24,2416        502    3  240  503   P40ADRES  36,3133       749    1  753        P52B      15,2062       928    1  928
P25LEM2   24,2443        503    1  503        P40ALM    36,3121       748    2  753  757   P52D      15,2143       930    2  930  932
P25LMWT1  24,2437        503    1  503        P40AUTO   35,3747       748    2  733  834   P52E      15,2102       928
P3XORP7X  35,3704        683    1  680        P40IGN    36,2504       739    1  732        P52F      15,2164       930    1  928
P30       35,2000        614    1  234        P40IN     36,3200       754    1  758        P52H      15,2153       930    1  928
P30EXIT   E5,1773    =   126    1  126        P40LM     36,3147       753    1  233        P52LS     15,2220       932    1  929
P30N33    35,2004        614                  P40PHS1   36,3236       755    2  755  759   P52OUT    15,2166       930    1  931
P30S      35,2000    =    35    1  614        P40S      36,2000    =   36    6   38  753   P52T      15,2110       928    2  928
P30S1     34,2000    =    34    1  616        P40SJUNK  36,2366       737    2  732        P52V      15,2130       928
P30ZERO   35,2417        631   11  621  661   P40SPOT   36,2146       733    3  731  733   P52W      15,2137       930    1  928
P31       35,2450        652    1  234        P40SXT4   36,3213       754    2  754  756   P57       15,3314       975    1  233
P32       35,2027        621    1  234        P40S1     27,2000    =   33    4   38  764   P57A      15,3353       975
P32/P72A  35,2053        621    1  621        P40S2     35,2000    =   35    1  748        P57AA     15,3355       975    1  975
P32/P72B  35,2131        622    1  623        P40S3     17,2000    =   31    1  741        P57C      15,3400       976    2  976
P32/P72C  35,2152        623    1  641        P40TABLE  36,2036       731    1  749        P57D      15,3402       976    1  976
P32/P72D  35,2156        623    1  623        P40ZOOM   17,2015       741    1  739        P57JUMP   15,3561       980    2  972
P32/P72E  35,2160        623    1  623        P40ZOOMA  17,2022       741    2  741  742   P57OPT    15,3320       975    2  975
P32/P72F  35,2166        623    1  623        P41ADRES  36,3134       749    1  755        P57OPT0   15,3575       981    2  980
P32STPT   35,2032        621    1  621        P41BLANK  36,2263       735    1  735        P57OPT1   15,3616       981    1  980
P33       35,2216        627    1  234        P41FJET   36,3303       755                  P57OPT2   15,3634       982    1  980
P33/P73A  35,2221        627    2  627  628   P41FJET1  36,3305       755    1  755        P57OPT3   15,3635       982    1  980
P33/P73B  35,2233        627    1  628        P41IN     36,3310       756    1  755        P57POST   15,3206       972    3  971  972
P33/P73C  35,2302        628    1  627        P41LM     36,3272       755    1  233        P63ADRES  32,3253       789    1  785
P33/P73D  35,2306        628    1  628        P41MANU   36,3215       754                  P63DISPS  31,3473       814    2  749  799
P33/P73E  35,2314        628    1  628        P41NORM   36,3312       756                  P63IGN    36,2455       739    1  733

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BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT             XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES

P63IGN1   36,2514       739                 QAXIS     E7,1717   =  151    3  840  854 R-OTHER   E3,1717       111    5  120  321
P63LM     32,2776       735    1  233       QCDUWUSR  E6,1647   =  136    3  136  918 R-RATE    16,2602      1427    2 1426
P63SPOT   36,2151   =   733    1  732       QCHAN         0002  =   93    2 1093      R-RHCCTR      0044  =   92    3 1433 1434
P63SPOT2  32,3215       788    1  788       QDIFF     E6,1450   =  132    3 1472 1477 R-TO-RP   24,3670      1142    6  791 1234
P63SPOT3  32,3235       789    1  789       QERRCALC  17,2626      1451    2 1413 1442 RACCDOT   E6,1512   =  132    4 1411 1476
P63SPOT4  32,3247       789    1  789       QERRCALL  16,3637      1441    1 1441      RACTCADR  05,3062       218    1  217
P63TABLE  36,2076       732    2  749  789 QERROR    E6,1450   =  130    5  132 1452 RACT1     E4,1702       116   11  117  646
P63ZOOM   17,2007       741    1  738       QGIMBITS      5007  = 1429    1 1428      RACT2     E4,1710       116    9  117  647
P64CEED   31,3515       815    1  814       QGIMTIMR  E6,1632       134    9  134 1480 RACT3     E7,1535       141   21  622  727
P64DISPS  31,3477       814    2  799  814 QLAST     E6,1455       130    5 1424 1447 RADARANG  26,3361       586    2  580  581
P65START  31,2621       802    1  798       QMAJ      E5,1746   =  123   17  124  983 RADAREAD  25,3150       555    2  154
P65VERT   31,3534       815                 QMIN      E5,1745   =  123   17  123  971 RADARFF       4000  =   28    1  520
P66LOC    32,2000   =    34    1  816       QMINEXIT  15,2765       966    1  969      RADARUPT  25,2000   =   32    3   41  612
P66NOW?   31,2564       801                 QOK       26,2605       577    1  577      RADCADR       1306  =  106    4  222  541
P66VERT   31,3543       816    1  815       QPLACE    E5,1417   =  127    7  127  381 RADIN     25,3331       557    1  557
P66VERTA  32,3270       816    1  816       QPLACES   E5,1420   =  127    3  127  380 RADLITES  25,3616       612    2  556  560
P67NOW?   31,2474       800                 QPRET         0052  =   93   20  297 1242 RADMODES      0110  =   85  117  154  876
P67VERT   31,3545       816    1  815       QRATEDIF  E6,1436   =  130    2 1447      RADNOOP   25,3530       561    2  537  561
P70       21,2072       830    1  233       QRAXIS    16,3624      1441    4 1429 1437 RADSAMP   25,2003       490    2  277  490
P70A      21,2073       830    2  241  830 QRBIT         4741  =  131    4 1433 1448 RADSKAL       1354       108    1  884
P70CADR   04,2401       233    1  233       QRCNTR    E6,1750   =  132    9 1472 1484 RADSTALL  07,3714      1329   15  265  895
P70INIT   32,3563       833                 QRCONTRL  17,2200      1444    1 1443      RANGCONV  32,2003        41    1  570
P70NOW?   21,2061       830                 QRNDXEP       0066  = 1478    9 1479 1480 RANGE     E4,1600       115   10  115  705
P71       21,2075       830                 QRTIME    17,2515      1448    2 1448      RANGEBQ   26,2510       576    3  576  583
P71A      21,2076       830    2  242  830 QRUPT         0012  =   92   13  155 1428 RANGEBQ1  26,2520       576    1  576
P71NOW?   21,2046       829                 QSAVED    E7,1464       140    2  680  681 RANGEDSP  E5,1624   =  122    3  122  806
P71RET    32,3707       835    1  833       QTEMP     E7,1632       142    5  616  765 RANGEVAR  E3,1770       112    1  577
P72       35,2031       621    1  233       QTEMP1    E7,1633       142    6  142  762 RANGRDOT  E7,1760   =  146    3  146  570
P73       35,2220       627    1  233       QTSN45    23,3533      1257    1 1251      RAPFG     E5,1436   =  121    1  121
P74       35,2547       661    1  233       QUADGUID  31,3121       808                 RAPO          0020  = 1274    1 1274
P75       35,2731       666    1  233       QUALITY1  13,3725      1247    1 1235      RAPREC    E7,1477   =  141    2  667  670
P76       13,2207       709    1  233       QUALITY2  13,3732      1247                 RASFLAG       0106  =   81    6 1219 1220
P76LOC    13,2000   =    30    1  709       QUALITY3  11,3160      1235                 RASTEER1  27,2731       776    1  771
P76SUB1   13,2340       711    1  710       QUARTER       4737  = 1099    4 1081 1086 RATEBIAS  22,3133       367    1  367
P78       34,3274       724    1  233       QUICTRIG  23,3615      1261    5  601 1261 RATEDAMP  16,3220      1434    4 1432 1433
P79       34,3526       728    1  233       QUIKDSP   06,2134       160    1  155      RATEDB1       4767  = 1510    1 1509
=========================================== QUIKFAZ5  33,3552       890   11  861  889 RATEDONE  16,3136      1433    1 1433
Q             0002  =    92  434   93 1509 QUIKOFF   06,2165       160    1  160      RATEINDX      1325       107    3  212  364
Q+1           6737      1025    6  157 1374 QUIKRUPT  06,2144       160    1  160      RATELIM1      4766  = 1510    1 1509
Q+10000       4643       998    1 1000      QUITBIT       4747  =   81                 RATELIM2  21,3646      1508    2 1510
Q+2           6741  =  1025    5  521 1379 QUITFLAG      0221  =   81    4  298 1218 RATELOOP  16,3641      1470    2 1428 1470
Q-RATE    16,2544      1426    2 1426      =========================================== RATERROR  16,3227      1434    1 1434
Q-RHCCT       0042  =    92    3 1433 1434 R         E7,1520   =  147   23  147  882 RATES     30,2510       847    1  847
Q,PQRGTS  17,2104      1442    1 1442      R(CSM)    E3,1717   =  120    6  598  882 RATESP    05,2027        52    2  986
QACCDOT   E6,1510   =   132    6 1411 1490 R*TL**P   23,3700      1263    2 1264      RATESTOP  31,3443       813    2  813  826

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES

RATESTRT  05,3061      218   1  212       READACCS  37,3441      858   1  671       REFSMMAT  E3,1733      111  53  194  979
RATEVAR   E3,1772      112   1  578       READCDUD  23,2277      520   1  518       REGCOARS  15,2156      930   1  931
RATT         0000  = 1247  36  339 1224  READCDUK  22,2403      357   2  351  481  REGODSP   10,2465     1358   2  736  745
RATT1        0016  = 1247  11  209  787  READLBIT     4746  =   84   2  872  874  REGODSPR  10,2470     1358   1  814
RBEFG     E5,1402  =  121   2  121  826  READLO    40,2747      420   4  420  422  REGSLEEP  07,3372     1320   1 1320
RCB-13    05,2025       52   1  986       READLO1   40,2760      420   1  421       REGUP        6233     1008   3 1008
RCDUFAIL     0274  =   86                 READLR       0256  =   84   1  879       REINTBIT     4745  =   82   3 1220 1385
RCDUFBIT     4745  =   86   7  184  563  READRBIT     4743  =   71   3  219  605  REINTFLG     0236  =   82   5  711 1392
RCDUOBIT     4737  =   85   5  497  537  READRDOT  32,2404      569   1  571       REJALM    07,2467      257   1  257
RCDUOFLG     0266  =   85                 READRFLG     0063  =   71   1  606       REJECT    07,2472      257   1  257
RCNORM       0042  =  125   3 1173 1179  READV     33,3527      889   1  889       REJECT2   07,2505      257   1  257
RCO       E7,1630  =  152   4  152  854  READVBIT     4747  =   84   1  889       RELDSP       4457      464  10  227  836
RCS       17,2107     1442   4 1449 1450  READVEL      0257  =   84   1  889       RELDSPON     4374      461   3  398  464
RCSFLAGS     1273      105  55  211 1483  RECALTST  40,3547      458   2  427  448  RELDSP1      4502      465   2  438  450
RCSMON    06,3156      191   1  191       RECAL1    40,3552      458   1  458       RELDSP2      4473      465   2  465
RCSMONEX     5270  =  190   2  191  192  RECAL2    40,3563      458   2  459       RELINTQ   10,3231     1367   2 1363 1367
RCSMONIT  06,3156  =  191   2  159       RECAL3    40,3575      458                 RELINUS   26,2217      475   1  240
RCSMONT   06,2000  =   29   1  190       RECRATIO  13,3715     1247   1 1238       RELOADSV  11,3642     1243   1 1242
RCV       E3,1534  =  110  28  110 1240  RECTEST   11,3303     1237   3 1237 1238  RELRET       0144  =   97   4  464  465
RCVCSM    E3,1606      111   1  585       RECTIFY   11,3441     1240   8 1156 1239  RELTAB       4066      155   4  157  443
RCVLEM    E3,1660      111   2  500  585  RECTOUT   13,3200     1216   2 1216 1217  RELTAB11     4101      155   2  156 1099
RDBADEND  25,3562      563   4  546  563  RECYCLE   34,3400      726   1  727       REMARK    07,2577      260   3  257  259
RDCDUS    14,3413      948   1  947       RED-OVER  31,3523      815   1  814       REMDIST   42,2000       46   1  487
RDE       13,3723     1247   1 1234       REDES-OK  31,3525      815   1  814       REMODBIT     4736  =   85   6  532  596
RDES         1316  =  106   4  106  534  REDESIG   31,2704      804   1  798       REMODE    25,2171      531   2  546  597
RDESGAIN  25,3066      552   2  550       REDESMON  11,2321      820   1  820       REMODFLG     0265  =   85
RDESIRED  E5,1755  =  125   3  125 1198  REDES1    31,2755      805   1  805       RENDEND   26,3176      582   1  579
RDG       E5,1402  =  826   2  807  809  REDFLAG      0143  =   76   5  785  815  RENDEZ    22,2000  =   32   1 1157
RDGIMS    34,3757      894   1  892       REDFLBIT     4746  =   76   2  804  814  RENDEZVU     0002  =  236  18  235
RDIFF     E6,1452  =  132                 REDO      37,2002      373   1  290       RENDNOO   04,2262      231   2  230
RDLONGR   40,2767      421   1  420       REDOCTR      0320       99   3  194  215  RENDRAD   25,3276      557   1  556
RDM       13,3721     1247                 REDOMANC  26,2150      474   1  473       RENDVOO   04,2226      230   1  230
RDOT      E7,1473  =  120   4  840  852  REDOMANN  26,2125      473                 RENDWBIT     4753  =   75   1  290
RDOTBIAS  25,2001       41   1  558       REDOMASK  10,3504     1372   2 1357       RENDWFLG     0131  =   75  13  236 1243
RDOTCONV  32,2001       41   1  570       REDOPRIO  10,2542     1359   1 1372       RENEWMK   07,2502      257   1  257
RDOTD     E4,1672  =  119   6  119  845  REDO2.17  36,2337      736   1  240       REPETE    35,3177      669   1  669
RDOTDNOM  23,2457      842   1  839       REDO4.2   36,2342      737   2  241  758  REPIP1    37,3557      870   1  871
RDOTM     E7,1750  =  146   3  146  578  REDO5.5   37,3453      858   1  242       REPIP3    37,3565      870   1  871
RDOTMSAV  E7,1746  =  146   4  145  570  REDO6.7   36,3350      756   1  243       REPIP4    37,3571      870   4  871
RDOTV     E7,1616      141   4  142  636  REDSPTEM  32,2017      207   2  207       REPOSBIT     4741  =   85   8  187  597
RDRET     E7,1675  =  145   3  145  586  REFLASH   10,2457     1357   1  745       REPOSCNT  E7,1423  =  139   4  139  510
RDRLOCS   25,2054      491   1  491       REFLASHR  10,2462     1357   2  755  814  REPOSMON     0270  =   85
RDRPTBB      4063      154   1  153       REFMF     15,3506      979   3  792  980  REPOSRPT  25,2144      530   1  534
RDRUSECK  43,2642      280   5  265  276  REFSMBIT     4737  =   70   7  206 1332  REPOSTM   E7,1424  =  139   5  139  511
RDSP      E5,1434  =  127                 REFSMFLG     0057  =   70   7  680  972  REP40ALM  36,3123      748   2  732  748

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SYMBOL      DEF   H     REFERENCES      SYMBOL      DEF   H     REFERENCES      SYMBOL      DEF   H     REFERENCES

REQADD    41,2064    407   1  407       RGOODEND  25,3555    563   6  532  563 RODSCAL1  E7,1756 =  151   3  151  816
REQCOM    41,2310    411   2  411       RGU       E5,1636 =  122   7  200  809 RODTASK   32,3263    816   1  816
REQDATX   41,2303    411   3  425  426  RGVGCALC  31,3013    806   5  798  805 RODTRAP   20,2000 =   31   1  822
REQDATY   41,2305    411   3  425  427  RHCACTIV  17,2350   1446   1 1446      ROE       14,2006     45   1  935
REQDATZ   41,2307    411   3  407  427  RHCMOVED  16,3223   1434   1 1432      ROLLOVER  27,3247    781   1  782
REQEXLOC  41,2207    409                RHCSCALE     4745 =   87   1  294      ROLLTIME  E6,1401    129   4  295  781
REQEX1    41,3473    448   1  448       RHCSCFLG     0313 =   87               RONE      E4,1606 =  115  16  115 1277
REQMM     41,3452    447   1  447       RIGHT     00,2236   1054   1 1056      ROO       04,2143    229
REQRET       1013    102  17  222  456  RIGHT-    00,2332   1056   1 1053      ROOAD     04,2365    232   1  228
REQUESTC  41,3477    448   1  448       RIGHTR    00,2031   1047   1 1055      ROOTCYCL  21,3636   1484   3 1482
REREADAC  37,3614    871   3  242       RIGHT5       4322    460   2  428  429 ROOTHALF  21,3632   1484   1 1482
RERRCALC  17,2646   1451                RIGNX     E5,1474 =  121   2  121  787 ROOTLOOP  31,3624    824   2  825
RERROR    E6,1[illegible]52 =  130   5  132 1452  RIGNZ     E5,1476 =  121   2  121  787 ROOTMU       0020 = 1202   3 1179 1197
RER60     26,2237    475   1  475       RINIT     E4,1722    118  11  652  765 ROOTPS       0126 =   98   5  823  825
RESAMPLE  25,3263    556   1  560       RLAST     E6,1[illegible]56    130   5 1425 1447 ROOTPS+1     0127 =   98
RESETRPT  11,2335    821   2  821       RLM       E4,1604 =  118  16  487  489 ROOTPSRS  31,3553    823   1  807
RESETX2   12,3120   1191   1 1189       RLMSRCH   E7,1675 =  144   6  144  592 ROOTSTOR  31,3670    825   3  825
RESET22   04,2250    230   2  230       RLMUNIT      0014 =  593               ROPECHK   43,3520   1290   1 1287
RESIGN    35,3223    670   1  670       RLS       E4,1422    113  15  196 1212 ROT-TOUV  17,3146   1457   4 1442 1497
RESQ      33,2037     44   1  880       RM        E7,1756 =  146   6  146  606 ROTATE    34,3052    643   2  642
REST      10,3245   1368   1 1365       RMAG      E7,1714 =  143   5  143  777 ROTEMP1   E6,1737 =  131   3 1457
RESTART   01,2000 =   28   4  239 1307  RMAG1        0014 = 1268   4 1271 1280 ROTEMP2   E6,1740 =  131   4 1457
RESTART?  31,2574    801   1  801       RMAX      E4,1404    113   1  586      ROTFLAG      0220 =   81   5  834  851
RESTARTS  01,352[illegible]   1303   1  218       RME       12,2021 =   37   1 1218      ROTFLBIT     4746 =   81
RESTORDB  20,2123   1407   8  288 1409  RMM       12,2017 =   37               ROTINDEX  E6,1744 =  131  10 1429 1458
RESTREG      0366    100   4  211 1364  RMODINIT  05,3365    223   1  219      ROTORQUE  16,3716   1471   1 1470
RESTSLEP  10,3251   1368   1 1368       RMODINV   25,2233    532   7  532  543 ROTSENSE  E6,1740 =  133   9 1461 1469
RESULTCT  E5,1537 = [illegible]   5  375  379  RN           1220    105  16  195 1221 ROT180    26,2350    483   1  483
RESUME       5270   1129  26  160 1413  RND/TST   42,3543    435   3  434  435 ROUND     00,2116   1049   1 1013
RETJADR   E6,1477    131   4 1445 1454  RNDCON    42,3302    422   2  423      ROUNDSUB     7136   1032   4 1044 1055
RETNMCRE  20,2442   1420   6 1415 1419  RNDREFDR  07,3175   1315   3  174 1335 RP-TO-R   26,3716   1140   9  786 1236
RETNOP    06,2264    164   1  165       RNDVZBIT     4745 =   66  10  185  592 RPAD      23,2314    695   4  696 1283
RETROOT      0132 =   98   3  823  825  RNDVZFLG     0010 =   66   6  287 1335 RPADTEM   E4,1602 =  115   6  115  721
RETURNTJ  17,3466   1464   7 1463 1467  RNGEDATA     0260 =   84               RPAD1     23,2314 = 1283
REVCNT       6242   1008   5  292 1099  RNGEDBIT     4750 =   84   2  884  893 RPASS1    E7,1477    141   4  141  642
REVERS    35,3226    670   1  670       RNGSCBIT     4742 =   74   2  571  894 RPASS2    E7,1521    141   7  141  647
REVERSAL  21,3610   1483   1 1483       RNGSCFLG     0120 =   74   4  558  894 RPASS3    E7,1551    141  12  633  729
REVN1645  35,2540    653   2  615  653  RNRAD        0046 =   92   5  555  557 RPASS3E   E4,1606 =  118   5  118  701
REV23     37,3155    704   1  706       RN1       E7,1544 =  147   7  147 1224 RPCRTIME  E7,1427    138   1  874
RFAILCNT  E4,1756    119   2  276  490  ROADBACK  25,2366    537   4  537  562 RPCRTQSW  E7,1430    138   1  874
RFAILS    40,3671    471   1  470       RODCOMP   32,3275    816   1  816      RPER         0016 = 1274   3  720 1274
RFAILS2   41,3727    469   1  468       RODCOUNT  E7,1746 =  151   5  801  822 RPPREC    E7,1521 =  141   2  667  670
RGEXIT    E7,1665 =  142                RODFLAG      0022 =   67   1  800      RPQFLAG      0170 =   78   6 1215 1238
RGIMBITS     5020 = 1429   1 1429       RODFLBIT     4740 =   67   2  217  801 RPQFLBIT     4735 =   78
RGIMTIMR  E6,1634 =  134 [illegible] 1412 1472  RODSCALE  E5,1537 =  122   2  122  800 RPQV      E4,1504 =  114   8  114 1239

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                3:15 DEC.  2,1970                PAGE 1547

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF      H       REFERENCES       SYMBOL      DEF      H       REFERENCES       SYMBOL      DEF      H       REFERENCES

RPREXIT      0050   = 1148    3 1140 1142  RROUT2    25,2310       535    1  536       RTNHOLD   E7,1607   =  149    4  149  796
RPRPXXXX  24,3706     1142    1 1140       RRRANGE   25,3105       553    3  491  606  RTNLAMB   E5,1710   =  125    8  125 1197
RPSV      E4,1521   =  114    5  114 1231  RRRDOT    25,3103       553    4  491  605  RTNPRM    E5,1753   =  125    3  125 1187
RPTORPA   26,3733     1140    1 1140       RRRET        1315       106    5  106  534  RTNSAVER     0145   =   98    3 1263 1264
RPTORPB   26,3725     1140    1 1141       RRRSBIT      4751   =    86    1  569       RTNTR     E5,1710   =  125    1 1198
RQVV      E4,1513   =  114    7  114 1231  RRRSFLAG     0300   =    86                 RTNTT     E5,1710   =  125    3 1186
RR-AZ     E4,1600   =  118    5  118  315  RRSHAFT   E7,1735   =   146    3  146  580  RTORPA    24,3712      1142    1 1142
RR-ELEV   E4,1602   =  118    2  300  315  RRSONLY   25,2244       533    3  530  532  RTORPB    24,3701      1142    1 1142
RRANGLES  13,2133      322    1  539       RRSPGAIN  25,2305       534    1  534       RTRN      E7,1465       140   14  650  730
RRATE     E4,1602   =  115    6  115  705  RRTARGET     1101   =   103   14  103  604  RTRNCADR  01,3565      1303    5 1303 1308
RRATEDIF  E6,1437   =  130    1 1447       RRTONLY   25,2241       533    5  530  597  RTRNMU    10,2022       693    1  693
RRAUTCHK  06,3006      182    2  159       RRTRKF       4570       524    3  612  613  RTSR1/MU  E4,1716       117    4  117  693
RRBORSIT  E7,1740   =  146    5  146  572  RRTRUN    E7,1733   =   146    3  146  582  RTSTBASE  E4,1753       119    3  277  490
RRCDUCHK  06,3037      184    2  182       RRTURNON  25,2062       526    1  183       RTSTDEX   E4,1751       119    7  119  491
RRCHECK      4576      524                 RRZERO    25,2343       537    1  265       RTSTLOC   E4,1754       119    8  119  491
RRDATABT     4750   =   86    1  524       RRZEROK   43,2142       265    1  265       RTSTMAX   E4,1752       119    2  277  490
RRDATAFL     0277   =   86                 RRZEROSB  25,2071       527    2  526  537  RTX1      E5,1776   =  124   14  124 1224
RRDESDUN  25,3005      551    1  551       RRZ2      25,2370       537    1  537       RTX2      E5,1777   =  124   18  617 1224
RRDESEND  43,2302      270    1  262       RR1AXIS   25,2246       533    1  533       RUFLAW1   17,3630      1468    1 1461
RRDESK2   43,2261      269    1  269       RR1AX2    25,2254       534    1  533       RUFLAW12  17,3636      1468    2 1468
RRDESNB   25,2475      543    3  269  511  RR29GAIN  32,2775       604    2  603       RUFLAW2   17,3664      1468    1 1461
RRDESNBK  43,2227      269    1  267       RSAMPDT   E4,1755       119    7  276  490  RUFLAW3   17,3672      1469    1 1462
RRDESSM   25,2373      538    3  509  591  RSBBQ     E3,1432       109    2  195  215  RUFRATE   17,3743      1469    2 1468
RRECT     E3,1502   =  110   15  110 1240  RSCALE    32,2177       209    1  209       RUFSETUP  17,3712      1469    4 1468 1469
RRECTCSM  E3,1554      110   11  110 1213  RSFLGBTS  05,3066       218    1  216       RUNIT     E7,1743   =  151    8  151  898
RRECTHIS  E3,1626   =  111    4  297 1210  RSPHERE   13,3717      1247    2 1237 1238  RUPDATED  33,3307       886
RRECTLEM  E3,1626      111    3  111 1212  RSTACK    E4,1600   =   118   12  276  490  RUPTAGN      0734       100    6  100 1129
RRECTOTH  E3,1554   =  110    1  297       RSTKLOC   E4,1754   =   119                 RUPTREG1     0070        95   62  155 1407
RRGIMON   06,3071      186    1  184       RSTOFGTS  21,3524      1482    2 1476       RUPTREG2     0071        95   26  162 1480
RRIMUDIF  43,2204      268    1  268       RSUBC        1101   =   103    3  494       RUPTREG3     0072        95   19  372 1480
RRINDEX      1317   =  106    3  533  534  RSUBE     14,2004        45    1  935       RUPTREG4     0073        95    7   95 1338
RRINIT    06,2564      173    1  173       RSUBEM    14,2000        45    2  935       RUPTSTOR     0063   =   95
RRLEADIN  25,2000   =   32    1  490       RSUBL     E7,1630   =   148    4  148  495  RUPT10BB     4065       154    1  154
RRLIMCHK     4523      522    4  187  542  RSUBM     14,2002        45    1  935       RUTH      16,3120      1432    1 1432
RRLIMNB   25,2540      543    2  543       RTARG     E7,1443       139    8  194  776  RUTMXTAB  42,3134       317    1  304
RRLIMOK      4560      523    2  523  544  RTARG1    E7,1471   =   144   11  686  690  RUTMXTEM     0153        98    2  304  428
RRLOSDSP  40,2017      299    2  299  300  RTB       01,2450      1090    1 1090       RVARMIN   E3,1774       112    1  576
RRLOSVEC     1101   =  571                 RTB/BHIZ  01,2447      1090    1 1012       RVBOTH    33,3032       882    1  961
RRNB      23,2041      324    3  543  591  RTBCODES  10,2000   =    29    1 1397       RVCON     13,3243      1217    1 1216
RRNBBIT      4746   =   66                 RTERM        0022   =  1268    3 1277 1279  RVEC      E5,1654   =  125   11  494 1200
RRNBMFAC  23,2065      324    1  299       RTHETA    E4,1604   =   115   10  115  706  RVQ       00,3274      1077    1 1013
RRNBSW       0011   =   66    5  539  565  RTIG      E7,1641       142   11  142  769  RVSW         0157   =   77    8  494 1186
RRNB1     23,2054      324    1  324       RTMAG     E7,1722   =   143    5  143  777  RVSWBIT      4743   =   77
RROUT     25,2306      535    3  534  604  RTMU      E4,1720       117    4  633  693  RWAITK    43,2145       265
RROUTLIM  25,2335      536    1  535       RTNAPSE   E5,1710   =   125    3 1200       RXZ       E7,1721   =  145   10  145  586

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H         REFERENCES         SYMBOL      DEF     H         REFERENCES         SYMBOL      DEF     H         REFERENCES

R02        04,2000  =   28    1 1332             R21LEM3    24,2742      509                      R29LOKON   32,2752      604    1  604
R02BOTH    04,3254    1332   11  339   927       R21LEM4    24,2777      510    1  509            R29NODES   33,2564      876    2  876
R02ZERO    04,3270    1332    1 1332             R21LEM5    24,2705      508    1  508            R29RANGE   24,3443      606    1  606
R04        43,2414     276    1  262             R21LEM6    24,2715      509    1  508            R29RDJOB   24,3413      605    1  605
R04A       43,2446     276    1  277             R21LEM7    24,3036      510    2  510            R29READ    24,3400      605    2  604   605
R04B       43,2470     277    1  277             R21LEM8    24,3043      510    1  510            R29REMOJ   33,2113      597    1  596
R04C       43,2505     277    2  277   279       R21LEM9    24,3075      511    1  511            R29RRR?    24,3466      606    1  606
R04END     43,2603     279    6  277   278       R21SRCH    24,2772      509    1  509            R29S1      25,2000  =   32    1  597
R04FLAG       0063  =   70    5   71   496       R22DISP       0314  =   99    6  314   586       R3D1          4321      460    5  403   457
R04FLBIT      4743  =   71    4  276   555       R22LEM     24,2451      504    3  507            R30LOC     22,2000  =   32    2   44   713
R04K       43,2575     279    1  276             R22LEM1    24,2521      505    1  505            R30OK      27,3766     1283
R04L       43,2577     279    1  277             R22LEM12   24,2463      504                      R31        37,2000  =   36    1  703
R04LR      43,2542     278    3  278             R22LEM2    24,2531      505    2  505            R31CALL    40,3674      703    1  283
R04RF      43,2526     278    2  278             R22LEM3    24,2551      505    2  505            R31LOC     40,2000  =   36    1  703
R04X       43,2463     277    1  279             R22LEM42   24,2627      506    4  499   506       R31SUFF    37,3370      707    1  704
R04Y       43,2556     278    2  278             R22LEM44   24,2622      506    1  506            R33        42,2002      275    1  275
R04Z       43,2420     276    1  276             R22LEM45   24,2632      506    2  506            R36        04,2656      701    2  284   702
R1            0040  = 1202   19  635  1200       R22LEM46   24,2640      507    2  506            R36INT     04,2676      701    1  702
R1A        E5,1741  =  125   15  125  1200       R22LEM7    24,2616      506    1  506            R36LM      04,2000  =   28    1  700
R1C        E7,1724  =  143    4  143   778       R22LEM93   24,2566      506    1  582            R36TAG2    04,2765      702    1  702
R1D1          4317     460   13  403  1073       R22LEM96   24,2572      506    2  586            R47        32,2000  =   34    1  206
R1S        E7,1572  =  147   14  147   890       R22RSTRT   24,2653      507    1  240            R51        14,3015      941    1  930
R1SAVE        1074     103    4  222  1370       R22WAIT    24,2636      507    4  504   506       R51.1      14,3017      941    1  241
R1VEC      E5,1654  =  125    6  125  1193       R23LEM     24,3135      513    1  497            R51.2      14,3055      941
R10        21,2000  =   31    3   42   898       R23LEM1    24,3143      513    1  514            R51.3      14,3056      941    1  943
R10,R11    21,2006     829    3  240   859       R23LEM11   24,3154      513    1  513            R51.4      14,3145      942    1  942
R10,R11A   21,2021     829    1  872             R23LEM2    24,3176      514    2  513   514       R51C       14,3022      941    2  941   942
R10FLAG       0015  =   66    1  838             R23LEM3    24,3201      514    2  513   514       R51E       14,3053      941    3  941
R10FLBIT      4752  =   66    4  831   907       R24END     24,3230      516    1  515            R51F       14,3042      941
R11        21,2000  =   31    2  829   835       R24LEM     24,3206      515    1  509            R51I       14,3043      941    1  941
R12LITES   25,3607     612    1  875             R24LEM1    24,3212      515                      R51K       14,3134      942    2  942   944
R12STUFF   34,2000  =   34    1  893             R24LEM2    24,3216      515    1  516            R51P63     14,3135      942    1  788
R2         E5,1717  =  125    3 1184             R24LEM3    24,3234      516    1  515            R52        14,3670      955    1  941
R2D1          4320     460    7  403  1099       R24LEM4    24,3251      516    1  516            R52A       14,3700      955    2  955   956
R2VEC      E5,1662  =  125   10  125  1193       R29        33,2045      596    2  597   876       R52B       14,3706      955    1  955
R21-503    24,2760     509    1  509             R29.LOS    33,2123      597    1  596            R54        14,3256  =  945    2  942   971
R21DISP    24,3121     511    1  509             R29/SERV   33,2000  =   34    1  595            R55        14,3224      945    1  942
R21END     24,2767     509    1  509             R29?       33,2547      876                      R55.1      14,3231      945
R21LEM     24,2674     508    1  498             R29DLOOP   24,3362      599    1  599            R55.2      14,3237      945    1  945
R21LEM1    24,2733     509                       R29DODES   32,2547      600    1  599            R55CDR     14,3255      945    2  944   945
R21LEM10   24,2725     509    2  508   511       R29DPAS1   32,2563      600    1  600            R55RET     14,3251      945    1  945
R21LEM11   24,3105     511    1  510             R29DPAS2   32,2702      603    1  601            R56        14,2611  =  937    1  941
R21LEM12   24,3006     510    1  510             R29DVBEG   32,2552      600    2  600   602       R59        15,2245      957    4  957   970
R21LEM13   24,3033     510    1  510             R29DVEND   32,2577      600    1  600            R59A       15,2257      957    1  957
R21LEM2    24,2731     509    1  552             R29FXLOC   32,2774      604    1  601            R59ALM     15,2427      959    1  959

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SYMBOL      DEF      H        REFERENCES      SYMBOL      DEF      H        REFERENCES      SYMBOL      DEF      H        REFERENCES

R59D      15,2375        959   1   959        S-2          7746  = 1286                     SCALEDOT  17,3320       1462   1 1462
R59E      15,2445        960   1   960        S-3          7745  = 1286                     SCALFE    17,3306       1461   1 1461
R59OUT    15,2455        960   4   957   959  S-4          6112  = 1286                     SCALEFAC  31,2005         40   2  796   818
R59RET    15,3034        970   1   970        S-7          5660  = 1286   1 1287            SCALEVEC  32,2132        208   2  207
R60INIT   32,3176        788                  SAMETYP   15,3610        981   1  981         SCALLOOP  21,3473       1481   1 1481
R60LEM    26,2123        473   6   340   956  SAMPLIM      1100        103   9  222   561  SCALPREP  37,3714       1336   2 1335  1336
R60VSAVE  E5,1630  =     122   4   122   788  SAMPLSUM     1101        103   9  103   893  SCALSAVE     0316         99   3 1335  1336
R61       23,2000  =      32   1   517        SAMPTIME     0013  =      92   5  207   462  SCALSHFT  E7,1720  =    145   4  145   586
R61C+L01  23,2127        517   2   517   519  SAVE      E5,1464  =     127                  SCALSTRT  21,3465       1481   1 1481
R61C+L03  23,2133        517                  SAVECOUT  E3,1766  =     604  11  601   603  SCAXIS    E7,1764  =    146  27  143   958
R61C+L04  23,2257        519   1   518        SAVEDEN   27,3535       1278   1 1278         SCHZEROS  37,3056        388   4  380   383
R61C+L05  23,2213        518   1   518        SAVEFLAG     1072  =  1372                    SCLNORM   17,3112       1456
R61C+L06  23,2236        519   3   518   519  SAVEHAND  E6,1462        130   7 1434  1447  SCNDSCL   34,2776        641   7  633   641
R61C+L1   23,2264        519                  SAVELOCR  10,2727       1362   1 1362         SCOUNT       1366  =    108   4  108  1290
R61C+L2   23,2252        519   1   519        SAVELOCS  10,2722       1362   2 1358  1361  SCOUTEND  40,2702        419   4  419
R61C+L4   23,2262        519   2   519        SAVESP    E6,1505  =     132   2 1472  1484  SCPATCH   E6,1746  =    132   2 1484
R61FLAG      0024  =      67   2   517        SAVET-30  E7,1477  =     147   8  147   736  SCRATCHX     0160  =   1496   5 1492  1496
R61FLBIT     4742  =      67   1   519        SAVLEMV   E7,1737  =     144   4  589   590  SCRATCHY     0161  =   1496   3 1492  1493
R61LEM    23,2116        517   4   496   516  SAVQR52   E7,1665  =     142   2  955   956  SCRATCHZ     0162  =   1496   4 1492  1493
R61LEM1   23,2137        518                  SAX       E5,1730  =     123   5  938   940  SD        22,2366        357
R61LEM2   23,2175        518                  SBAND     42,2000  =      36   4   46   486  SDISPLAY  43,3113        290   1 1293
R61TEST   26,2242        475   1   473        SBANDANT  42,3606        486   2  280   489  SECAD     22,2027        351
R62       23,2000  =      32   1   485        SBANDEX   42,3745        488   1  488         SECMAX    E7,1573  =    141   5  667   669
R62DISP   23,2103  =     485   1   286        SBIT1        4753  =  1285                    SECON1    42,3267        421   1  423
R62FLASH  23,2103        485   2   485        SBIT10       4742  =  1285                    SECON2    42,3271        421   1  421
R65CNTR   E7,1745  =     146   6   146   576  SBIT11       4741  =  1285   2 1291  1292     SEC01        4777  =    763
R65LEM    23,2123        517   3   503   576  SBIT12       4740  =  1285   1 1291           SEC15     36,3750        763
R65WAIT   23,2271        519   2   517   518  SBIT13       4737  =  1285                    SEC15DP   36,3747        763
R77       43,2404        276   1   263        SBIT14       4736  =  1285                    SEC30DP   36,3751        763
R77CHECK  25,33[illegible]        558   1   556        SBIT15       4735  =  1285   1 1292           SEC45     36,3754        763
R77END    43,2617        279   1   263        SBIT2        4752  =  1285                    SEC45DP   36,3753        763
R77FLAG      0117  =      74   2   276   279  SBIT3        4751  =  1285                    SELCTSUB  17,3173       1457   3 1443  1454
R77FLBIT     4741  =      74   4   220   558  SBIT4        4750  =  1285   1 1289           SELECTMU  10,2000        693   6  622   729
========================================  SBIT5        4747  =  1285                    SELECTP   16,3531       1440   2 1436  1440
S(XI)        0032  =  1202   6 1178  1184     SBIT6        4746  =  1285                    SELECTYZ  16,3551       1440   1 1429
S+ZERO       4755  =  1285   9  290  1291     SBIT7        4745  =  1285   1 1292           SELFADRS  43,3245       1286   2  290   291
S+1          4753  =  1285   9  290  1293     SBIT8        4744  =  1285                    SELFBANK  01,3224       1116   1 1116
S+2          4752  =  1285                    SBIT9        4743  =  1285   1 1289           SELFCHEC  43,2000  =     36   1 1285
S+3          6245  =  1285                    SBNK03       5020  =  1286   1 1291           SELFCHK   43,3336       1287   5  222  1287
S+4          4751  =  1285                    SCABBIT      4751  =      84   3  559   612  SELFERAS     1357        108   1  108
S+5          4756  =  1285                    SCALADJ   25,3402        559   1  558         SELFRET      1361  =    108   7  108  1287
S+6          6242  =  1285                    SCALBAD      0261  =      84                  SELFSUPP  40,2000  =     36
S+7          4757  =  1286   1 1287           SCALCHNG  25,3350        558   1  557         SENDID    05,3753        996   2  992   996
S-ZERO       4754  =  1286   1 1290           SCALDONE  21,3507       1482   1 1481         SENDPULS  07,3133       1314   1 1313
S-1          7747  =  1286   2 1291  1293     SCALECHK  25,3321        557   1  557         SENSEGET  17,2114       1442

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SENSETYP E6,1500        131    5 1438 1462 SETPD        7613       1044    1 1011      SFTEMP1      0123  =   96   20  304  433
SENSOR   17,3724       1469    2 1461      SETPOS    33,3740        896    1  896      SFTEMP2      0124  =   96    2  433  434
SENSTEST 17,3344       1462    1 1462      SETPOS1   33,3721        895    1  789      SGNAGREE  10,3612     1397    6  376 1218
SEPMIN   42,3435        424    2  421  423 SETPOS2   33,3737        896    1  895      SGNCHECK  12,2562     1192    2 1182 1183
SEPMNRET     0144  =     97    2  424      SETPRIO   10,2510       1358                SGNCOM    40,2422      402    1  403
SEPSCRET     0144  =     97    2  423  424 SETPRPOS  33,2104        596    1  596      SGNDVOVF  00,2402     1057    1 1057
SEPSEC   42,3404        423    1  422      SETRAD    23,2344        696    1  695      SGNOFF       0123  =   96    3  402  403
SEPSECNR 42,3417        423    3  421  423 SETRADX   23,2357        696    1  696      SGNON        0122  =   96    3  402  403
SEPSEC1  42,3412        423    1  423      SETRE     13,2560       1139    2 1133 1135 SGNRDOT   E5,1754  =  125    2  125 1198
SERV     32,2000   =     34    1  866      SETREX       0051  =  1139    2 1139      SGNTAB    40,2443      403    2  402  403
SERVCADR 36,2105   =    749    1  755      SETROUND  00,2272       1054    3 1054      SGNT01    40,3070      432    1  431
SERVEXIT 32,3770        866    8  731  866 SETRRCTR  25,2317        535    1  536      SGNTST1   40,2462      403    3  403
SERVICER 33,2206        860    2  242  858 SETRRECR  25,2156        530    3  529  596 SHAFTBQ   26,3011      580
SERVICES 33,2000   =     34    8   39  894 SETRXX    13,2573       1139    3 1139      SHAFTLIM  25,2564      544    1  544
SERVIDLE 27,3321        865    2 1383 1384 SETSENSE  17,3276       1461    1 1461      SHAFTVAR  E4,1410      113    1  581
SERVOUT  33,2400        863    3  862      SETTIME   17,2566       1449    1 1449      SHFTFACT  32,3534      819    1  818
SERV1    37,2000   =     36    2  857  869 SETTIME4  06,2074        157    1  160      SHFTFLAG  E6,1741  =  132    4 1481 1482
SERV2    22,2000   =     32    1  863      SETTIME5  16,2152       1412    1 1413      SHIFTR1   23,2426      699   11  617  727
SERV3    27,2000   =     33    1  865      SETTRKF      4564        524    2  185  523 SHIFT11   33,3030      881    3  882  883
SERV4    34,2000   =     34    1  894      SETUPDSP  10,2213       1294    1 1294      SHOLTS    41,3661      468    1  467
SETAUG   40,2645        418    1  418      SETUPER1  37,3005        388    1  387      SHORTMP      7307     1036   11  400 1337
SETBANK  13,3036       1213    4 1211 1212 SETUP29D  33,2152        598    1  598      SHORTMP2     7313     1036    1  885
SETCLEARS C7,3144      1315    2  169 1312 SETUP70   04,2373        233    1  227      SHORTT    00,2017     1047    2 1010
SETCTR   21,3663       1508                SETUP71   04,2372        233    1  227      SHORTV    00,2121     1050    1 1010
SETEBANK     4313       460    2  410  420 SETVAC    41,3510        448    1  448      SHOW      37,2457      380    3  375  377
SETGAMMA 13,2550       1138    2 1133 1135 SETWO     05,3562        992    3  992  994 SHOWSUM   43,3100      290    1  290
SETGLOCK 06,2465        170    4  169  170 SETXFLAG  07,2667  =     851                SHOW1     37,2461      381    1  381
SETGMEX  13,2556       1138    1 1138      SETXTACT  43,2105        263    1  264      SHUTDOWN  16,2163     1413    1 1410
SETIFIGS 13,2644       1210    8  236 1221 SETX2     26,2526        576    1  576      SIDLOOP   43,3267     1286    1 1287
SETINFL  05,2731        215                SEUDOP00  04,2202        229    1  231      SIGN         7655     1046    1 1011
SETISSW  06,2703        179    7  165 1318 SEVEN        4757       1095   25  155 1495 SIGNAOS      0163  = 1506   12 1498 1505
SETITCTR 11,3765       1246    1  688      SFAIL        1357  =     103    4  108 1287 SIGNFIX   40,3031      431    2  431
SETLOC   01,2661       1107    3 1107 1111 SFCOM     42,2145        305    1  305      SIGNLCHK  25,2767      551    2  551
SETMARK  10,2526       1359                SFCONST1  E5,1467  =     127                SIGNMPAC  10,3712     1401   14  353 1280
SETMAXDB 20,2127       1407    2  791 1407 SFCONUM   41,3047        428    2  416  430 SIGNRET      0125  =   96
SETMGA   06,3730        692    1  692      SFINTAB   42,2464        311    1  305      SIGNTEST  40,2446      403    2  402
SETMINDB 20,2140       1407    6  513 1407 SFINTABR  41,3212        431    1  430      SIM2CADR  05,2454      211
SETMOON  13,2716       1211    3 1211 1239 SFMIXCAL  40,3060        432    1  432      SINB      E5,1646  =  123
SETMUER  10,2011        693    1  693      SFNORCAL  40,3063        432    1  432      SINBLANK  40,2572      405    1  405
SETNADD      4311       460    2  407  429 SFOUTAB   42,2556        312    1  305      SINCDU       0736  =  100    6  100 1264
SETNCADR     4303       460    7  407  460 SFOUTABR  41,2600        417    1  417      SINCDUX      0742  =  100    6  478 1266
SETNEGU  21,3363       1479    1 1479      SFRET     41,3064        428                SINCDUY      0736  =  100    5  478 1266
SETNORM  10,2534       1359    1 1357      SFRET1    41,3046        428                SINCDUZ      0740  =  100    7  478 1266
SETOVF       7003      1027    1 1030      SFRUTMIX  41,3034        428    5  410  432 SINE      00,3530     1082    2 1013 1260
SETOVF2      7152      1032    1 1028      SFRUTNOR  41,3026        428    5  416  432 SINESLOC  23,3762     1264    1 1264

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES

SINGIMLC  26,2375      483   1  481         SMALRATE  17,3654     1468   1 1468         SPSIN         5033     1102   5  188 1261
SINI      26,2002       52   2 1144         SMODE        1362  =   108   7  108 1287    SPSLOOP1  20,3106     1494   1 1495
SINNODI      0010  =  1148   1 1144         SMODECHK  43,3301     1287   3 1287 1290    SPSLOOP2  20,3123     1494   1 1495
SINTH        0022  =   124  21  299 1254    SMPAC+    00,3405     1080   3 1079         SPSRCS    21,3727     1509   2 1438 1452
SINTHETA  E7,1731  =   145   3  146  586    SNAPAGN   05,3633      993                  SPSSTART  21,3735     1509   1 1509
SINVEC1   26,2377      483   1  482         SNAPEND   05,3652      994                  SPT          5036     1102   1 1102
SINVEC2   26,2401      483   1  482         SNAPLOOP  05,3622      993   1  993         SPVAC        5116     1103   3  232 1361
SINZERO   30,3665      922   1  922         SNGLCD    22,2376      357                  SPVACIN      5112     1103   1 1103
SIN5DEG   05,3502      852   1  852         SNTH      E5,1727  =   125  15  125 1199    SQ           1077      103   2 1102
SIN60DEG  26,3704      593   2  590         SNUFFBIT     4737  =    74   1 1453         SQRT      00,3207     1076   1 1013
SIX          6242  =  1099  36  169 1487    SNUFFER      0115  =    74   2  298         SQRTABRT  00,3402     1079   2 1079
SIXTY     43,3236     1286   1 1292         SNUFFOUT  43,3221      298   1  262         SQRTNEG   00,3373     1079   1 1079
SIZETAB   01,2002      239   2 1306 1308    SN1       00,3553     1083   1 1082         SQRTNM2   00,3475     1081   1 1081
SIZETST   42,3561      435   2  434  435    SN359+    35,2413      631   1  634         SQRTNORM  00,3502     1081   1 1081
SKALSKAL     1356      108   1  884         SOB          0042  =  1148   4 1143 1144    SQRTSHFT  00,3221     1076   1 1076
SKEEP1       1371  =   108  20  108 1293    SOLNSBIT     4751  =    75                  SQRTSUB   00,3343     1079   3 1070 1084
SKEEP2       1372  =   108  10  108 1291    SOLNSW       0127  =    75   5 1193 1199    SR           0021  =    92  30  405 1484
SKEEP3       1373  =   108  14  108 1292    SOMEADS   20,3444     1500                  SRCHOBIT     4736  =    68   1  589
SKEEP4       1374  =   108  14  108 1293    SOMEERRR  37,3040      388                  SRCHOPTN     0037  =    68   4  287  515
SKEEP5       1375  =   108  10  108 1292    SOMEKEY   07,2404      255   1  254         SRDDV     00,2024     1047   1 1070
SKEEP6       1376  =   108   6  108 1293    SOMERR2   37,3047      388   1  378         SRTEST    00,3456     1081   1 1080
SKEEP7       1377  =   108  22  215 1292    SOPT      43,3705     1293   1 1293         SR30.1    22,3551      720   2  715  717
SKIPADD   10,2750     1363   1 1363         SOPTION   43,3670     1292   2 1291         SS        E7,1732  =   143   9  777  778
SKIPDB1   20,3372     1499   1 1498         SOPTIONS  43,3312     1287   2 1287         SSP          6620     1021   1 1011
SKIPDB2   20,3456     1500   3 1499 1500    SOPTION1  43,3322     1287   1 1287         STABL?    31,2557      801   1  800
SKIPPAXS  16,2734     1429   2 1428 1441    SOPTION2  43,3323     1287                  STACCOUT  20,2752     1490   2 1490
SKIPSIM   05,2456      211   1  211         SOPTION3  43,3324     1287                  STADR        6354     1014   1 1013
SKIPTPER  22,3626      721   1  721         SOPTION4  43,3325     1287                  STALL     07,3717     1330   2 1329
SKIPU     E6,1535      133   9  133 1472    SOPTION5  43,3326     1287                  STAR      E5,1730  =   123   9  123  966
SKIPV     E6,1536  =   133   3 1412 1472    SOPTION6  43,3327     1287                  STARAD    E5,1706  =   123  45  123 1256
SLAP1     05,2447      211   1  409         SOPTION7  43,3330     1287                  STARALGN     0736      100   2  100
SLCTMU    10,2000  =    29   1  693         SOPTON10  43,3331     1287                  STARCODE     0735      100   4  100  956
SLEEPIE   37,3034      388   2  383  387    SOJPLY    37,3071      389                  STARIND   E5,1757  =   124  16  124  970
SLEFT5       4340      461   1  444         SOUTHDR   E5,1421  =   127   3  127  376    STARM        0040  =   124
SLOAD        6501     1019   1 1011         SPARCSIN  30,3673      923   3  807  922    STARSAV1  E5,1760  =   124  12  124  982
SLOAD2       6055     1002   5 1019 1401    SPARE        0007  =   193  11  194  204    STARSAV2  E5,1766  =   124   8  124  981
SLOPEBIT     4751  =    68                  SPCOS        5032     1102   5  188 1261    STARTAB   14,2000  =    31   1   47
SLOPEHI   00,2314     1055   1 1080         SPECSTS   37,2572      384                  STARTDAP  16,2046     1411
SLOPELO   00,3007     1069   1 1081         SPECTEST  01,2651     1107   1 1111         STARTDES  25,2432      540   2  539  543
SLOPESW      0033  =    68   2 1182 1193    SPEEDRUN  21,2374      901   1  900         STARTEB      5007  =   223   1  220
SMALL     00,3133     1073   1 1070         SPIRAL       1240  =   960   4  261  959    STARTMNV  26,2172      474
SMALLEPS  27,2366      766   1  766         SPLRET    22,3541  =   718   1   37         STARTPIP  37,2161      375   1  375
SMALLTJU  16,3707     1470   1 1470         SPNDX        1272      105   8  365  366    STARTP47  36,3447      758   1  758
SMALL2    00,3062     1070   1 1073         SPSCODE      4743  =  1309                  STARTP64  31,2630      802   1  798
SMALPDIF  16,2507     1425   2 1425         SPSCONT   20,2712     1490   1 1496         STARTP66  31,2477      800   1  801

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STARTP67 31,2551      801   1  800           STOREMIN 12,2152     1175   1 1175           SURFSTOR 07,2521      258   1  255
STARTSB1 05,3116      219   1  216           STORETGO 27,2666      775   2  775           SURFSUP  15,3151      971   1  971
STARTSB2 05,3146      219   1  216           STORE1      6623     1021   1 1052           SVCT3       5240     1121   2 1121
STARTSIM 05,2452      211                    STORE1S  26,3667      592   1  592           SVCT3X      5256     1121   3 1121
STARTSTO    6434     1017                    STORHAPO 22,3600      720                    SVDWN1   13,2114      321   3  297 1210
STARTSUB 05,3107      219   4  211  218      STORHPER 22,3612      721                    SVDWN2   13,2070      320   2 1156 1212
STARTSW  05,2451      211                    STORJUMP    6372     1015   1 1014           SVEXITAD 05,3474      832   1  831
STATE       0074       95  44   65 1093      STORLP71 04,3647     1393   2 1393 1394      SVEXTADR 27,3356      866   1  865
STATEBIT    4747  =    71   1 1385           STORTORK 16,3702     1470   1 1471           SW/      01,2516  = 1094   1 1012
STATEFLG    0067  =    71   9  575 1243      STORV    20,3612     1502   1 1502           SWANDBIT    4741  =   77   3  739  898
STATEINT 13,2604     1209   3  239 1210      STORY    27,2431      769   1  769           SWANDISP    0155  =   77   1  863
STATEUP  13,2026      236   1 1210           STRAT    14,2722      939   1  939           SWBIT       0131  =   97   5 1092 1094
STATEXIT E4,1516  =   115                    STRATGY  14,2714      939                    SWBRANCH    6715     1024   1 1094
STATINT1 13,2613     1209   2  240 1209      STRTGYPO 07,3405     1321   2 1319 1324      SWCALL      4622      998   5  217 1090
STATQUO  04,2304      231   2  231           STRTGYP2 07,3411     1321   4 1322 1326      SWCHCLR  35,2625      662   1  662
STBLEORB 34,2000  =    34   1  724           STRTIDLE    5701     1383   1 1383           SWCHSET  35,2603      662   1  662
STCLOK1  36,2663      743   1  742           STRTP66A 31,2505      800   1  801           SWINIT   05,3366      223   9  213
STCLOK2  36,2664      743   2  734  788      STSHOSUM 43,3522     1290   2  290  291      SWITCHES 01,2516     1092   1 1094
STCLOK3  36,2665      743                    SUBDIVDE 16,2263     1422   3 1424           SWRETURN    4631      998  10  244 1333
STCTR    20,2544     1487   1 1488           SUBEXIT  E7,1470      140  25  621  726      SWSKIP   01,2577     1094   2 1094
STCTR1   20,2547     1487   1 1489           SUBLIST     0337  =   994  12  991  994      SWSTORE  01,2553     1093   2 1093
STDESIG  25,2602      546   3  511  546      SUBTR    00,3702     1085   1 1086           SWWORD      0130  =   97   2 1092 1093
STDESIG1 25,2616      546                    SUFFCHEK 12,3450     1196   3 1195 1196      SXA      01,2364     1087   1 1012
STEER?   31,3432      813   2  798  812      SUHALFA  22,2677      362   1  362           SYNCT4   06,2154      160   1  160
STEERBIT    4741  =    69   3  813  861      SUHALFAP 22,2717      362   1  362           SYSTEST  43,3064      290   1  263
STEERING 36,3666      762   2  732           SUPDACAL    4651      999   2  440 1291      S1          0050  =   93  30  357 1255
STEERSW     0042  =    69   2  771           SUPDXCHZ    5165     1116   6  283 1116      S10BITS     5012  = 1286   2 1288
STERN    31,2470      800                    SUPERADR 16,2665     1428   1 1428           S13BITS  43,3240     1286   1 1292
STIKLOAD 01,2206      293   1  293           SUPERBNK    0007  =    93  27  215 1381      S2          0051  =   93  45  322 1255
STIKSENS E6,1444      130   8  212 1447      SUPERJOB 16,2666     1428   2 1428           S24.9SEC 36,3144      749   1  736
STIKSTRT 05,3060      213   1  212           SUPERSW     4727     1001   3 1364 1383      S30.1    34,2000      616   1  614
STILBADH E7,1674  =   150   4  150  895      SUPERO11    4773     1096   3  857 1311      S32.1F1     0132  =   75   4  632  641
STILBADV E7,1675  =   150   4  150  895      SUPER100    4745  = 1096                    S32.1F2     0133  =   75   4  632  641
STILLRCS 17,2661     1452   3 1446 1452      SUPER101    4775     1096   1 1099           S32.1F3A    0134  =   75   8  633  641
STMIN-   20,3527     1501   2 1505           SUPER110    4776     1096   3  598 1099      S32.1F3B    0135  =   75   8  633  641
STMP        0020  =   987   7  986           SUPRCON  43,3237     1286   1 1292           S32/33.X 34,3120      646   2  630  645
STOPCLOK 36,3013      746   3  745           SURFAGAN 07,2645      261   1  261           S32/33.1 34,3100      645   2  623  628
STOPRATE 20,2165     1408   9  288 1409      SURFDISP 15,3161      972   2  971  974      S32BIT1     4735  =   75
STORANG  27,2046      481   1  481           SURFEND  07,2641      261   1  261           S32BIT2     4736  =   75
STORBNDS 12,2140     1175   1 1178           SURFFBIT    4744  =    79   8  213  860      S32BIT3A    4737  =   75
STORDELT 35,3235      670   2  669  670      SURFFLAG    0177  =    79  16  236 1212      S32BIT3B    4740  =   75
STORE       6422     1016   6 1015           SURFJOB  07,2604      260   1  258           S33/34.1 35,2764      667   2  627  662
STORE,1     6414     1016   1 1015           SURFLINE 15,3101      971   2  970  981      S34/35.1 35,3274      672   4  666  729
STORE,2     6417     1016   1 1015           SURFREJ  07,2507      257   1  257           S34/35.2 35,3306      673   2  663  666
STOREMAX 12,2077     1175   3 1174 1175      SURFSTAR 15,2000      250   1  253           S34/35.3 35,3377      675   1  679

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S34/35.4  35,3442       676   1  679      TASKOVER     5261     1129  81  165 1378 TDISP     15,3350       975   1  975
S34/35.5  35,3522       578   2  663  666 TAT          0014 = 1247  16  207 1224 TDISPSET  31,3704       825   2  804  808
S3435.23  35,3325       673   1  673      TAU.      E4,1473 =  114  13  114 1233 TDPOS     E5,1756 =  126   1  126
S3435.25  35,3327       673   1  727      TAUROD    E5,1540 =  122   2  122  813 TDVEL     E5,1764 =  126   1  126
S40.1     27,2246       765   2  754  756 TAUVERT   E5,1516 =  121   2  121  815 TEMK         1076      103  10 1102
S40.1B    27,2336       766   1  765      TBASE1       1053      102   4  736 1304 TEMP      E5,1441 =  127
S40.13    27,2540       773   2  240  737 TBASE2       1055      102   6  474 1220 TEMPADD   E5,1440 =  127
S40.13D   27,2626       774   2  773  774 TBASE3       1057      102               TEMPBB       0064 = 1300   1 1299
S40.130V  27,2653       775   1  775      TBASE4       1061      102   4  232  744 TEMPBBCN     0073 = 1300   6 1299 1302
S40.131   27,2610       774   1  774      TBASE5       1063      102   1  859      TEMPFLSH     0374      100   3  228 1364
S40.132   27,2616       774   2  774  775 TBASE6       1065      102   1  744      TEMPG        0061 = 1300   8 1299 1302
S40.132*  27,2620       774   1  775      TBUILDFX     4767     1096   1 1510      TEMPG2       0071 = 1300   3 1298 1301
S40.133   27,2647       775               TBUF      E4,1670 =  119  14  119  849 TEMPNM       0063 = 1300   3 1299 1302
S40.134   27,2650       775   2  774  775 TC        E3,1550 =  110  10  110 1240 TEMPNUM   E6,1742 =  131   2 1440
S40.136   27,2006        38   1  774      TCALARM2  43,3264     1286               TEMPOK    06,2525       171   2  171
S40.136_  27,2010        38   1  775      TCCSM     E3,1622      111               TEMPOR2      0160 = 1372  10 1356 1366
S40.137   27,2641       775               TCDANZIG  27,3753 = 1282   5  565 1277 TEMPP        0062 = 1300   6 1299 1302
S40.138   27,2661       775   1  775      TCDH      E3,1776      112  11  194  644 TEMPPHS      0154 = 1308   9 1303 1308
S40.2,3   27,2413       769   2  754  756 TCFINDVC     4354      461   1  448      TEMPPF       0070 = 1300   2 1299 1302
S40.8     27,2447       771   1  761      TCGETCAD  00,3761     1377   1 1378      TEMPP2       0072 = 1300   5 1298 1301
S40.9     27,2707       776   1  761      TCGFAPPR  E5,1470 =  121   3  121  825 TEMPR60      1164      104   7  473  842
S41.1     27,3267       784   4  756  759 TCGFBRAK  E5,1434 =  121   2  121  810 TEMPSW       0065 = 1300   8 1298 1301
S50       14,2506 =  935                  TCGIAPPR  E5,1471 =  121   1  121      TEMPSWCH     0157 = 1308   3 1303 1308
S52.2     14,3617       953   2  930  947 TCGIBRAK  E5,1435 =  121   2  121  810 TEMPSW2      0066 = 1300   4 1298 1301
S52.2.1   14,3637       953               TCLEM     E3,1674      111               TEMPTIME  E5,1430 =  127   3  127  380
S52.2A    14,3630       953   1  953      TCNUVAC      4351      461   1  448      TEMPVAR   E5,1667 =  126   3 1150 1151
S52.3     14,3650       954   1  930      TCP       E6,1445      130   3 1422 1435 TEMP2G       0155 = 1308   9 1303 1308
S8BITS       4357 = 1286   1 1293      TCPIN     43,3202      298   1  298      TEMP31    E6,1737 =  130   6 1444 1445
========================================= TCPINAD   43,3205      298   1  297      TEMX         1254 =  105   8  105  871
T            0036 = 1202  13  494 1196 TCQ          6742 = 1294   4  264  525 TEMY         1255 =  105   5  105  871
T(X)      27,3735      1282   2 1279 1280 TCQBNK00  00,3455     1080   1 1080      TEMZ         1256 =  105   7  105  871
T-OTHER   E3,1570 =  111   1  194      TCQCDUW   30,3475      918   1  924      TEM1         0141       97  34   97 1365
T/2SEC    15,2770       966   1  965      TCQR      E6,1457      130   3 1422 1448 TEM2         0142       97  34   97 1399
TABLNTH   06,2037       157   1  157      TCSI      E7,1633      142  12  194  644 TEM3         0143       97  19   97 1260
TABLTTF   E7,1562 =  149   7  149  827 TCSLEEP   00,3772     1378   1 1377      TEM4         0144       97  11   97  922
TABLTTFL  31,3746       827   1  807      TCSUBTR   00,3734     1086   1 1084      TEM5         0145       97   6   97  921
TAD          7071      1030   1 1011      TCTSKOVR     4353      461   1  751      TEN          4363 = 1099  10  208 1431
TAGSUB    01,2441      1089   4 1087 1088 TCWAIT       4352      461   1  448      TENDAPPR  E7,1424       138
TALIGN    E5,1774 =  124   9  124  976 TDEC         1115      104      104 1243 TENDBRAK  E7,1423       138   2  139  811
TANG         1107       103  34  103  603 TDECAY    E7,1740 =  143   1  771      TENSEC    24,3115       511   1  510
TANGNB    E7,1752 =  146   9  146  606 TDECAYFX     4770     1096               TEPHEM    E3,1706       111  10  112 1395
TARGETDB  E6,1476 =  130   4 1435 1448 TDEC1        0040 = 1247  62  207 1243 TERMASC   30,3007       854   2  853  854
TARGETV   12,3541      1197   1 1197      TDEC2     E7,1573 =  141   3  622  697 TERMATE   10,3372      1370   1 1368
TARGTDEX  31,2452       799   2  810  825 TDELTAV   E3,1520 =  110  13  110 1242 TERMEXTV     5472 =  263   4  268  273
TARGTIME  E4,1706 =  117   2  726  729 TDESIRED  E5,1670 =  125   5  125 1196 TERMNVEC  12,3630      1199   1 1199

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SYMBOL        DEF    H       REFERENCES     SYMBOL        DEF    H       REFERENCES     SYMBOL        DEF    H       REFERENCES

TEKM1TMP     0157 =   98   3 1264         TGO       E7,1516 =  147  38  147  853 TIMEDELT 13,3673    1225   4 1223 1224
TEFMAC    36,3256    755   3  754  755 TGOCALC   27,2464    771              TIMEDIDL 04,3567    1392   2 1392 1395
TERRLAMB  E5,1757 =  125   2 1195 1196 TGOCOMP   32,3737    836   2  833  835 TIMEDIDR 04,3601    1393   1  243
TEST      01,2565   1094   1 1094      TGOFFNOW  21,3413   1480   3 1479 1480 TIMEGMBL 21,3330    1478   2 1450 1491
TESTBIT   40,3527    457   3  457      TGO1      E7,1501 =  835   2  835      TIMEHOLD     1105     103   7  553  606
TESTCCS   32,2672    602               THDUMP    31,2367    796              TIMEINC  13,3645    1224   1 1225
TESTLODX  31,3664    825   1  825      THETA        0024 =  124  11  946 1251 TIMEOVFL 12,2311    1178   1 1176
TESTLOOP  13,3257   1218   6 1216 1244 THETACON  27,2411    767   1  765      TIMEP        0030 =  987   3  985  986
TESTNN    41,2046    407   1  439      THETAD       0321     99  22   99 1313 TIMER    E5,1470 =  127
TESTOFUF  40,3174    432   4  431  441 THETAN    E5,1452 =  128   1  128      TIMERAD  12,3547    1198   1  622
TESTVB    41,2041    407               THIRD     35,3735    684   1  669      TIMESTEP 11,3252    1237   4 1219
TESTXACT  43,2076    263  19  268 1388 THIRTEEN     4761 = 1073   2 1070 1402 TIMETEST 01,3574    1304   1 1307
TESTY     35,3032    667   1  667      THISAXIS  23,2513 =   37   1   37      TIMETHET 12,2732    1186   6  494  729
TEST3979  34,3447    727   1  726      THISPREC  13,3057 =   37   2  701  715 TIMEX    35,3271     670   2  668  670
TET       E3,1516 =  110  32  110 1239 THISSHIP  22,3356    715   1  714      TIME1        0025 =   92  21  165 1369
TETCSM    E3,1570    111   5  111 1395 THISTPIP  E7,1761 =  151   6  151  818 TIME2        0024 =   92  39  194 1397
TETLEM    E3,1642    111   4  111 1395 THISVINT  13,2066    237   1 1224      TIME2SAV     0314      99   4   99 1337
TETOTHER  E3,1570 =  111               THRDCHK   34,2[illegible]    640   2  639      TIME3        0026 =   92   4  219 1128
TETTHIS   E3,1642 =  111   1  710      THREE        6245 = 1099  45  233 1458 TIME4        0027 =   92   4  157  219
TEVENT       1344    107   6  194  831 THREE/8   12,3747   1246   1 1232      TIME5        0030 =   92   6  219 1421
TFF       E4,1540 =  115  11  115  721 THREEDEG  32,2545    571   1  571      TIME6        0031 =   92   7 1404 1457
TFF/RTMU     0036 = 1268   6  714 1279 THRESH1   36,2020     40   1  753      TIMQGMBL 21,3336    1479   1 1480
TFFALFA      0032 = 1268   6 1272 1279 ~~THRESH2      [illegible]     40   3  758  838~~ TIMSUBM      0016 = 1148   3 1145
TFFBANK   22,3320    714   1  713      THRESH3   36,2021     40   1  753      TIMSUBO  E3,1706 =  112   1 1145
TFFCALLS  22,3565    720   1  720      THRUTLAG  31,2004     40   1  795      TINT     E7,1630 =  144   6  725  726
TFFCONIC  27,3360   1271               THROTTLE  31,2216    793   2  813  819 TINTSOI  E4,1702 =  117   2  725  726
TFFCONMU  27,3361   1271   1  720      ~~THROTUP   32,3746~~    836   2  834      TITER    E7,1613 =  141   5  667  669
TFFDELQ      0012 = 1268   2 1280 1281 ~~THRUST       0055 =   77   5  211  836~~ TIX      01,2415    1088   1 1012
TFFELL    27,3653   1280   1 1278      TICKTEST  22,3430    716   2  713  716 TJCALC   17,3347    1462   2 1462
TFFEL1    27,3655   1280   1 1278      TICKTFF   22,3420    715   1  715      TJETLAW  17,3252    1461   2 1438 1452
TFFNP        0034 = 1268   6 1271 1280 TICKTPER  22,3410    715              TJETU    E6,1525 =  134   2 1463 1464
TFFQ1        0016 = 1268   5 1277 1280 TIG       E7,1441    139  43  194  976 TJLAW    17,2666    1452   1 1456
TFFRP/RA  27,3427   1274   1  720      TIG-0     36,2403    738   2  241  737 TJLAWADR 17,3113    1456   1 1452
TFFRTALF     0030 = 1268   3 1272 1279 TIG-30    36,2276    736   2  241  735 TJMIN    17,3741    1469   1 1467
TFFSW        0167 =   78   3 1277      TIG-30.1  36,2266    735   1  735      TJP      F6,1524     133  18  133 1470
TFFSWBIT     4753 =   78               TIG-30A   36,2273    736   1  735      TJU      E6,1525 =  133  19  134 1509
TFFTEM       0044 = 1268  13 1277 1281 TIG-35    36,2240    735   3  241  734 TJV      E6,1526 =  133   3 1411 1455
TFFTICK   22,3453    716               TIG-5     36,2352    737   4  240  743 TJZERO   21,3766    1510   2 1510
TFFVSQ       0024 = 1268   1 1271      TIGNOW    36,3241    755   2  741  754 TLAND    E5,1400 =  121   6  121  932
TFFX         0042 = 1268   7 1277 1280 TIGSAVE   E7,1762 =  143   4  761  765 TLIM     06,2514     171   1  162
TFFXTEST  27,3561   1278   1 1278      TIGSAVEP  E7,1764 =  143   2  761      TLOAD        6470    1019   3  357 1099
TFFZEROS  23,2521 = 1283   2 1277 1278 TIGTASK   36,2567    741   1  732      TM       E6,1733 =  135   4  364  367
TFF1/ALF     0026 = 1268   7 1272 1281 TIGTASK1  17,2000    741   1  741      TMANUCHK 22,3064     366
TFF1/4    23,2511 = 1283   4 1271 1277 TIMECHEK  10,3321   1369   1 1369      TMARK    E5,1432 =  127   4  127  380
TFI       E7,1453 =  139               TIMECHK   22,3075    366   1  366      TMEXITL  05,3704     994

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TMFAIL2   04,3365     1339    2 1340         TRANSPOS  22,2326     356    1  351         TSSP      00,2025     1047
TMFI      E6,1703  =   135    9  352   353   TRANSTM   E7,1662  =   148    3  148   495   TSTAB     40,3637      470    1  471
TMIN      34,2111      632    2  641         TRANS4    17,2321    1446    1 1443         TSTART82  E4,1604  =   115    7  339   715
TMINDEX      0336  =    99    7   99   994   TRAPEDP   E6,1430     129   11  129  1425   TSTCON1   41,3656      467    1  467
TMIS      E6,1703  =   135   15  135   351   TRAPEDQ   E6,1431  =  129    6 1411  1426   TSTCON2   41,3657      468    1  467
TMODE        6477     1019    1  520         TRAPEDR   E6,1432  =  129    6 1411  1426   TSTCON3   41,3660      468    1  468
TMPTOSPT  33,2440      872    1  871         TREDES    E7,1666  =  150    5  804   826   TSTFBANK  27,2232      751    1  751
TMPRESUME 05,3706      994                   TREDESCL  31,3751     827    1  826         TSTFORDP  41,2466      415    1  414
TNEWA     E7,1431      138    2  761         TRG*NBSM  23,3664    1262    5  250   968   TSTLTS1   41,3631      467    1  467
TNONTEST  06,2227      163    1  161         TRG*SMNB  23,3651    1262    2  571   896   TSTLTS2   41,3662      468    1  467
TNUV      E3,1526  =   110   12  110  1242   TRIG1     23,3333    1251    1 1251         TSTLTS3   41,3667      468    1  468
TOBALL    26,2136      473    1  473         TRIG2     23,3344    1251    1 1251         TSTLTS4   40,3471      450    1  468
TOBALLA   26,2140      473    2  474         TRIMACCL  31,2000      39    1  812         TSTORE       6454     1017    1 1017
TOBALLC   26,2161      474    1  474         TRIMDONE  01,2323     295    1  782         TSTPOINT  23,3755     1264
TOCON2       5417     1299    1 1300         TRIMGIMB  27,3217     781    1  295         TSTRLSRM  13,2575     1139    1 1139
TOF-FF    27,2000  =    33    1 1271         TRIPA     E5,1664  =   126    5  126  1151   TSTPRT    E7,1611  =   141    3  283   703
TOF-FF1   27,2000  =    33    2   46  1283   TRKFLCDU  06,3070     185    2  185         TTEMP     E6,1707  =   135    8  365   368
TOFAC     25,3574      566    1  566         TRKFLON      4601     525    2  524   613   TTF/8     E7,1642  =   149   20  149   874
TOOBADF   22,2724      363    1  351         TRKMKCNT  E7,1462     139   11  139  1222   TTF/8CL   31,3061      807    3  798
TOOBADI   22,2742      363    1  352         TRMTRACK  43,3024     287    2  262   593   TTF/8TMP  E7,1552  =   149    5  149   803
TOPSEUDO  17,2524     1448    1 1448         TRMTRAK1  42,2054     287    1  287         TTFDISP   E7,1475  =   147    4  147   825
TORKJET1  20,2000       42    2 1490         TRNSPSPD  22,2335     356    1  352         TTFINCR   31,2641      803    4  798   802
TORQCONS  20,3145     1495    1 1495         TRUE360X  12,3172    1191    1 1190         TTFSCALE     4740  =   827
TORQNDX   E5,1440  =   128    8  373   388   TRUNBQ    26,3107     581                   TTHROT    E7,1617  =   149    3  149   795
TORQUE    37,2117      374    1  388         TRUNVAR   E4,1411     113    1  582         TTO       E4,1666  =   119    4  119   846
TOTATTER  43,2166      266    1  262         TRYCOUNT  25,3166     555    1  555         TTOAXIS   E6,1742  =   133   10 1464  1467
TPAGREE      7257     1036   19  275  1397   TRYGTS    17,2574    1449    1 1442         TTOGO     E7,1453      139   24  139   852
TPASS4    E7,1630      142   11  144   778   TRYSWN    25,2523     543    1  543         TTPI      E7,1635      142   19  194   670
TPDVI        6610     1021    1 1021         TRYSWS    25,2461     542    1  539         TTPIO     E7,1637      142    3  623   628
TPERTICK  22,3460      716    1  716         TRYUORV   16,2753    1429    1 1430         TURNITON  35,3766      748    1  748
TPIP      E7,1624  =   149    5  149   803   TSCALE    32,2174     209    1  208         TURNOFFQ  16,2714     1428    1 1428
TPIPOLD   E7,1573  =   149    2  802   803   TSCALINV     4750  =  827    1  825         TURNOFFR  16,2724     1429    1 1428
TPLEFTN   40,3153      433    3  419   433   TSENSE    17,2144    1443    1 1443         TURNON    17,3125     1456
TPMODE    10,3633     1398   11  576  1191   TSIGHT    E7,1561  =  145   17  258   979   TURNONBT     4753  =    86    1  526
TPREV     E5,1761  =   125    2 1195  1196   TSIGHT1   14,3162     943    1  941         TURNONFL     0302  =    86
TPSL1        4404      462    6  423   433   TSKOVCDR  01,3520    1132    1 1132         TVEC         0032  =  1247    4 1235
TPUSH     00,3272     1077    1 1077         TSL&TCJ   30,3617     921    1  921         TWEEKIT      0050  =  1204    4 1182  1196
TR*GL**P  23,3560     1260    1 1260         TSLC         7616    1044    1 1011         TWELVF       5751  =  1484    1 1481
TRACE1    40,3236      441                   TSLCLOOP  00,2201    1052    1 1052         TWIDDLE      5173     1119   26  375   966
TRACE1S   40,3247      441                   TSLCTEST  00,2207    1052    1 1052         TWO          4752  =  1099  109   37  1505
TRACKBIT     4747  =    68   14  280  1315   TSLC2     00,2172    1052    1 1044         TWOPI     35,3731      684    5  622   673
TRACKFLG     0031  =    68    6  287   709   TSNEXTP   16,3014    1430    4 1429  1430   TX0       E7,1653  =   152    4  152   851
TRAKFWDV  E7,1703  =   150    2  150   900   TSNEXTS   17,2174    1443                   TX789     E7,1471  =   145    3  145  1157
TRAKLATV  E7,1702  =   150    5  150   906   TSNUMBRT  17,2164    1443    1 1446         TYPEP     16,3563     1440    1 1440
TRANSM1   E4,1400  =   117    2  117   386   TSSL      00,2101    1049    3 1047  1056   TYPEPOLY  17,3231     1458    2 1457  1458

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T1TOT2    E4,1652      116   6  117  641 UNFVLIM   30,3765      925   1  919      UPEND70   04,3723     1395   1 1392
T2A       30,3022  =   855   1  847      UNFVX/2   E6,1667  =   136               UPEND71   04,3632     1393   1 1392
T2TEST    30,2451      846   2  846  853 UNFVY/2   E5,1671  =   136   3  912  913 UPEND72   04,3664     1394   1 1392
T2TOT3    E4,1654      116   5  316  641 UNFVZ/2   E6,1673  =   136   3  912  913 UPEND73   04,3536     1392
T3        30,3024      855   1  847      UNIT      00,3023     1070   3  601 1402 UPENT2    10,3544     1374   4 1363 1368
T3RPTBB        4057    154   1  153      UNIT/R/   E7,1536  =   147  39  147  903 UPERROR   43,3740     1388   1 1388
T3RUPT    01,3407     1128   2  153  154 UNITDV    00,3151     1074   3 1072      UPERROUT  04,3760     1396   4 1388 1395
T3RUPT2   01,3414     1128   1 1129      UNITGOBL  E7,1520  =   147   2  780  880 UPFLAG         5504    1375  73  266 1392
T4JUMP    06,2116      159   2  158      UNITNORM  04,3154     1188   1 1188      UPFNDVAC  04,3544     1392   1 1391
T4RPTBB        4064    154   1  153      UNITX     23,2517     1100  13   37 1100 UPJOB     04,3551     1392   1 1392
T4RUP     06,2000  =    29   2  155  156 UNITY     23,2515     1100   5   37  896 UPLIM     12,3277     1194   1 1193
T4RUPT    06,2000      155   2  153  154 UNITZ     23,2513     1100  10   37  880 UPLOADNV  04,3516     1391   2 1389 1390
T5ADR          1274    105   5  153 1491 UNKNOWN        0007 =   193               UPLOCBIT       4750 =    78   3 1339
T5TEMP         0061 =  137   1 1419      UNLX/2         0024 =   150               UPLOCKFL       0164 =    78
T6ADR          4055    154   1  153      UNLRB/2        0024 =   150               UPMNSVCD  04,3242     1226   1 1225
T6FURTHA  E6,1470      130  11 1404 1457 UNP36     E4,1514  =   118   3  701      UPNEG          7551    1043   1 1043
T6JOB     17,2033     1404               UNRM      E4,1660  =   117   7  668  677 UPOK      04,3350     1339
T6JOBCHK  17,2027     1404   2 1404 1405 UNSETR1   10,3360     1369   1 1368      UPOLDMOD       1171 =   104   3  104 1394
T6NEXT    E6,1466      130  12  219 1457 UNSUSPEN  40,3477      450   1  450      UPOUT     04,3711  =  1394   7 1389 1396
======================================== UNVEC     E7,1543  =   141   5  647  648 UPOUT4    04,3712  =  1391   3 1390
U=SCAXIS  27,2134      482   1  482      UNWC/2    E6,1661  =   136  10  136  912 UPPART2   04,3401  =  1389   1 1389
UAXDIST        0141 = 1505   2 1502 1503 UNWCLOOP  31,3410      813   1  813      UPPART3   04,3562  =  1392
UAXIS     20,3316     1408               UNWCTEST  30,3523      919   2  913      UPPOS          7551    1043   1 1043
UCSM      E7,1636  =   148   3  148  494 UNX/2          0000 =   136   7  912  919 UPPSV     24,2316      499   2  498  510
UDB1           0135 = 1505   2 1502 1503 UNY/2          0006 =   136   1  913      UPPSV1    24,2336      500   1  500
UDB2           0136 = 1505               UNZ/2          0014 =   136   8  912  913 UPPSV3    24,2370      500   1  500
UDB3           0140 = 1505               UNZ2      06,2313      165   1  166      UPPSV4    24,2351      500   1  501
UDB4           0137 = 1505   2 1502 1503 UPACTOFF  04,3765     1396   2 1395 1396 UPPSV5    24,2333      500   1  500
UERROR    E6,1751  =   131   3  131 1452 UPBUFF         1174 =   104  29  204 1395 UPRATE    32,3647      834   1  834
UHYP      E7,1717  =   151   7  151  902 UPCOUNT        1173 =   104   5  104 1390 UPRPTBB        4060 =   154   1  153
UHZP      E7,1725  =   151   6  120  903 UPDATBIT       4745 =    67   1  506      UPRPT1    04,3331     1339
UJETCOM   E6,1770  =   137   4 1412 1509 UPDATCHK  33,3155      684   2  874  875 UPRUPT    04,3317     1339   1  153
ULC       E7,1723  =   145   8  145  585 UPDATEVG  36,3611      761   2  757  762 UPSTORE   04,3520  =  1391   1 1390
ULLAGER        4746 =   88   3  743 1443 UPDATE2   04,2000  =    28   2 1225 1389 UPSVFLAG  E3,1501  =   110   6  110 1226
ULLAGFLG       0314 =   88   2  224  743 UPDATFLG       0027 =    67  15  287  727 UPTEMP         1167     104  12  104 1394
ULLAGOFF  36,2562      740   1  241      UPDATIME  42,2016      275   1  275      UPTEST    04,3371     1339   2 1339
ULLGNOT   36,2325      736   5  731  736 UPDATNN   41,2320      411   3  439  454 UPTHROT   32,3667      834
ULLGTASK  36,2346      737   3  239  746 UPDATOFF  43,3061      289   1  263      UPTHROT1  32,3701      834   1  835
ULOS      E4,1710  =   117   6  667  675 UPDATRET       0117 =    96   3  411  412 UPTMFAST  06,2676      179   1  181
UMPAC+    00,3170     1074   2 1074      UPDATVB   41,2340      411  10  404  454 UPVERB         1172 =   104   5  104 1392
UMPAC-    00,3162     1074   2 1074      UPDAT1    41,2345      412   2  411  443 UPVERBSV       1166     104   2 1388 1389
UN        E5,1673  =   125   9  125 1199 UPDNLIST  05,2407  =   193               UPVERIFY  04,3463     1390   3 1390 1391
UNAJUMP   00,2000     1013   1 1010      UPDTCALL  22,3206      368   1  367      UPVEFYNV  04,3517     1391   1 1390
UNFC/2    E6,1653  =   136  19  136  910 UPDTMEND  42,2032      275               UPWAKE    04,3554     1392
UNFV/2    E6,1667  =   136   5  136  910 UPDTPHAS       4756 =  1391   1 1392      UP1       E4,1660      116  11  117  648

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES

UP21        4362  = 1391     1 1390           VACT1     E7,1471      141     4  144   642 VBTERM    40,3450      448     2  409   455
UP70        4755  = 1389     1 1388           VACT2     E7,1513      141     3  636   648 VBTSTLTS  41,3613      467     1  409
UP71        4753  = 1389     1 1388           VACT3     E7,1543      141    13  141   697 VBUF         0122       96    71   96  1505
UP72        4752  = 1389     1 1388           VACT4     E7,1565      141     6  142   636 VBZERO    43,2130      265     1  262
UP73        6245  = 1389     1 1388           VACX      E4,1537  =   114     1  114       VB04N12   26,2117      340     1  339
UR          0000  =  489     1  488           VACY      E4,1541  =   114     1  114       VB05N06   15,3651      982     1  976
URATEDIF  E6,1426 =  130     5 1447  1449     VACZ      F4,1543  =   114                  VB05N09      5006  =   930     3  941   977
URP         0006  =  489     2  488           VAC1         0401      100                  VB06N18   26,2120      340     1  340
URPV        0016  = 1247    11 1234  1248     VAC1ADRC  05,3353      222     1  221       VB06N98   37,2472      381     1  381
URRECT    E5,1646 =  125     4  125  1179     VAC1USE      0400      100     4  221  1106 VB56CADR     6025      593     1  593
UR1       E5,1721 =  125    11  125  1199     VAC2         0455      100                  VB6N5     14,3326      947     1  946
USEADD    41,2105    407     1  407           VAC2USE      0454      100     3  221  1106 VB64      43,2700      280     1  262
USECOS    30,3654    922     1  922           VAC3         0531      100                  VB67      31,2000  =    34     1  608
USEGTS    33,2336    862                      VAC3USE      0530      100     3  221  1106 VB67A     30,2000  =    34     1  610
USEJETS   33,2375    863     4  862           VAC4         0605      100                  VB97DEX      4765  =   745     1  742
USEMAXDT  13,3334   1218     1 1219           VAC4USE      0604      100     3  221  1106 VB99DEX      4760  =   745     1  737
USEPIOS   13,3001   1212     1 1212           VAC5         0661      100     1 1308       VCV       E3,1542  =   110    21  110  1240
USEQRFLG    0304  =   87                      VAC5USE      0660      100     3  221  1105 VCVCSM    E3,1614      111     1  578
USEQRJTS    4732  =   87     6  760  1491     VAD          6751     1026     1 1011       VCVLEM    E3,1666      111     2  500   578
USERPRIO    0163  = 1373     3 1359  1369     VALMIS    37,2263      377     1  388       VDB       17,2504     1448     1 1448
USEVF     33,3466    888     1  888           VALTCHK   33,3514      889     3  886   889 VDEF      00,3232     1077     1 1013
USPRCADR    4713    1000     7  601  1260     VAL67     05,2043       52     3  985   986 VDG       E5,1410  =   826     1  809
UT        E7,1672    143    10  143   769     VAPFG     E5,1444  =   121     1  121       VDGVERT   E7,1644  =   150     3  800   818
UTIME     21,3705   1509     1 1508           VAPFG*    E5,1460  =   121     1  121       VDG2TTF   E5,1424  =   826     1  807
UV          0154  = 1506     7 1498  1505     VAPREC    E7,1505  =   141     2  667   670 VD1          4360      461    15  222  1099
UXVECT    E7,1717 =  144     7  144   592     VARADAR   25,2047      491     1  490       VE        E4,1664  =   119     6  119   846
UXVECTPR    0014  =  593     3  590           VARALARM     5744     1384     4  180  1332 VEARTH    E5,1706  =   123     6  123   962
UYVECT    E7,1725 =  144     6  144   592     VARDELAY     5224     1119    11  164  1312 VECAGREE  00,3010     1069     4 1066  1402
UYVECTPR    0022  =  593     2  590           VARIANCE  E5,1706  =   126    12  126  1150 VECANG1   26,2403      483     1  482
UZ          0024  = 1247     2 1234  1235     VATT         0006  =  1247    25  565  1224 VECANG2   26,2405      484     1  482
U1POS     22,2250    354     1  354           VATT1        0024  =  1247    14  268   806 VECLEAR   27,2043      481     1  481
U2        E5,1711 =  125     5  125  1198     VBAD      33,3665      893     1  892       VECOFANG  22,2723      362     2  362
U2POS     22,2224    354     1  354           VBCOARK   43,2171      267     1  262       VFCPNT1   27,2032      431     1  518
U3POS     22,2274    355     1  355           VBFANDIR  41,2146      408     1  408       VECPNT2   27,2035      481     1  481
=========================================     VBIAS     E5,1630  =   122     3  800   813 VECPOINT  27,2040      481     3  340   474
V         E7,1526 =  147    21  147   902     VBPROC    40,3442      448     5  409   456 VECPT     27,2000  =    33     1  480
V(CSM)    E3,1725 =  120     7  598   832     VBRELDSP  40,3461      450     1  398       VECQTEMP  E6,1725  =   136     4  481   433
V-OTHER   E3,1725    111     5  120   321     VBRESEQ   40,3457      449     1  409       VECSGNAG  10,3772     1402     2  209
V/SC        7624    1045     1 1011           VBRFG     E5,1410  =   121     2  121   826 VECSHIFT  23,2416      698     3  634   647
V/SCDV    00,2750   1068     3 1[illegible]   VBRFG*    E5,1424  =   121     2  121   826 VECTAB    E4,1531  =   114    10  114  1245
V/SC1       7632    1045     1 1045           VBRQEXEC  41,3466      447     1  409       VECTABND  E4,1574  =   114
V/SC2     00,2654   1066     1 1045           VBRQWAIT  41,3512      448     1  409       VEC1      E5,1722  =   124     7  970   982
VACDSP    10,2657   1361     1 1361           VBSP1LD   41,3006      427     2  425   426 VEC2      E5,1730  =   124     6  970   982
VACFOUND  01,2620   1106     5 1106           VBSP2LD   41,3007      427     2  425   426 VEHUPBIT     4744  =    67
VACSTOR   07,2526    258     1  255           VBSP3LD   41,3010      427     1  425       VEHUPFLG     0026  =    67    13  288  1156

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SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H        REFERENCES

VELCHK    25,3231       556    1  556       VINJNOM   23,2455       842    1  839       VPD          0000  =  940
VELCONV   21,2003        42    2  903  904  VINTFBIT     4751  =   71                   VPDVL        6573    1021
VELDABIT     4745  =     84    2  886  892  VINTFLAG     0071  =   71   27  236 1242  VPPREC    E7,1527  =  141    2  667  670
VELDATA      0255  =     84                 VIPRIME   E4,1736       118    9  653  779  VPROJ        7425    1041    1 1011
VELSC     37,3101       389    1  385       VJETCTR   E6,1771  =    137    3  137 1428  VRATEDIF  E6,1427  =  130    3 1448
VELUPDAT  33,3315       886                 VLAUN     E5,1510  =    128    5  386  387  VRECT     E3,1510  =  110   11  110 1240
VERB      40,2354       402    1  398       VLAUNS    E5,1462  =    128                 VRECTCSM  E3,1562     110    2  841  983
VERBFAN   41,2133       408    7  407  410  VLIGHT    25,3664       613    1  612       VRECTLEM  E3,1634     111
VERBMASK     4144  =   1372    1 1357       VLITE        4751  =    613    2  613  829  VRIGHT2   00,2242    1054    1 1054
VERBNCUN  E7,1615       141    6  630  730  VLOAD        6505      1019    1 1011       VROTATEX     7420    1040    3 1050 1072
VERBREG      1001       101   20  222  458  VLOAD*       6107  =   1099    1 1018       VROUND       7140    1032    6 1040 1041
VERBSAVE     1041       102    3  407  446  VLOADCOD     4735  =   1099    1 1018       VRTSTART  31,2536     800    1  801
VERBTAB   41,2151       408    1  408       VMAX      E4,1405       113    1  586       VSCALE    32,2201     209    1  208
VERB37    04,2[illegible]  =  28    1  224       VMEAS     E7,1652  =    149    4  149  892  VSELECT   E7,1651  =  149   11  149  896
VERB69    43,2037       262    1  262       VMEASCHK  33,3310       886    5  884  890  VSELECT*     0131  =  122    3  888
VERB85    43,3227       298    1  263       VMIN      E5,1570  =    122    3  122  834  VSHRRND   00,2073    1048    4 1050 1086
VERB86    43,3206       298    1  263       VMODE        6521      1019    2 1041 1077  VSHR2     00,2060    1048    1 1048
VERIFBIT     4751  =     78    1 1391       VMONITOR  21,2620       904    1  907       VSQ       00,3245    1077    1 1013
VERIFLAG     0165  =     78                 VMOON     E5,1722  =    123    8  123  986  VSQSUB    00,3317    1078    3 1070 1077
VERIFYMK  07,2444       255    1  255       VN           1226       105   10  195 1221  VSSL      00,2145    1051    3 1050 1056
VERROI    E6,1752  =    131                 VNCON     43,3130       291    1  290       VSSR      00,2127    1050    1 1054
VERTDISP  31,3527       815    1  799       VNDSPCON  40,3316       443    1  443       VSTILBAD  33,3666     893    1  892
VERTOFFT  37,2231       376                 VNDSPLY   34,3621       730    4  724  727  VSTORE       6443    1017
VERTGUID  31,3531       815    3  798  801  VNLDRCDU  43,2260       269    1  269       VSU          6747    1026    1 1011
VERTSKIP  37,2534       383    1  383       VNLODCDU  43,2225       268    2  268  281  VSUBC     E3,1760  =  112    3  494
VEX       E7,1742       143    3  754  772  VNLODDT   42,2034       275    1  275       VSUN      E5,1714  =  123    7  123  986
VFAIL     33,3575       890    2  887       VNLODGYR  43,2357       273    1  273       VTARGET   E5,1702  =  125    4  125 1197
VFLAG        0062  =     70    4  937  940  VNPLANV   15,2562       962    1  961       VTARGTAG  E5,1701  =  125    5  125 1197
VFLAGBIT     4742  =     70                 VNPOOH    35,3712       683   16  614  679  VTIG      E7,1647  =  142    8  142  769
VFLSHBIT     4752  =     84    1  829       VN0611    35,2060       621    1  622       VTPRIME   E7,1565  =  142    5  663  727
VFLSHFLG     0262  =     84    2  887  890  VN0641    37,2473       381    1  373       VUPDAT    33,3435     888    1  887
VG        E7,1706       143    6  143  771  VN0655    35,2113       622    1  621       VUPDATED  33,3513     889
VGAIN*    27,2455       771    1  780       VN1       E7,1552  =    147    7  147 1224  VV/SC        7627    1045
VGBODY    E7,1501  =    147   10  147  846  VN1645    35,3606       680    7  623  727  VVARMIN   E3,1775     112    1  578
VGDISP    E7,1663  =    142    5  314  771  VN2       E7,1656  =    149    4  150       VVEC      E5,1743  =  125   16  125 1200
VGPREV    E7,1700  =    143    8  240  776  VOK       26,2662       578    1  578       VVECT     E7,1706  =  151   16  151  902
VGTIG     E7,1700  =    143    9  143  773  VOK1      26,2723       579    1  579       VVXSC        7404    1040
VGU       E7,1626  =    149    9  149  815  VOK2      26,2725       579    1  579       VXBEAMNB  E4,1644  =  116    2  116  896
VGVECT    E7,1645  =    152    6  152  846  VONE      E4,1614  =    115    9  705 1271  VXINH        0250  =   83    2  888  891
VHORCOMP  32,3517       819    1  816       VONE'     E4,1567  =    114    3 1271 1277  VXINHBIT     4740  =   83    1  887
VHORIZ    E4,1662  =    119    4  119  819  VOPENED   06,3223       192    1  191       VXM          7337    1038    1 1011
VHY       E7,1704  =    150    4  151  903  VPASS1    E7,1505       141    6  141  642  VXM/MXV      7342    1039    1 1038
VHZ       E7,1705  =    151    4  151  903  VPASS2    E7,1527       141    5  141  647  VXRCM     E7,1703  =  144    3  144  592
VIGN      E5,1472  =    121    2  121  787  VPASS3    E7,1557       141    9  638  729  VXSC         7401    1040    1 1011
VINIT     E4,1730       118   10  652  766  VPASS4    E7,1505  =    144    3  663  727  VXSCAL    33,2016      41

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VXV          7460    1042   2 1011 1267 V06N58SR 34,3637     730   1  727      V3           0030 =  940
VYBEAMNB E4,1636 =  116   3  116  896 V06N59   35,3726     684   1  679      V37       04,2040    227   2  298  447
VYSCAL   33,2014      41              V06N60   31,3760     827   1  815      V37BAD    04,2067    227   1  232
VZBEAMNB E4,1630 =  116   3  116  896 V06N61   36,3146     749   1  745      V37FLAG      0162 =   78   1  864
VZSCAL   33,2012      41   1  886      V06N63   31,3756     827   1  814      V37FLBIT     4746 =   78   3  228 1383
V0           0006 =  940              V06N63*  30,3033     855   1  850      V37KLEAN  05,2652    214   2  230 1383
V00N25       6010 =  209              V06N64   31,3757     827   2  814  815 V37NONE   04,2322    231   1  228
V00N34       4242 =  209              V06N71   07,2625     260               V37N99    04,2037    225   1  225
V01N14   32,2170     209              V06N72PV 24,3134     512   1  511      V37QCAD   04,2364    232   1  231
V01N25   10,3476    1372   2 1360 1362 V06N75   35,2412     631   2  623  628 V37RET    04,2120    228   1  233
V01N46   20,2112     293   1  292      V06N76   30,3034     855   1  839      V37RETAD  04,2366    233   1  228
V01N70   14,3772     956   1  955      V06N79   15,2464     960   1  959      V37XEQ    04,2330    232   1  232
V01N70*  15,2463     960   1  957      V06N79*  07,2626     260   1  261      V37XEQC   04,2357    232
V01N71   07,2330     253   1  246      V06N81   35,3727     684   3  614  678 V41K      14,3564    952   1  950
V04N06   10,3502    1372   1 1362      V06N81SR 34,3640     730   1  727      V43K      43,2745    282   1  281
V04N06SR 34,3634     730   1  725      V06N84   13,2336     711   2  709      V47TXACT  43,2367    274   1  262
V04N12X  43,2635     279   1  277      V06N87   14,3773     956   1  956      V50N00    10,3500   1372   1 1367
V04N1272 23,2037     271   1  271      V06N87*  07,2331     253   1  246      V50N00A   32,2171    209
V05N00M1 10,3515    1372   1 1365      V06N89*  14,2505     933   1  933      V50N16    32,2173    209   1  208
V05N09       5006   1096   6  621 1382 V06N90N  04,3012     702   1  702      V50N25X   43,2636    279   1  277
V06N05   24,2664     507   1  505      V06N93   14,3254     945   1  945      V50N48    01,2336    295   1  295
V06N07   10,3477    1372              V06N99   31,2143     610   1  608      V50PASTE  10,3203   1367   1 1367
V06N11   35,2410     631   1  621      V06N99DS 31,2024     608   1  608      V6N34     24,3665    657   1  655
V06N13   35,2411     631   1  627      V06N9933 31,2051     608   1  608      V6N99PRO  31,2032    608   1  608
V06N16   32,2172     209   2  207      V0647    01,2334     295   1  294      V67       43,3213    298   1  262
V06N16N  04,3011     702   1  701      V1           0014 =  940               V67CALL   31,2007    608   1  298
V06N18   26,2254     475   2  473  474 V1S      E7,1600 =  147  14  147  889 V67CLRF   31,2110    609   1  609
V06N22       5010   1096   4  485  974 V1ST02S  10,3620    1397   4  365 1254 V67FLAG      0160 =   77   3  608  609
V06N33   35,2025     615   2  614  652 V16N20   14,3223     944   1  944      V67FLBIT     4744 =   77
V06N33*  24,2315     499   1  493      V16N40   36,3760     763   1  754      V67SURF   31,2102    609   1  609
V06N33A  30,3035     855   1  838      V16N44   22,3317     714   2  714  717 V67WW     31,2120    609   1  608
V06N33SR 34,3632     730   1  724      V16N45   35,3730     684   1  680      V67XXX    30,2042    610   1  610
V06N34*  14,2170     930   2  928  975 V16N54   37,3407     707   1  703      V70UPDAT  43,3724   1388   1  262
V06N34SR 34,3636     730   1  725      V16N56   40,2076     300   1  299      V71UPDAT  43,3726   1388   1  262
V06N37   35,3723     684   3  622  662 V16N63   14,2445     854   1  853      V72UPDAT  43,3730   1388   1  262
V06N42   35,2026     615   2  614  653 V16N66   43,2633     279   1  278      V73UPDAT  43,3732   1388   4  262 1388
V06N43   24,3664     657   1  657      V16N67   43,2634     279   1  278      V74       43,3045 =  288
V06N43*  31,2215     792   1  791      V16N72   43,2631     279   1  278      V82CALL   22,3242    713   1  283
V06N48   01,2335     295   1  295      V16N78   43,2632     279   1  278      V82CON    43,2754    283   1  283
V06N49NB 24,2665     507   1  507      V16N80   24,3254     516   1  515      V82EMBIT     4752 =   78
V06N51   42,3767     489   1  489      V16N85B  36,3761     763   4  736  757 V82EMFLG     0166 =   78   7  715  720
V06N55   35,3724     684   2  622  682 V16N85C  30,3017     854   1  854      V82FLAGS  E4,1537 =  115   6  115  716
V06N55SR 34,3633     730   1  724      V1683    36,3762     763   1  759      V82GOFF   22,3247    713   1  713
V06N57SR 34,3635     730   1  725      V2           0022 =  940               V82GOFF1  22,3321    714   1  713
V06N58   35,3725     684   1  663      V2FG     E5,1510 =  121   2  121  815 V82GOFLP  22,3267    713   1  714

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V82GOFF    22,3465    717   1  713      WCHVERT    E7,1647 =  150   3  800  815 WSTOR      33,3472    888   3  888
V82GON1    22,3503    717   2  717  718 WDAGAIN    41,3371    443   2  443  444 WSURFPOS   E4,1406    113   2  584  609
V82GON2    22,3536    717   1  717      WDCNT         0137 =   97   5  441  444 WSURFVEL   E4,1407    113   2  584  609
V82GON3    22,3541    718   1  718      WDRET         0115 =   96   9  441  444 WTABORT    01,3363   1125   1 1123
V82PERF    43,2746    283   1  263      WEARTH     26,2020     53   1 1146      WTLST2     01,3374   1127   8 1124 1125
V82REDSP   22,3475    717   1  717      WEIGHT/G      1244 =  105   6  765  774 WTLST4     01,3260   1123   1 1127
V82STALL   22,3300    713   1  714      WHATALM    31,2447    799   1  807      WTLST5     01,3310   1124   1 1122
V83CALL    37,3121    703   1  703      WHATDISP   31,2443    799   1  814      WTLTCADR   01,3774   1308   3 1304 1307
V83PERF    43,2756    283   1  263      WHATEXIT   31,2441    799   2  811      WTRUN      E4,1403    113   2  585  609
V89CALL    26,2022    339   1  264      WHATGJID   31,2431    798   1  807      WVELSTOP   26,3313    584   1  584
V89CALL1   26,2072    340   1  340      WHATOUT    31,2371    796               WWBIAS     E4,1604 =  115  11  317  610
V89PERF    43,2764    284   1  263      WHCHREAD   E7,1745 =  146   2  314  581 WWPOS      E4,1600 =  115  15  298  610
V89RECL    26,2036    339   1  340      WHERETO    31,2244    793   1  793      WWVEL      E4,1602 =  115   9  317  610
V90PERF    43,2773    284   1  263      WHICH      E7,1455    139  30  242  862 =======================================
V97N00     10,3541   1373   1 1367      WHICHADR   32,3764    836   1  832      X             0024 = 1202  22 1175 1190
V99RECYC   36,2777 =  745   1  732      WHIMPER       5644   1383   3  865 1384 XACTALM    43,2114    263   1  269
======================================= WHOCARES   E7,1471 =  140   4  486 1361 XACTO      43,2116    264
W          E5,1400    121  34  121 1242 WHOLECON   42,3534    435   3  434  435 XAD        01,2400   1088   1 1012
W.IND         1257 =  107   4  107  584 WIDEDB     20,2151   1408   1 1407      XAD2       01,2403   1088   2 1088
W.IND1        1260 =  107               WITCHONE   10,3205   1367   3 1359 1363 XCHNYLOC   10,3223   1367   1 1363
WAITABIT   36,2563    740   5  731  733 WIXA          1320    106   5 1153 1155 XCHQADD    10,3015   1364   1 1363
WAITADR       0063 =   95   3 1119 1123 WIXB          1321    106   3 1153 1155 XCHSLEEP   10,2764   1363   1 1364
WAITBANK      0062 =   95   1 1122      WLINIT     26,3251    584   3  576  585 XCHTOEND   10,3222   1367   3 1359 1363
WAITBB        5220   1119   2 1119 1129 WLOOP      12,3013   1189   1 1189      XCHX       01,2372   1088   1 1012
WAITEXIT      0061 =   95   7 1119 1377 WLSRFPOS   26,3274    584   1  584      XCOMMON    12,3066   1190   1 1192
WAITLIST      5203   1119  46  164 1324 WLSRFVEL   26,3311    584   1  584      XDC        E5,1664 =  122  12  122 1256
WAITMASK   10,2760   1363   1 1363      WM         E4,1724 =  120   5  120  883 XDELVBIT      4744 =   69
WAITPOOH   01,3523   1132   1 1122      WMATEND    11,3671   1243   1 1241      XDELVFLG      0045 =   69   8  615  771
WAITTEMP      0064 =   95   3 1127      WMATRXNG   43,3073    290   1  263      XDIFF      12,2163   1176
WAIT2      01,3231   1122   2 1119      WORKTIME   16,2624   1427   1 1427      XDSPBIT       4753 =   73   2 1340 1354
WAKECAD    00,3773   1378   1 1377      WOTEST     05,3763    997   1  991      XDSPFLAG      0112 =   73   1  207
WAKECADR   10,3510   1372   3 1363 1364 WOZERO     05,3605    992   2  992  997 XI            0030 = 1202   7 1176 1195
WAKEPLAY   10,3024   1364   1 1369      WO1        05,3512    991   1  997      XKEP       E3,1552 =  110   3  125 1240
WAKER      00,3765   1377   1 1378      WPLATI     E5,1560 =  128               XKEPCSM    E3,1624    111
WAKESTAL   13,3465   1220   2 1220      WPLATO     E5,1464 =  128               XKEPLEM    E3,1676    111
WAKETEST   01,3044   1111   1 1111      WPOSTORE   26,3276    584   1  584      XKEPNEW    E4,1527 =  114   3  114 1228
WANGI      E5,1436 =  128   1  374      WRDRET        0115 =   96               XMAX          0012 = 1202   9 1175 1178
WANGO      E5,1434 =  128   1  374      WRENDPOS   E4,1400    113   3  117  609 XMIN          0014 = 1202   6 1175 1178
WANGT      E5,1440 =  128   1  128      WRENDVEL   E4,1401    113   2  584  609 XMKRUPT    07,2416    255   1  255
WANTAPS    36,2322    736   1  732      WRITEP        5754   1404   6 1404 1455 XNB        E5,1664 =  123  12  373 1397
WBANK      26,3331    585   1  584      WRITEU        5760   1405   1 1455      XNBADP     37,2476    381   1  373
WCALC      22,2746    364               WRITEV        5771   1405   1 1455      XNBECADR   10,2035   1265   1 1265
WCENTRAL   E6,1743 =  132   2 1473 1474 WRTDESIR   15,3105    971   1  971      XNBPIP     E4,1545 =  114  11  114  913
WCHPHASE      1351    108  14  739  825 WSHAFT     E4,1402    113   2  585  609 XNBPIPAD   33,2414    863   1  861
WCHPHOLD   E7,1621 =  149   7  149  814 WSIZE      26,3437    586   1  584      XORCHK     33,2710    878   1  874

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF     H        REFERENCES        SYMBOL       DEF     H        REFERENCES        SYMBOL       DEF     H        REFERENCES

XORFLBIT     4743  =   84    1  874             YSCI      E5,1714  =  123    1  124             ZONE1     17,3562    1466    2 1463 1466
XORFLG       0253  =   84    1  878             YSCREF    E7,1614  =  147    1  769             ZONE2     17,3553    1466
XOVINFLG     0311  =   87    7  224  878        YSM       E5,1650  =  122    4  122 1253        ZONE2,3   17,3547    1466    1 1463
XOVINHIB     4743  =   87    2  910 1430        YSMD      E7,1614  =  147    6  147  983        ZONE3     17,3555    1466    1 1466
XPREV     E3,1552  =  125    2 1176 1179        YSZERO    07,2177     251    1  251             ZONE3LIM  E6,1556  =  134    1 1466
XRANGE    E7,1642  =  152    5  152  839        YUNIT     12,2002    1101    2   37  968        ZONE3MAX  20,3762    1506    1 1497
XREG         1003     101    5  305  429        YV           1126  =  104   11  104 1243        ZONE4     17,3374    1463
XREGLP       1006     101    3  401  429        YZCHK     07,2171     251    1  250             ZONE4,5   17,3363    1462
XPOT      26,2366     483    1  483             ====================================== ZONE5     17,3426    1463    1 1463
XSCI      E5,1706  =  123    1  123             Z            0005  =   92   24  304 1383        ZON1,2,3  17,3542    1465    1 1462
XSCREF    E7,1606  =  147    3  769             ZACCDOT   20,2751    1490    1 1490             ZOOM      17,2022  =  742    2  240  742
XSM       E5,1642  =  122   24  122 1253        ZAPTJ     21,3667    1509    1 1509             ZOOMTIME  E7,1422     138    5  240  812
XSMADR    37,2477     381                       ZATTEROR  20,2153    1408   13  285 1448        ZPRIME       0026  =  124    7 1249 1250
XSMD      E7,1606  =  147   15  147  983        ZAXIS1    E7,1725  =  120    6  840  851        ZREG         1005     101    3  407  435
XSQC(XI)     0034  = 1202    5 1178 1184        ZDATA2    21,2270     899    1  907             ZREGLP       1010     101    2  101  435
XSTORE    01,2346    1087    3 1087             ZDC       E5,1700  =  122    5  123 1256        ZRUPT        0015  =   92    2 1428 1458
XSU       01,2411    1088    1 1012             ZDOT      E4,1712  =  120    3  120  845        ZSCI      E5,1714  =  124
XTRANS    17,3063    1455    3 1445 1453        ZDOTD     E4,1676  =  119    6  119  845        ZSCREF    E7,1622  =  148    1  769
XUNIT     12,2004    1101    8   37 1136        ZERDUMMY  E7,1646  =  149    2  149  150        ZSM       E5,1656  =  122    2  122 1253
XXXALT    E7,1670     142    4  142  695        ZERLINA      1254  =  105    4  106  821        ZSMD      E7,1622  =  147    5  148  983
XYMARK    E7,1551  =  145   18  145  957        ZERO         4755    1095  320  157 1510        ZSPCR     15,2413     959    1  958
X1           0046  =   93   70  252 1400        ZERO/SP   23,2521  =  593    1  566             ZUNIT     12,2000    1101    5   37 1237
X1INPUT   E7,1611  =  142                       ZEROANS   00,3376    1079    2 1079             ZV           1134  =  104    8 1238 1243
X2           0047  =   93   29  487 1272        ZERODATA  21,3050     907    1  900             Z1TEM        0131  = 1505    4 1501 1502
X789      E3,1700     111    5  196 1157        ZERODP    12,2006  = 1101                       Z123      23,2543    1149    1 1150
======================================= ZEROENBL  16,3205    1434    2 1434             Z123COMP  17,3526    1465    3 1463 1465
Y         E4,1734  =  120    4  120  854        ZEROHIGH  21,3454    1481    1 1481             Z3TEM        0152  = 1506    1 1497
YAW       E4,1762  =  120    3  120  840        ZEROICDU     5457    1309    4  165 1311        Z5TEM        0132  = 1505    4 1500 1501
YAWANG    E4,1602  =  119    2  487  488        ZEROING   37,2367     379    2  373  383        ======================================
YAWDUM    30,2232     840    1  840             ZEROING1  37,2371     379    1  379             0.35356   20,3100    1494    2 1488 1489
YCO       E7,1632  =  152    6  152  848        ZEROLOOP  21,3616    1483    2 1483             0EBANK    43,3341    1288
YCOMP     27,3312     854    3  834  845        ZEROLSTY  21,3024     906    7  905  906        003140CT     5774    1405    4 1405 1444
YCONS     E4,1746  =  120    3  120  849        ZERONDX   E5,1571  =  128   11  373  383        06SEC     23,2276     520    1  519
YDC       E5,1672  =  122    5  122 1256        ZEROOO    23,2521  = 1157                       074000CT  16,3613    1441    1 1429
YDOT      E4,1710  =  120    5  120  848        ZEROOT    21,3451    1481    2 1481             ======================================
YDOTD     E4,1674  =  119    3  119  845        ZEROPLUS  20,3014    1492    1 1492             1.2SPOT   01,2016     239    4  239  243
YLIM      E5,1572  =  122    2  122  834        ZEROTJ    17,2571    1449                       1.3SPOT   01,2024     239    1  239
YMKRUPT   07,2422     255    1  254             ZEROVEC   12,2006    1101   14   37 1246        1.5SECS   26,3714     593    1  589
YNB       E5,1672  =  123    6  374 1253        ZEROVECS  23,2521    1100   19   37 1157        1.95SECS  33,3143     883
YNBPIP    E4,1553  =  114    4  114  852        ZI        E5,1642  =  126   25  126 1158        1-CSTH    E5,1733  =  125    4  125 1194
YNBSAV    E4,1636  =  116    4  116  981        ZIXA         1322     106    4 1153 1155        1/.03        4733  = 1506    3 1498 1500
YOK       32,3661     834    1  834             ZIXB         1323     106    4 1153 1155        1/ACCFIX  06,3236     192    1  191
YRATE     E4,1752  =  120    5  120 [illegible] ZNB       E5,1700  =  123    6  374 1253        1/ACCJOB  20,2454    1486    2  192 1407
YREG         1004     101    3  426  434        ZNBPIP    E4,1561  =  114    1  913             1/ACCONT  20,3231    1497    2 1489 1491
YREGLP       1007     101    2  101  434        ZNBSAV    E4,1644  =  116    3  979  981        1/ACCRET  20,3671    1504    2 1491 1503

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF    H        REFERENCES   SYMBOL       DEF    H        REFERENCES   SYMBOL       DEF    H        REFERENCES

1/ACCS    20,2457     1486    2  863 1486 10VSQRT2  42,3770      489    2  487      2.17SPOT  01,2051      240
1/ACCSET  20,2447     1486    1 1411      1REV      12,2073     1174    1 1174      2.2SPOT   01,2016   =  239    1  239
1/ACCRAST E6,1573   =  134    1 1462      1SEC         4777     1096   17  270  901 2.21SPOT  01,2054      240
1/ACCSTP  E6,1553   = 1505    2 1498      1SEC+1    43,2640      279    2  276  278 2.3SPOT   01,2027      239    1  239
1/ACC[illegible]T    0127   = 1505    5 1499 1504 1SECX        4777   =  381                2.5SPOT   01,2032      240
1/ANET       0160   = 1506    7 1500 1504 1SECXT    E5,1572   =  128    2  333  384 2.7SPOT   01,2035      240
1/ANET-   20,3712     1504    1 1501      1SEC2D    27,2675      775    1  774      2.7SPT    04,2132      228    1  228
1/ANETP   E6,1551   = 1505    5 1435 1498 1STAR     15,3047      970    2  970  982 2/3       12,3773   = 1246    1 1234
1/ANET1   E6,1567   =  134   13  134 1503 1STOR2ND  10,3163     1366    1 1366      2BLANK    40,2601      405    6  402  458
1/ANET2   E6,1570   =  134    6 1449 1495 1STOTWOS  16,2256     1422    3 1421 1422 2DZERO    12,2006   = 1137
1/ATM1       0123   = 1505   22 1501 1506 1STO2S    10,3614     1397    3  373  959 2EBANK    43,3355     1288    1 1289
1/ATM2       0124   = 1505    4 1500 1501 1TO2&TCQ  30,3652      922    2  922      2INTOUT   40,2732      420    1  417
1/DV0     E7,1570   =  855    2  843      1TO2SUB   10,3644     1398    6 1397 1398 2J        33,2043       45    1  880
1/DV1     E7,1634   =  152    5  152  843 10,11     21,2042      829    2  829      2J3RE/J2  13,2016       46    2 1235
1/DV2     E7,1636   =  152    5  152  843 10SECS    32,3754      836    1  851      2K           4741   = 1099    3 1006 1111
1/DV3     E7,1640   =  152    5  152  843 100CS     33,3146   =  855    2  848  849 2K+3         4444      464    1  464
1/GYRO    06,3507      333    3  328  335 100MRUPT     7727   =  155                2KFT/SEC  33,2707      878    1  889
1/MU         0016   = 1202    4 1174 1193 11DSPIN   40,3404      445    4  403  442 2NDRETRN  22,3117      366    2  366
1/NETMIN  20,3720     1504    2 1501 1505 120D      23,3246     1157    1 1155      2PHSCHNG     5327     1298   10  492  863
1/PIPA    06,3263      326    3  385  966 120MRUPT  06,2041      157    1  160      2PI+3     27,3215      780    2  778
1/PIPADT     1075      103   10  165  965 120MS        5751   =  181                2PI/8     26,3440      587    2  580  582
1/PIPA1   06,3272      326    1  326      13-11,1   41,3726      469    1  468      2PISC     04,3054     1185    2 1175 1192
1/ROOTMU     0022   = 1202    5 1174 1184 13,14,15     7740     1098    5  282 1419 2RNDEND   40,3173      434
1/RTMU    27,2030       46                13,7,2       4615      525    1  524      2ROUND    40,3163      434    3  431  433
1/RTMUE   22,2002       44    2  714  717 130DEG    35,3745      684    1  661      2SEC(17)  30,3022      855    1  855
1/RTMUM   22,2000       44    1  717      14,11,9   06,2171      160    1  157      2SEC(18)  33,3146      883    2  845  855
1/WLFCP   12,3151     1191    1 1191      14MS      17,3107   = 1446    6 1445      2SEC(28)  33,3150      883    1  887
1/10      01,2341      295    1  294      1406ALM   31,3735      826    2  799      2SEC(9)   30,3031      855    1  843
1/10S     17,2343     1446                1406PDO   31,3733      826    1  799      2SECS        5000     1096    8  278 1316
1/10SEC   16,3132     1433                15/16     12,3761     1246    1 1234      2STARS    15,3045      970    1  982
1/2DEG    31,3753      827    1  807      15ADRERS  01,2427     1089    7 1087 1091 2VEXHUST  E7,1742   =  772
1/40      16,3620     1441    4 1423 1425 15BITADR     6252     1009    1 1015      2V1STO2S  10,3635     1398    2  323
1/6TH     14,3771      956    1  955      1500DEC   24,2666      507    2  499  507 20.5DEGS  25,2572      544    1  544
1BITDF    26,2407     6[illegible]4                160CT     30,3577      920    1  920      20J       33,2041       45    1  880
1B1       12,2004   = 1148    1 1138      17TO20    43,3643     1292                20MRUPT      7731   =  159    3  157  160
1DEC70    21,2106      830    1  930      170MS        4361   =  892    1  892      20SEC     32,2176      209    1  208
1DEC71    21,2107      830    1  830      180DEGS   31,3752      827    1  807      200MS     16,3616     1441    2 1427
1DPB2     34,2067      632    2  633  635 180MESS   27,3123      779    1  778      201F04    43,2637      279    1  277
1DPB28    34,2071      632    2  633  638 180SETUP  36,3633      761    1  761      21/22REG     0115   =   96    3  398  470
1JACC     E6,1530      133   11  133 1497 ========================================= 25/32        7716   = 1441    1 1435
1JACCCON  20,3212     1496    1 1495      2.0SPT    04,2130      228                25KFT     33,2677      878    2  850  878
1JACCQ    E6,1531   =  133    6 1471 1495 2.11SPOT  01,2040      240                250DEC    24,2304      499    2  498
1JACCR    E6,1532   =  133    6 1471 1495 2.11SPT   04,2131      228                250MS+1      4766   =  279    1  279
1JACCU    E6,1533   =  133   12 1489 1501 2.13SPOT  01,2043      240                26SECS    36,3757      763
1JACCV    E6,1534   =  133    1 1489      2.15SPOT  01,2046      240                27TO30    43,3651     1292

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT             XX MISCELLANEOUS TROUBLE
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SYMBOL         DEF     H     REFERENCES     SYMBOL         DEF     H     REFERENCES     SYMBOL         DEF     H     REFERENCES

======================================== 4.27SPOT   01,2131     241              504RM      04,2002      45   1 1139
3.2SPOT    01,2016  =  240   1  239      4.3SPOT    01,2073     241   1  239      504RPR        0000  = 1148   4 1140 1142
3.3SPOT    01,2057     240   1  239      4.31SPOT   01,2134     242              526ALARM   24,2102     496   1  565
3.5SEC     27,2677     775   1  774      4.33SPOT   01,2137     242              54DD       23,3244    1157   1 1153
3.5SPOT    01,2062     240               4.35SPOT   01,2142     242              59.99SEC   42,3542     435   1  435
3/32       12,3757    1246   1 1234      4.37SPOT   01,2145     242              59MIN      42,3541     435   1  434
3/4        12,3763    1246   5  958 1246 4.5SPOT    01,2076     241              ========================================
3/4DP      22,3655     827   2  807  809 4.7SPOT    01,2101     241              6.2SPOT    01,2016  =  243   1  239
3/5        12,3745    1246   1 1234      4.9SEC     36,3145     749   1  735      6.3SPOT    01,2175     243   1  239
3/64       12,3753    1246   1 1234      4SEC(17)   30,3020     855   2  773  846 6.5SPOT    01,2200     243
3/8DP      22,3653     827   1  807      4SEC(28)   33,3152     883   1  817      6.7SPOT    01,2203     243
3AXISBIT      4746  =   74   2  473  474 4SECS         5003    1096   2  165  795 6DD        23,3245    1157   1 1155
3AXISFLG      0124  =   74   7  229  255 40CYC      16,3133    1433   1 1435      6FAILTAB   06,3252  =  192   2  191  192
3CSECS     13,3671    1225   1 1224      40CYCL     17,2342    1446   1 1447      6SEC       27,2703     775   2  775
3J22R2MU   13,2024      46               40FPS      05,3504     852   1  852      6SEC(18)   30,3026     855   1  843
3SECONDS   26,3711     593   1  591      42DEG      15,2772     967   1  963      6SECONDS   26,3713     593   1  589
3SECS         5002    1096   1  793      49FPS      23,2453     842   1  840      6SECS      25,3545     562   1  561
30DEG      24,3354     573   1  572      ======================================== 60DEC      05,3065     218   1  213
30DEGCHK   24,3336     572               5.2SPOT    01,2150     242   1  239      60MIN      35,2421     631   6  623  628
30KFT      33,2705     878               5.3SPOT    01,2164     242   1  239      60MS       17,2316    1446   2 1445
30RDMSK    06,2761     181   1  161      5.4SPOT    01,2156     242              60SCNDS    24,2450     503   1  503
33DEC         4254     456   1  456      5.5DEGS       4562     523   2  523  544 600MS      07,3747    1331   1 1314
33RDMSK       5026  =  181   2  167      5.5SPOT    01,2167     242              600SEC     24,3662     657   1  657
34DEC         4242     455   2  209  455 5.7SPOT    01,2172     242              600SECS    13,2630    1210   2  239 1210
35DEG      15,2773     967   1  963      5/128      12,3771    1246   1 1234      63/64+1       7726    1098
35KCHK     33,2721     878   1  874      5/8        13,3711    1247   7 1212 1247 ========================================
360-CDU    40,2625     418   2  418  432 5BLANK     40,2536     404   6  404  457 7.5        33,3144     883   1  887
360-CDUE   40,2634     418   1  418      5BLANK1    40,2557     405              7/12       12,3765    1246   1 1234
360-CDUO   40,2623     418   1  417      5B10       01,2476    1091              70DEC      32,3561     833
360CHECK   12,3122    1191   2 1189      5DEGREES   14,2607     936   2  936  971 77DECML    37,3075     389   1  383
360LAMB    12,3463    1196   1 1193      5DEGTEST   15,3145     971   2  971      77001CCT   05,3064     218   1  212
360SW         0206  =   80   3 1189 1191 5FAILTAB   06,3242  =  192   2  191  192 79DISP     15,2437     959   2  959
360SWBIT      4753  =   80               5MKALARM   07,2454     256   2  255  261 ========================================
399DEC     37,2471     381   1  376      5SEC       36,3756     763   2  735  737 8192AUG    07,3557    1324   1 1324
======================================== 5SECDP     36,3755     763   1  734      82DEGS        4563     523   1  523
4.11SPOT   01,2104     241               5SECS      27,2701     775   2  774      89SECS     27,2705     775   1  775
4.13SPOT   01,2107     241               50FT       33,2703     878              89TEST     40,2161     399   2  398
4.15SPOT   01,2112     241               50KFT      33,2701     878              ========================================
4.17SPOT   01,2115     241               504AZ         0022  = 1148   3 1146      9/16       12,3767    1246   1 1234
4.2SPOT    01,2065     240   1  239      504F          0006  = 1148   5 1144 1145 9,6,4      05,3364     223   1  216
4.21SPOT   01,2120     241               504LM      E4,1412     113   3 1140 1234 90SECS     06,3005     181   2  164
4.23SPOT   01,2123     241               504LPL        0016  = 1148   4 1147      99999CON   32,3255     789   1  786
4.25SPOT   01,2126     241

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF    H PAGE       SYMBOL      DEF    H PAGE       SYMBOL      DEF    H PAGE       SYMBOL      DEF    H PAGE

+AZ       11,2356     821       AUTRATE1     4753  =   88       CDUREADI  E5,1442  =  127       DEG60     15,2471     960
+EL       11,2370     821       AUTRATE2     4752  =   88       CDUSCMD      0054  =   92       DELRSPL   22,3541  =   37
=======================       AUTR1FLG     0321  =   88       CDUTIMEF  E5,1436  =  127       DELTEE    E7,1611  =  141
-AZ       11,2351     821       AUTR2FLG     0320  =   88       CDUTIMEI  E5,1434  =  127       DELVMID   E7,1575  =  141
-EL       11,2363     821       AUXFLAG      0147  =   76       CHAN      E5,1443  =  127       DELVTEST  27,2252     765
-LLKOLFG  23,2040     271       AVEMDBIT     4753  =   81       CHKBIT10  17,2205    1444       DERCOF+1     0153  =   98
-MUDT1    33,2033      44       AVERAGEG  33,2267     861       CHKLIST   05,3532     992       DERCOF-1     0151  =   98
=======================       AVFLBIT      4747  =   69       CHKSAB    14,3261     946       DERCOF-2     0150  =   98
?            6001  =  749       =======================       CKIMUSE      5244    1121       DERCOF-3     0147  =   98
=======================       BADROOT   31,3656     825       CKMDMODE  43,3740  = 1388       DERCOF-4     0146  =   98
ABORT        5644  = 1384       BDTOK     27,2461     771       CKPNDBIT  43,2666     280       DERCOF-5     0145  =   98
ABVAL     00,3201    1075       BHIZ      01,2452    1090       CL1/NET+  20,3462    1500       DERCOF-6     0144  =   98
ACCOKFLG     0317  =   88       BIASTEMP  E6,1711  =  135       CNGL      22,2400     357       DERCOF-7     0143  =   98
ACMODBIT     4737  =   68       BIGAOS    20,3341    1498       CNTCHK    07,2235     252       DERCOF-8     0142  =   98
ACOSABRT  00,3723    1086       BIT14+7   26,2252     475       CNTRCHK   43,3466    1289       DESIGFLG     0271  =   85
ADDRESS      0103    1004       BIT4H     30,3030     855       COARFINE  14,3360     347       DEX2         0144  =   98
ADPS+1    43,3625    1292       BIT8,9    17,3111    1456       COFMAXGO  22,2176     353       DFRNT     40,3364     445
AFCCALC2  31,3214     809       BLANKCHK  10,3132    1366       COGAFBIT     4750  =   80       DGOOD?    32,2741     604
AFDUMP    31,2223     793       BLANKRET     0114  =   96       COMPMAT   13,2237     710       DIDFLAG      0020  =   67
AGSBUFFE  E4,1615  =  117       BNKCHK    43,3716    1293       CONTDES2  26,3576     590       DIMOBIT      4753  =   71
AGSDISPK  32,2022     207       BNKOPTN   43,3315    1287       CONV3     42,3625     487       DMENFBIT     4743  =   74
AGSLIST   05,2407  =  193       BRSPOT1   31,2617     802       COPYCYC2  33,2627     877       DNLRALT      1341  =  107
AGSUPDAT     0001  =  236       BRSPOT2   31,2702     804       CORFOUND  01,2636    1107       DNLSTADR     0332  =   99
ALCGKK    37,2627     385       BRSPOT3   31,3057     807       COUNTPL   E5,1542  =  127       DOALARM      5155  = 1384
ALGORTHM  21,3143    1473       BRSPOT4   31,3243     810       CSMDKFLG     0305  =   87       DOALIGN   15,3121     971
ALINEX    26,2067     339       BUSYMASK  10,3527    1372       CS359+    35,2415     631       DODNADR   05,3524     991
ALKCG     37,2632     385       BUTTONS   05,2703     215       CULTBIT      4745  =   71       DODNCHAN  05,3572     992
ALMNCADR     5734    1384       B12-1        4356  =  461       CYCLSHFT  43,3475    1290       DORSAMP2  25,2027     490
ALPHATRY  21,3345    1479       B5TOB8    01,2465    1090       C1MP      E6,1723  =  135       DOSHIFT   21,3537    1482
ALRM527   24,2776     510       =======================       C1PP      E6,1721  =  135       DOTIXBR   01,2424    1088
ALTROUT   21,2167     898       CADRMARK     0373     100       C2MP      E6,1717  =  135       DPAGREE      7255    1036
ALTSCALE     0272  =   85       CALCDIR   E5,1460  =  127       C2PP      E6,1715  =  135       DPSBURN   E6,1750  =  131
AMEMORY   E4,1400  =  113       CALCTHET  27,2255     765       C2SQM     E6,1713  =  135       DP0          0036  =  940
ANTENFLG     0267  =   85       CALC2BIT     4752  =   70       C2SQP     E6,1711  =  135       DP1          0040  =  940
AORBSFLG     0315  =   88       CALC3BIT     4751  =   70       =======================       DSKYFLAG     0113  =   73
AOSV      E6,1544  =  133       CALSAM    15,2540     962       DAPDATA3  01,2300     295       DSPDECNR  40,3262     442
APSESBIT     4747  =   79       CDELF/2      0016  = 1268       DAPLRUPT  E6,1754  =  137       DSPLV     41,3413     443
ARCOMF    21,2176     898       CDRVE     06,2012     156       DBSELFLG     0316  =   88       DUMPCNIC  27,3426    1272
ASCSPOT   23,2503     867       CDUANG    E5,1543  =  127       DCDU      E6,1635  =  136       DUMPRPRA  27,3464    1274
ASECXT    E5,1573  =  128       CDUDANG   E5,1440  =  127       DEC-12    12,2016    1101       DUMPTFF1  27,3547    1278
ASENT7    23,2000  =   32       CDUFLAG   E5,1461  =  127       DEC-6     12,2015    1101       DUMPTFF2  27,3644    1279
ASTNCLOK  32,3204     788       CDUINC    10,3660    1398       DEC27        4764  = 1096       DVCNTSET  33,2323     861
ATOPTHIS  13,2734  =   37       CDULIMIT  E5,1443  =  127       DEC29        4765  = 1096       DVMON     33,2314     861
AUTOMANV  26,2166     474       CDUNDX    E5,1536  =  127       DEC51     04,3253    1332       DVMONCON  36,2550     740
AUTOMODE     0301  =   86       CDUREADF  E5,1441  =  127       DEGINSF2  40,3021     431       DXCHIT+1     0125  =   98

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF    H PAGE    SYMBOL      DEF    H PAGE    SYMBOL      DEF    H PAGE    SYMBOL      DEF    H PAGE

D21       E6,1705  =  135    ENTPASHI  41,2012     406    GETRCCT   21,3303    1475    INTVEC    E5,1462  =  128
D6OR9BIT     4752  =   71    EPADFBIT     4737  =   67    GET22/32  21,2552     903    INTYPBIT     4750  =   71
=========================    ERMINUS   40,3647     470    GLOKFBIT     4736  =   70    INTZ      E5,1474  =  128
E/BKCALL  04,2576     370    EP TEST   17,3327    1462    GMBLBITB  21,3635    1484    IFIGCOMP  06,3330     328
E/CALL    04,2615     371    ETPIBIT      4745  =   69    GN/CCODE     5001    1096    ISSUP     06,2321     165
E/JOBWAK  04,2631     372    EXOVFLOW  31,3441     813    GOAGIN    10,3050  = 1372    ISSWOFF   06,2716     173
E/SWITCH  04,2613     370    EXSPOT1   31,3316     811    GOCLOSE   21,3625    1484    ISWCALL      4700    1000
EARTCNTR  14,2522     935    EXVERT    31,3436     813    GODSP     10,2443    1357    ITRPNT1   32,3354     817
EIGHT        4750  = 1099    E0        E7,1676  =  145    GODSPP1   10,2452    1357    ITRPNT2   32,3510     819
END-E3    E3,1777  =  112    E02       E4,1636  =  116    GODSP2    10,2444    1357    ITR0         6370    1014
END-E4    E4,1757  =  119    E1        E7,1700  =  145    GOGOMARK  10,2405    1356    ITR1         6357    1014
END-E5    E5,1774  =  128    E3        E7,1704  =  145    GOMARK2   10,2337    1355    ITR10        6142    1005
END-E6    E6,1771  =  137    =========================    GOMARK2R  10,2356    1355    ITR11        6202    1006
END-E7    E7,1777  =  152    FALTOF       4370     461    GOMARKS   10,2331    1355    ITR12        6134    1005
END-E7.0  E7,1745  =  152    FAZA1     23,2775    1154    GOPERFRS  10,2705    1362    ITR14        6237    1008
END-E7.1  E7,17 7  =  152    FAZB1     23,3073    1155    GOPERFS   10,2625    1360    ITR15        6123    1005
END-E7.2     4000  =  152    FDAIY     E4,1745     118    GOPERF1R  10,2703    1362    ITR7         6261    1009
END-E7.3  E7,1630  =  152    FDAIZ     E4,1746     118    GOPERF2   10,2630    1360    ITSWBIT      4735  =   77
END-E7.4  E7,1777  =  152    FFTAG11      4000  =   28    GOSERV    33,2274     861    =========================
END-E7.5  E7,1655  =  152    FFTAG12      4000  =   28    GOXDSP    10,2330  = 1372    JAMPROC      4243     456
END-IN/M  E7,1772  =  142    FFTAG13      4000  =   28    GOXDSPR   10,2350  = 1372    JETSON    17,3402    1463
END-UF       1357  =  108    FIGTIME   35,3046     668    GRP4OFF   32,3704     835    JSWCHBIT     4736  =   65
ENDBALL   26,2346     478    FINALBIT     4746  =   69    GTSGO+ON  21,3113    1472    =========================
ENDCHKG   37,2366     379    FINEK2    43,2347     273    GUESS     37,2020     373    KAOS      16,2623    1427
ENDDAPT4     5270  =  189    FIREP     16,3041    1431    GUESSBIT     4752  =   68    KEYCOM    04,3303    1338
ENDHMSS   42,3606  =  436    FI EQR    17,2225    1444    GUESS1    37,2255     377    KLEENEX   10,2333    1355
ENDL H    34,3744     893    FIRSTTME  27,3171     779    GUILDEN   31,2467     800    K1        E6,1703  =  135
ENDMANUV  26,2174     474    FIXCLPAS  40,2402     402    GYTOBETQ  E5,1462  =  127    K2        E6,1711  =  135
ENDMARKS  07,2317     253    FLAGORGY  32,3017     785    G21       E6,1707  =  135    K3        E6,1717  =  135
ENDNVBSY  04,2655     464    FLAPBIT      4744  =   81    =========================    K3S1      22,2370     357
ENDPASTE     4143     439    FLASHH?   21,2025     829    IC FK2    43,2214     2 8    K4        22,2372     357
ENDPINBF     4512  =  465    FLPCBIT      4740  =   80    IDADDTEM     0142  =   97    K4SQ      22,2374     357
ENDPINS1  40,3674  =  471    FLPIBIT      4741  =   80    IDAD3TEM     0152      98    =========================
ENDPINS2  41,3731  =  469    FLVRBIT      4736  =   80    IDLERET1  10,3301    1368    LASTLADW  E7,1745  =  151
ENDRMODF     4616  =  525    FREERET      0144  =   97    IG        E6,1725  =  135    LASTTIME  01,3501    1132
ENDROLL   22,3226     369    FSPASBIT     4742  =   65    IGNALG    32,3031     785    LATAZCHK  37,2021     373
ENDRQDAT  41,2316     411    FUELNEED  E7,1666  =  150    IGNALGRT  32,3202     788    LATFWDV   21,2562     903
ENDSPOCT  40,3415     445    FUNCT3    21,3252    1475    IMMEDRET  10,3367    1370    LEMONM       0056  =   93
ENDSTEER  3 ,36 6     761    =========================    IMUBACK   37,2005     373    LOS1      E5,1444  =  127
ENDS40.9  27,2725     776    GDUMP1    31,3453     813    IMUFIN20  07,3210  = 1331    LOS2      E5,1452  =  127
ENDVPUSH     6540    1020    GENMARK   10,3021    1364    IMUGOOD   07,3636    1327    LOTEMIN      0124  =   96
END2DEC   40,3305     442    GEOIMUTT  37,2004     373    IMUZERO3  07,2766    1311    LOUNITX   12,2004  =   37
ENGONFLG     0123  =   74    GEORGEK   37,3111     389    INFINBIT     4745  =   79    LOUNITY   12,2002  =   37
ENTERDAT  07,2073     246    GEOSTRT4  37,3025     388    INTFLAG      0227  =   82    LOUNITZ   12,2000  =   37
ENTERQR   17,2416    1447    GETAOSUV  20,3242    1497    INTOTHIS  13,2300     710    LRALTFLG     0276  =   86

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                    3:15 DEC.  2,1970                    PAGE 1566

UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL       DEF    H PAGE       SYMBOL       DEF    H PAGE       SYMBOL       DEF    H PAGE       SYMBOL       DEF    H PAGE

LRPOSCHK  25,3220      556       NEGTORKU  E6,1516  =  133       OMEGCALC  26,3610      591       POWFLIT1  23,2000  =   32
LRPOSFLG     0275  =    86       NEGTORKV  E6,1520  =  133       OPTAXIS   07,2142      248       PREBJUMP     5316     1294
LRS24.11  26,3471      589       NEGTOTKP  E6,1514  =  132       OPTION3      1146      104       PRECIBIT     4744  =   71
LRUPT        0011  =    92       NEG100       5172     1116       OPTNBIT      4745  =   69       PRIODFLG     0075  =   72
LRVELBIT     4744  =    86       NEG5      41,2115      408       OPTNREG   E5,1463  =  127       PRIO1        4742  = 1099
LRVELFLG     0273  =    86       NETZERO      6121     1005       ORBMANAD  32,3767      837       PRIO11       5022     1097
L[illegible]     0144  =    97       NEWIBIT      4737  =   79       ORBWFBIT     4746  =   71       PRIO2        4741  = 1099
LUNABIT      4740  =    70       NJETSBIT     4735  =   67       ORDERBIT     4746  =   79       PRIO36       7724     1098
=======================          NO.VJETS  E6,1523  =  133       ORIG      E4,1515  =  115       PROCEEDE  06,2075      158
MANUFBIT     4736  =    77       NOBITS    E5,1442  =  127       ORIGIN    E5,1773  =  126       PRODUCT   21,3525     1482
MANUFLAG     0152  =    77       NOMDNLST  05,2172  =  193       OTHSHIP   22,3333      714       PROJ         0022  =  150
MANUSTAL  22,3067      366       NORESET   07,3430     1321       OUPRCFLG     0306  =   87       PRONVBIT     4745  =   73
MARKFO    10,2340     1355       NORFINAL  13,3300     1218       OUTGOAVE  22,3707  =  864       PSKIPADR  16,3623     1441
MASKREG   E5.1534  =   127       NORMSBIT     4742  =   77       OUTLINK      0057  =   93       PSTHIGAT     0251  =   83
MASSMON   33,2233      860       NORMSCI   16,3614     1441       =======================          PULSEFLG     0303  =   87
MDOTAPS   36,2010       38       NORMTEST  00,3512     1081       P-RATE    16,2510     1425       PULSEM    14,3230      945
METHOD2   22,2216      354       NPMIDBIT     4737  =   72       PARAM30   35,2017      614       PUTXY     41,2714      426
MGLVFBIT     4752  =    75       NPMIDFLG     0076  =   72       PDA          0026  =  124       PUTXYZ    41,2632      425
MIDAVBIT     4752  =    81       NRMNVBIT     4744  =   72       PERFCHEK  10,3135     1366       P12LMB    30,2122      839
MIDFLBIT     4737  =    65       NRUPTBIT     4750  =   73       PHI          0024  =  520       P20LEMB7  24,2130      496
MID1FBIT     4751  =    81       NRUPTFLG     0107  =   73       PHSBB1    E3,1437      109       P20LEMF   24,2231      498
MKOVFLAG     0110  =    73       NSTEER    36,3672      762       PHSBB2    E3,1441      109       P20LMWT1  24,2241      498
MKVAC     07,2014      244       NTARGBIT     4751  =   76       PHSBB3    E3,1443      109       P20S2     25,2000  =   32
MKVB52    07,2620      260       NVSBWAIT     4445      464       PHSBB4    E3,1445      109       P21       E6,1703  =  135
MKVB53    07,2617      260       NVSUBCOM     4170      452       PHSBB5    E3,1447      109       P25LEMWT  24,2435      503
MODE71    05,3500      832       NWAITBIT     4742  =   72       PHSBB6    E3,1451      109       P30N33    35,2004      614
MONIT1    41,3232      437       NWAITFLG     0101  =   72       PHSNAME4  E3,1444      109       P39SWBIT     4743  =   79
MOONBIT      4740  =    65       =======================          PHSNAME6  E3,1450      109       P41FJET   36,3303      755
MRKIDBIT     4735  =    72       OCT00010     4750  =  232       PHSPRDT5     1064      102       P41MANU   36,3215      754
MRKIDFLG     0074  =    72       OCT02100  06,3131      187       PHSPRDT6     1066      102       P41NORM   36,3312      756
MRUPTBIT     4747  =    73       OCT10000     4737  =  218       PINBRBIT     4746  =   73       P52E      15,2102      928
MRUPTFLG     0106  =    73       OCT11        4320  = 1095       PINTEST   43,2002  =  466       P52V      15,2130      928
MU(P)        0032  =  1247       OCT1103      5710     1383       PIPASCFY  E3,1455      109       P57A      15,3353      975
MUM       13,2004       46       OCT20        4747  =  749       PIPASCFZ  E3,1457      109       P63IGN1   36,2514      739
MUM(-37)  27,2024       44       OCT203    26,2253      475       PIPUSE    07,3273     1318       P65VERT   31,3534      815
MUNRVG    33,3066      882       OCT217       5714     1383       PLUSX     27,2423      769       P66NOW?   31,2564      801
MWAITBIT     4741  =    72       OCT25        4362  = 1099       PMINM     34,2103      632       P67NOW?   31,2474      800
MWAITFLG     0100  =    72       OCT30000     4355  =  218       PON2      37,2240      376       P70INIT   32,3563      833
MXMYMZ    26,2757      579       OCT30002     6471  = 1099       POOH      04,2163      229       P70NOW?   21,2061      830
=======================          OCT40200     7735     1098       POSGMBL   37,2064      374       P71       21,2075      830
NBD3      06,3606      334       OCT40420  10,3536     1373       POSITF    15,3743      986       P71NOW?   21,2046      829
NBPOSPL   37,2012      373       OCT67777  10,3535     1373       POSTORKV  E6,1517  =  133       =======================
NB1NB2    23,2513  =    37       OCT7777   05,3057      218       POSUPDAT  33,3165      884       QUADGUID  31,3121      808
NDCMPTST  41,2436      415       OGF       E6,1717  =  135       POS1/4    12,3755  = 1246       QUALITY2  13,3732     1247
NEEDLE11  20,2334     1418       OLDESFLG     0016  =   66       POS2CHK   33,2502      874       QUALITY3  11,3160     1235

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SYMBOL         DEF  H PAGE    SYMBOL         DEF  H PAGE    SYMBOL         DEF  H PAGE    SYMBOL         DEF  H PAGE

QUITBIT       4747  =   81    R61LEM1    23,2137     518    SINB       E5,1646  =  123    TDECAYFX      4770    1096
==========================    R61LEM2    23,2175     518    SLOPEBIT      4751  =   68    TEMP       E5,1441  =  127
RCDUFAIL      0274  =   86    ==========================    SNAPAGN    05,3633     993    TEMPADD    E5,1440  =  127
RCDUOFLG      0266  =   85    S+2           4752  = 1285    SNAPEND    05,3652     994    TENDAPPR   E7,1424     138
RDIFF      E6,1452  =  132    S+3           6245  = 1285    SNGLCD     22,2376     357    TESTCOS    32,2672     602
RDM        13,3721    1247    S+4           4751  = 1285    SOLNSBIT      4751  =   75    TESTVB     41,2041     407
RDSP       E5,1434  =  127    S+5           4756  = 1285    SOMEAOS    20,3444    1500    TETOTHER   E3,1570  =  111
RECAL3     40,3575     458    S+6           6242  = 1285    SOMEERRP   37,3040     388    TFFCONIC   27,3360    1271
REDOMANN   26,2125     473    S-2           7746  = 1286    SOPTION2   43,3323    1287    TFFSWBIT      4753  =   78
REMODFLG      0265  =   85    S-3           7745  = 1286    SOPTION3   43,3324    1287    TFFTICK    22,3453     716
REPOSMON      0270  =   85    S-4           6112  = 1286    SOPTION4   43,3325    1287    TFI        E7,1453  =  139
REQEXLOC   41,2207     409    SAVE       E5,1464  =  127    SOPTION5   43,3326    1287    TGOCALC    27,2464     771
RERFCALC   17,2646    1451    SAVEFLAG      1072  = 1372    SOPTION6   43,3327    1287    THDUMP     31,2367     796
RGEXIT     E7,1665  =  142    SBIT1         4753  = 1285    SOPTION7   43,3330    1287    TICKTPER   22,3410     715
RHCSCFLG      0313  =   87    SBIT10        4742  = 1285    SOPTON10   43,3331    1287    TIMER      E5,1470  =  127
RLMUNIT       0014  =  593    SBIT13        4737  = 1285    SOUPLY     37,3071     389    TMANUCHK   22,3064     366
RMM        12,2017  =   37    SBIT14        4736  = 1285    SPECSTS    37,2572     384    TMEXITL    05,3704     994
RNGEDATA      0260  =   84    SBIT2         4752  = 1285    SPSCODE       4743  = 1309    TMRESUME   05,3706     994
ROC        04,2143     229    SBIT3         4751  = 1285    STARM         0040  =  124    TRACE1     40,3236     441
ROOTPS+1      0127  =   98    SBIT5         4747  = 1285    STARTDAP   16,2046    1411    TRACE1S    40,3247     441
ROTFLBIT      4746  =   91    SBIT6         4746  = 1285    STARTMNV   26,2172     474    TRUNBO     26,3107     581
RPAD1      23,2314  = 1283    SBIT8         4744  = 1285    STARTSIM   05,2452     211    TSNEXTS    17,2174    1443
RPQFLBIT      4735  =   78    SCALBAD       0261  =   84    STARTSTO      6434    1017    TSSR       00,2025    1047
RRCHECK       4576     524    SCLNORM    17,3112    1456    STARTSW    05,2451     211    TSTPOINT   23,3755    1264
RRDATAFL      0277  =   86    SD         22,2366     357    STATEXIT   E4,1516  =  115    TTFSCALE      4740  =  827
RRLOSVEC      1101  =  571    SECAD      22,2027     351    STCLOK3    36,2665     743    TURNON     17,3125    1456
RRNBBIT       4746  =   66    SEC01         4777  =  763    STDESIG1   25,2616     546    TURNONFL      0302  =   86
RRRSFLAG      0300  =   86    SEC15      36,3750     763    STERN      31,2470     800    T6JOB      17,2033    1404
RSTKLOC    E4,1754  =  119    SEC15DP    36,3747     763    STORHAPO   22,3600     720    ==========================
RUPDATED   33,3307     886    SEC30DP    36,3751     763    STORHPER   22,3612     721    UAXIS      20,3316    1498
RUPTSTOR      0063  =   95    SEC45      36,3754     763    STRATGY    14,2714     939    UDB2          0136  = 1505
RVSWBIT       4743  =   77    SEC45DP    36,3753     763    SUPER100      4745  = 1096    UDB3          0140  = 1505
RWAITK     43,214[illegible]     265    SELFSUPR   40,2000  =   36    S32BIT1       4735  =   75    UNFVX/2    E6,1667  =  136
R21LEM1    24,2733     509    SENSEGET   17,2114    1442    S32BIT2       4736  =   75    UNKNOWN       0007  =  193
R21LEM3    24,2742     509    SETCTR     21,3663    1508    S32BIT3A      4737  =   75    UNLR/2        0024  =  150
R22LEM12   24,2463     504    SETINFL    05,2731     215    S32BIT3B      4740  =   75    UNLRB/2       0024  =  150
R24LEM1    24,3212     515    SETMARK    10,2526    1359    S40.133    27,2647     775    UPDNLIST   05,2407  =  193
R29?       33,2547     376    SETPRIO    10,2510    1358    S40.137    27,2641     775    UPDTMEND   42,2032     275
R30OK      27,3766    1293    SETXFLAG   07,2667  =  851    S50        14,2506  =  935    UPEND73    04,3536    1392
R51.2      14,3055     941    SFCONST1   E5,1467  =  127    S52.2.1    14,3637     953    UPLOCKFL      0164  =   78
R51F       14,3042     941    SFRET      41,3064     428    ==========================    UPOK       04,3350    1339
R55.1      14,3231     945    SFRET1     41,3046     428    TBASE3        1057     102    UPPART3    04,3562  = 1392
R60INIT    32,3176     738    SHAFTBQ    26,3011     580    TCALARM2   43,3264    1286    UPRPT1     04,3331    1339
R61C+L03   23,2133     517    SIGNRET       0125  =   96    TCCSM      E3,1622     111    UPTHROT    32,3667     834
R61C+L1    23,2264     519    SIM2CADR   05,2454     211    TCLEM      E3,1674     111    UPWAKE     04,3554    1392

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE       MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF     H PAGE      SYMBOL      DEF     H PAGE      SYMBOL      DEF     H PAGE      SYMBOL      DEF     H PAGE

USEGTS    33,2336     862       VO6N71    07,2625     260       ========================        30KFT     33,2705     878
USEQPFLG     0304  =   87       V1           0014  =  940       OEBANK    43,3341    1288       360SWBIT     4753  =   80
========================        V2           0022  =  940       ========================        ========================
VAC7      E4,1543  =  114       V3           0030  =  940       1.95SECS  33,3143     883       4.11SPOT  01,2104     241
VAC1         0401     100       V37XEQC   04,2357     232       1/RTMU    27,2030      46       4.13SPOT  01,2107     241
VAC2         0455     100       V50N00A   32,2171     209       1/10S     17,2343    1446       4.15SPOT  01,2112     241
VAC3         0531     100       V67FLBIT     4744  =   77       1/10SEC   16,3132    1433       4.17SPOT  01,2115     241
VAC4         0605     100       V74       43,3045  =  288       1BITDP    26,2407     484       4.21SPOT  01,2120     241
VECTABND  E4,1574  =  114       V82EMBIT     4752  =   78       1SECX        4777  =  381       4.23SPOT  01,2123     241
VEHUPBIT     4744  =   67       ========================        100MRUPT     7727  =  155       4.25SPOT  01,2126     241
VELDATA      0255  =   84       W.IND1       1260  =  107       120MS        5751  =  181       4.27SPOT  01,2131     241
VELUPDAT  33,3315     886       WCALC     22,2746     364       17TO20    43,3643    1292       4.31SPOT  01,2134     242
VERIFLAG     0165  =   78       WHATOUT   31,2371     796       ========================        4.33SPOT  01,2137     242
VERRCB    E6,1752  =  131       WPLATI    E5,1560  =  128       2.0SPT    04,2130     228       4.35SPOT  01,2142     242
VERTDPFT  37,2231     376       WPLATO    E5,1464  =  128       2.11SPOT  01,2040     240       4.37SPOT  01,2145     242
VFLAGBIT     4742  =   70       WRDRFT       0115  =   96       2.11SPT   04,2131     228       4.5SPOT   01,2076     241
VINTFBIT     4751  =   71       ========================        2.13SPOT  01,2043     240       4.7SPOT   01,2101     241
VLAUNS    E5,1462  =  128       XACTO     43,2116     264       2.15SPOT  01,2046     240       ========================
VPD          0000  =  940       XDELVBIT     4744  =   69       2.17SPOT  01,2051     240       5.4SPOT   01,2156     242
VPDVI        6573    1021       XDIFF     12,2163    1176       2.21SPOT  01,2054     240       5.5SPOT   01,2167     242
VRECTLEM  E3,1634     111       XKEPCSM   E3,1624     111       2.5SPOT   01,2032     240       5.7SPOT   01,2172     242
VSTORE       6443    1017       XKEPLEM   E3,1676     111       2.7SPOT   01,2035     240       5BLANK1   40,2557     405
VUPDATED  33,3513     889       XSMADR    37,2477     381       2DZERO    12,2006  = 1137       5B10      01,2476    1091
VV/SC        7627    1045       X1INPUT   E7,1611  =  142       2FNDEND   40,3173     434       50FT      33,2703     878
VVXSC        7404    1040       ========================        2VEXHUST  E7,1742  =  772       50KFT     33,2701     878
VXSCAL    33,2016      41       ZEROOP    12,2006  = 1101       26SECS    36,3757     763       ========================
VYSCAL    33,2014      41       ZEROD     23,2521  = 1157       27TO30    43,3651    1292       6.5SPOT   01,2200     243
V0           0006  =  940       ZEROTJ    17,2571    1449       ========================        6.7SPOT   01,2203     243
V00N25       6010  =  209       ZONE2     17,3553    1466       3.5SPOT   01,2062     240       63/64+1      7726    1098
V00N34       4242  =  209       ZONE4     17,3374    1463       3J22R2MU  13,2024      46       ========================
V01N14    32,2170     209       ZONE4,5   17,3363    1462       30DEGCHK  24,3336     572       70DEC     32,3561     833
V06N07    10,3477    1372       ZSCI      E5,1714  =  124

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT             XX MISCELLANEOUS TROUBLE
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

 DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL

 0000   92  A            0010 1148  CVECTR       0016 1274  RPER         0027   67  UPDATFLG     0040 1247  TDEC1
 0000  136  UNX/2        0010 1148  DVECTR       0017   67  NJETSFLG     0027   92  TIME4        0040 1268  NRMAG
 0000  235  COSTALIN     0010 1148  SINNODI      0017   92  BRUPT        0030   67  NOUPFLAG     0041   68  LOSCMFLG
 0000  489  UP           0010 1202  ALPHA        0020   67  DIDFLAG      0030   92  TIME5        0041   92  PIPAZ
 0000  940  VPD          0010 1203  COGAMIN      0020   92  CYR          0030   93  CHAN30       0042   69  STEERSW
 0000 1148  504RPR       0010 1204  MIN          0020  124  COSTH        0030  940  V3           0042   92  Q-RHCCTR
 0000 1247  RATT         0011   66  RRNBSW       0020  936  CSUN         0030  987  TIMEP        0042   93  LVSQUARE
 0001   65  JSWITCH      0011   92  LRUPT        0020  987  STMP         0030 1202  XI           0042  125  RCNORM
 0001   92  L            0011   93  DSALMOUT     0020 1202  ROOTMU       0030 1204  COSF         0042 1148  SOB
 0001   93  LCHAN        0012   66  LOKONSW      0020 1268  NRTERM       0030 1268  TFFRTALF     0042 1202  KEPC1
 0001  236  AGSUPDAT     0012   92  QRUPT        0020 1274  RAPO         0031   68  TRACKFLG     0042 1268  TFFX
 0002   65  MIDFLAG      0012   93  CHAN12       0021   67  ERADFLAG     0031   92  TIME6        0043   92  P-RHCCTR
 0002   92  Q            0012 1202  XMAX         0021   92  SR           0031   93  CHAN31       0044   69  IMPULSW
 0002   93  QCHAN        0012 1268  TFFDELQ      0022   67  RODFLAG      0032   92  CDUX         0044   92  R-RHCCTR
 0002  236  RENDEZVJ     0013   66  NEEDLFLG     0022   92  CYL          0032   93  CHAN32       0044   93  LV
 0003   65  MOONFLAG     0013   92  SAMPTIME     0022  124  SINTH        0032  561  DELELO       0044 1158  NORMZI
 0003   92  EBANK        0013   93  CHAN13       0022  150  PROJ         0032 1148  BVECTR       0044 1202  KEPC2
 0003   93  HISCALAR     0014   66  FREEFLAG     0022  593  UYVECTPR     0032 1202  S(XI)        0044 1268  TFFTEM
 0003  236  ORBMANUV     0014   93  CHAN14       0022  936  CMOON        0032 1247  MU(P)        0045   69  XDELVFLG
 0004   65  P21FLAG      0014  136  UNZ/2        0022  940  V2           0032 1247  TVEC         0045   92  INLINK
 0004   92  FBANK        0014  593  RLMUNIT      0022 1148  504AZ        0032 1268  TFFALFA      0046   69  ETPIFLAG
 0004   93  LOSCALAR     0014  593  UXVECTPR     0022 1202  1/ROOTMU     0033   68  SLOPESW      0046   69  OPTNSW
 0004  236  DESASCNT     0014  940  V1           0022 1247  COSPHI/2     0033   92  CDUY         0046   92  RNRAD
 0005   65  FSPASFLG     0014 1202  XMIN         0022 1268  RTERM        0033   93  CHAN33       0046   93  X1
 0005   92  Z            0014 1203  DCOGA        0023   92  EDOP         0034   68  GUESSW       0047   69  FINALFLG
 0005   93  CHAN5        0014 1204  DELINDEP     0024   67  R61FLAG      0034   92  CDUZ         0047   92  GYROCMD
 0005  236  LUNRSALN     0014 1247  TAT          0024   92  TIME2        0034   93  DNTM1        0047   93  X2
 0006   66  P25FLAG      0014 1268  RMAGI        0024  124  THETA        0034 1202  XSQC(XI)     0050   69  AVFLAG
 0006   92  BBANK        0015   66  R10FLAG      0024  150  UNLR/2       0034 1268  TFFNP        0050   92  CDUXCMD
 0006   93  CHAN6        0015   92  ZRUPT        0024  150  UNLRB/2      0035   92  CDUT         0050   93  S1
 0006  136  UNY/2        0015   93  MNKEYIN      0024  520  PHI          0035   93  DNTM2        0050 1148  RPREXIT
 0006  489  URP          0016   66  OLDESFLG     0024 1148  AVECTR       0036   68  DRIFTFLG     0050 1204  TWEEKIT
 0006  940  V0           0016   92  BANKRUPT     0024 1148  MMATRIX      0036   92  CDUS         0051   69  PFRATFLG
 0006 1148  504F         0016   93  NAVKEYIN     0024 1202  X            0036  940  DP0          0051   92  CDUYCMD
 0006 1247  VATT         0016  936  CEARTH       0024 1247  UZ           0036 1202  T            0051   93  S2
 0006 1300  BB           0016  939  CSS          0024 1247  VATT1        0036 1204  DEP          0051 1139  SETREX
 0007   66  IMUSE        0016 1148  TIMSUBM      0024 1268  TFFVSQ       0036 1268  TFF/RTMU     0051 1148  EARTHMXX
 0007   93  SUPERBNK     0016 1148  504LPL       0025   92  TIME1        0037   68  SRCHOPTN     0052   70  CALCMAN3
 0007  193  ERASZERO     0016 1202  1/MU         0026   67  VEHUPFLG     0037   92  PIPAX        0052   92  CDUZCMD
 0007  193  SPARE        0016 1203  COGAMAX      0026   92  TIME3        0040   68  ACMODFLG     0052   93  QPRET
 0007  193  UNKNOWN      0016 1204  MAX          0026  124  PDA          0040   92  PIPAY        0053   70  CALCMAN2
 0010   66  RNDVZFLG     0016 1247  RATT1        0026  124  ZPRIME       0040  124  STARM        0053   92  CDUTCMD
 0010   92  ARUPT        0016 1247  URPV         0026  987  GTMP         0040  940  DP1          0054   70  NODOFLAG
 0010   93  OUT0         0016 1268  CDELF/2      0026 1204  ITERCTR      0040 1148  COB          0054   92  CDUSCMD
 0010 1138  GAMRP        0016 1268  TFFQ1        0026 1268  TFF1/ALF     0040 1202  F1           0055   93  THRUST
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL

    0056   70  GLOKFAIL       0070 1300  TEMPPR         0113   73  DSKYFLAG       0124   98  DXCRIT         0140   97  MATINC
    0056   93  LEMCNM         0071   71  VINTFLAG       0113   96  LASTXCMD       0124 1505  1/ATEM2        0140   97  MAXDVSW
    0057   70  REFSMFLG       0071   95  RUPTREG2       0114   96  BLANKRET       0125   96  MIXTEMP        0140   97  MIXBR
    0057   93  OUTLINK        0071 1300  TEMPG2         0114   96  DSEXIT         0125   96  SIGNRET        0140   97  POLYCNT
    0060   70  LUNAFLAG       0072   71  D6OR9FLG       0114   96  EXITEM         0125   98  DXCRIT+1       0140   98  PWRCNT
    0060   93  ALTM           0072   95  RUPTREG3       0114   96  INTB15+        0126   75  NORRMON        0140 1505  UDB3
    0061   70  NOR29FLG       0072 1300  TEMPP2         0114 1506  DBVAL2         0126   98  ROOTPS         0141   76  MUNFLAG
    0061   95  EXECTEM1       0073   71  DIMOFLAG       0115   74  SNUFFER        0127   75  SOLNSW         0141   97  DSREL
    0061   95  ITEMP1         0073   95  DSRUPTEM       0115   96  DECRET         0127   98  ROOTPS+1       0141   97  POLYRET
    0061   95  WAITEXIT       0073   95  KEYTEMP1       0115   96  INTBIT15       0127 1505  1/ACOSTT       0141   97  TEM1
    0061  137  T5TEMP         0073   95  RUPTREG4       0115   96  WDRET          0130   75  MGLVFLAG       0141   98  DERPTR
    0061 1300  TEMPG          0073 1300  TEMPBBCN       0115   96  WRDRET         0130   96  BUF            0141 1505  UAXDIST
    0061 1413  COSMG          0074   65  FLAGWRD0       0115   96  21/22REG       0130   97  INDEXLOC       0142   97  DSMAG
    0062   70  VFLAG          0074   72  MRKIDFLG       0115 1506  DBVAL3         0130   97  SWWORD         0142   97  IDADDTEM
    0062   95  EXECTEM2       0074   95  STATE          0116   74  NOTHROTL       0130  122  ABVEL*         0142   97  TEM2
    0062   95  ITEMP2         0075   66  FLAGWRD1       0116   96  ADDRWD         0130  122  L*WCR*T        0142   98  DERCOF-8
    0062   95  WAITBANK       0075   72  PRIODFLG       0116 1506  DRIFTER        0131   75  RENDWFLG       0142   98  DEXDEX
    0062 1300  TEMPP          0076   68  FLAGWRD2       0117   74  R77FLAG        0131   97  SWBIT          0143   76  REDFLAG
    0063   70  R04FLAG        0076   72  NRMIDFLG       0117   96  CHAR           0131  122  H*GHCR*T       0143   97  COUNT
    0063   71  READRFLG       0077   70  FLAGWRD3       0117   96  DECOUNT        0131  122  VSELECT*       0143   97  TEM3
    0063   95  ITEMP3         0077   72  PDSPFLAG       0117   96  ERCNT          0131 1505  Z1TEM          0143   98  DERCOF-7
    0063   95  NEWPRIO        0100   71  FLAGWRD4       0117   96  POLISH         0132   75  S32.1F1        0143   98  DEXI
    0063   95  RUPTSTOR       0100   72  MWAITFLG       0117   96  UPDATRET       0132   98  RETROOT        0143   98  DEX1
    0063   95  WAITADR        0101   72  NWAITFLG       0117   98  PWRPTR         0132 1505  Z5TEM          0143 1505  DBB1
    0063  137  DINDX          0101   73  FLAGWRD5       0117 1506  ACCRETRN       0133   75  S32.1F2        0144   97  DSPWDRET
    0063 1300  TEMPNM         0102   72  MRKNVFLG       0120   74  RNGSCFLG       0133   97  BUF2           0144   97  FREERET
    0063 1478  NZACCDOT       0102   75  FLAGWRD6       0120   96  FIXLOC         0134   75  S32.1F3A       0144   97  LSTPTR
    0064   71  PRECIFLG       0103   72  NRMNVFLG       0121   74  DMENFLG        0135   75  S32.1F3B       0144   97  RELRET
    0064   95  ITEMP4         0103   77  FLAGWRD7       0121   96  OVFIND         0135   97  DMPNTEMP       0144   97  SEPMNRET
    0064   95  LOCCTR         0104   72  PRONVFLG       0122   96  DECTEM         0135   97  MPTEMP         0144   97  SEPSCRET
    0064   95  WAITTEMP       0104   78  FLAGWRD8       0122   96  DISTEM         0135 1505  UDB1           0144   97  TEM4
    0064 1300  TEMPBB         0105   73  PINBRFLG       0122   96  NOUNTEM        0136   97  DOTINC         0144   98  DERCOF-6
    0065   71  CULTFLAG       0105   80  FLAGWRD9       0122   96  SGNON          0136   97  DVSIGN         0144   98  DEX2
    0065   95  ITEMP5         0106   73  MRUPTFLG       0122   96  VBUF           0136   97  ENTRET         0144 1505  DBB2
    0065   95  NEWLOC         0106   81  RASFLAG        0122 1505  ACCSW          0136   97  ESCAPE         0145   97  NOUNADD
    0065 1300  TEMPSW         0106   82  FLGWRD10       0123   74  ENGCNFLG       0136  406  ENTEXIT        0145   97  TEM5
    0066   71  ORBWFLAG       0107   73  NRUPTFLG       0123   96  HITEMIN        0136 1505  UDB2           0145   98  DERCOF-5
    0066   95  ITEMP6         0107   83  FLGWRD11       0123   96  NVTEMP         0137   76  GMBDRVSW       0145   98  RTNSAVER
    0066 1300  TEMPSW2        0110   73  MKCVFLAG       0123   96  SFTEMP1        0137   97  DOTRET         0145 1505  DBB4
    0066 1476  CHNL12         0110   85  FLGWRD12       0123   96  SGNOFF         0137   97  DVNORMCT       0146   76  NTARGFLG
    0066 1478  QRNDXER        0110   85  RADMODES       0123 1505  1/ATEM1        0137   97  ESCAPE2        0146   97  NNADTEM
    0067   71  STATEFLG       0111   86  DAPBOOLS       0124   74  3AXISFLG       0137   97  INFEL          0146   98  DERCOF-4
    0067   95  NEWJOB         0111   87  FLGWRD13       0124   96  CODE           0137   97  WDCNT          0146 1505  DBB3
    0070   71  INTYPFLG       0112   73  XDSPFLAG       0124   96  LOTEMIN        0137 1505  UDB4           0147   76  AUXFLAG
    0070   95  RUPTREG1       0112   96  LASTYCMD       0124   96  SFTEMP2        0140   97  DSPMMTEM       0147   97  NNTYPTEM
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

  DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL

  0147   98  DERCOF-3     0161 1496  SCRATCHY     0221   81  QUITFLAG     0314   99  R22DISP      0660  100  VAC5USE
  0147 1505  AXDSTEM      0161 1506  ARET         0223   81  MID1FLAG     0314   99  TIME2SAV     0661  100  VAC5
  0150   76  ATTFLAG      0162   78  V37FLAG      0224   81  MIDAVFLG     0315   88  AORBSFLG     0705 1308  GOLOC
  0150   97  IDAD1TEM     0162  420  MPAC+6       0225   81  AVEMIDSW     0316   88  DBSELFLG     0734  100  KEYTEMP2
  0150   98  DERCOF-2     0162 1373  GENMASK      0227   82  INTFLAG      0316   99  SCALSAVE     0734  100  RUPTAGN
  0151   77  ITSWICH      0162 1496  SCRATCHZ     0230   82  APSFLAG      0317   88  ACCOKFLG     0735  100  AOTCODE
  0151   77  IDAD2TEM     0162 1506  ABSAOS       0236   82  REINTFLG     0320   88  AUTR2FLG     0735  100  STARCODE
  0151   98  DERCOF-1     0163   78  AVEGFLAG     0245   83  LRBYPASS     0320   99  REDOCTR      0736  100  SINCDU
  0151 1506  FLATEMP      0163   99  MODE         0250   83  VXINH        0321   88  AUTR1FLG     0736  100  SINCDUY
  0152   77  MANUFLAG     0163 1373  USERPRIO     0251   83  PSTHIGAT     0321   99  CPHI         0736  100  STARALGN
  0152   98  DERCOFN      0163 1506  SIGNAOS      0252   84  NOLRREAD     0321   99  THETAD       0740  100  SINCDUZ
  0152   98  IDAD3TEM     0164   78  UPLOCKFL     0253   84  XORFLG       0322   99  CTHETA       0742  100  SINCDUX
  0152 1506  Z3TEM        0164   99  LOC          0254   84  LRINH        0323   99  CPSI         0744  100  COSCDU
  0153   77  IGNFLAG      0164 1373  COPINDEX     0255   84  VELDATA      0324   99  DELV         0744  100  COSCDUY
  0153   98  DERCOF+1     0164 1506  -SIGNAOS     0256   84  READLR       0324   99  DELVX        0746  100  COSCDUZ
  0153   98  RUTMXTEM     0165   78  VERIFLAG     0257   84  READVEL      0326   99  DELVY        0750  100  COSCDUX
  0154   77  ASTNFLAG     0165   99  BANKSET      0260   84  RNGEDATA     0330   99  DELVZ        0752  100  -PHASE1
  0154   99  MPAC         0165 1372  MPAC2SAV     0261   84  SCALBAD      0332   99  DNLSTADR     0753  101  PHASE1
  0154 1308  TEMPPHS      0165 1506  HOLD         0262   84  VFLSHFLG     0332   99  DNLSTCOD     0754  101  -PHASE2
  0154 1373  FACEREG      0166   78  V82EMFLG     0263   85  HFLSHFLG     0333   99  DUMPCNT      0755  101  PHASE2
  0154 1506  UV           0166   99  PUSHLOC      0264   85  CDESFLAG     0334   99  LDATALST     0756  101  -PHASE3
  0155   77  SWANDISP     0167   78  TFFSW        0265   85  REMODFLG     0334  994  CTLIST       0757  101  PHASE3
  0155 1308  TEMP2G       0167   99  PRIORITY     0266   85  RCDUOFLG     0335   99  DNTMGOTO     0760  101  -PHASE4
  0155 1373  PLAYTEM1     0170   78  RPQFLAG      0267   85  ANTENFLG     0336   99  DUMPLOC      0761  101  PHASE4
  0155 1496  -EPSILON     0172   79  NEWIFLG      0270   85  REPOSMON     0336   99  TMINDEX      0762  101  -PHASE5
  0155 1496  EPSILON      0173   37  MOONOTH      0271   85  DESIGFLG     0336  994  DNECADR      0763  101  PHASE5
  0156   77  NORMSW       0173   79  CMOONFLG     0272   85  ALTSCALE     0337   99  DNQ          0764  101  -PHASE6
  0156 1308  POINTER      0174   37  MOONTHIS     0273   86  LRVELFLG     0337  994  SUBLIST      0765  101  PHASE6
  0157   77  RVSW         0174   79  LMOONFLG     0274   86  RCDUFAIL     0340   99  DNTMBUFF     0766  101  CDUSPOT
  0157   98  TERM1TMP     0175   79  FLUNDISP     0275   86  LRPOSFLG     0366  100  RESTREG      0766  101  CDUSPOTY
  0157 1308  TEMPSWCH     0176   79  P39/79SW     0276   86  LRALTFLG     0367  100  NVWORD       0770  101  CDUSPOTZ
  0157 1372  CORMPAC      0177   79  SUPFFLAG     0277   86  RRDATAFL     0370  100  MARKNV       0772  101  CDUSPOTX
  0157 1373  PLAYTEM3     0200   79  INFINFLG     0300   86  RRRSFLAG     0371  100  NVSAVE       0774  101  MINDEX
  0157 1496  DOCKTEMP     0201   79  ORDERSW      0301   86  AUTOMODE     0372  100  CADRFLSH     0775  101  MMNUMBER
  0157 1506  ANET         0202   79  APSESW       0302   86  TURNONFL     0373  100  CADRMARK     0776  101  DSPCNT
  0157 1506  FUNTEM       0203   79  COGAFLAG     0303   87  PULSEFLG     0374  100  TEMPFLSH     0777  101  DSPCOUNT
  0160   77  V67FLAG      0205   80  INITALGN     0304   87  USEQRFLG     0375  100  FAILREG      1000  101  DECBRNCH
  0160 1372  TEMPOR2      0206   80  360SW        0305   87  CSMDKFLG     0400  100  VAC1USE      1001  101  VERBREG
  0160 1373  PLAYTEM4     0210   80  FLVI         0306   87  OURRCFLG     0401  100  VAC1         1002  101  NOUNREG
  0160 1496  COEFCTR      0212   80  FLPC         0307   87  ACC4-2FL     0454  100  VAC2USE      1003  101  XREG
  0160 1496  SCRATCHX     0213   80  FLPI         0310   87  AORBTFLG     0455  100  VAC2         1004  101  YREG
  0160 1506  1/ANET       0214   80  FLRCS        0311   87  XOVINFLG     0530  100  VAC3USE      1005  101  ZREG
  0161   78  IDLEFLAG     0215   81  LETABORT     0312   87  DRIFTDFL     0531  100  VAC3         1006  101  XREGLP
  0161 1373  OUTHERE      0216   81  FLAP         0313   87  RHCSCFLG     0604  100  VAC4USE      1007  101  HITEMOUT
  0161 1496  MASSCT[illegible] 0220   81  ROTFLAG      0314   88  ULLAGFLG     0605  100  VAC4         1007  101  YREGLP
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF PAGE  SYMBOL            DEF PAGE  SYMBOL            DEF PAGE  SYMBOL            DEF PAGE  SYMBOL            DEF PAGE  SYMBOL

   1010  101  LOTEMOUT         1072 1372  SAVEFLAG         1166  104  UPVERBSV         1302  106  IMODES30         1360  108  ERESTORE
   1010  101  ZREGLP           1073  103  MARK2PAC         1167  104  EBUF2            1303  106  IMODES33         1361  108  SELFRET
   1011  101  MODREG           1074  103  R1SAVE           1167  104  INTWAKIQ         1304  106  IMUCADR          1362  108  SMODE
   1012  102  DSPLOCK          1075  103  1/PIPADT         1167  104  UPTEMP           1304  106  MODECADR         1363  108  ALMCADR
   1013  102  REQRET           1076  103  TEMK             1167 1225  INTWAKUQ         1305  106  OPTCADR          1365  108  ERCOUNT
   1014  102  LOADSTAT         1077  103  SQ               1170  104  COMPNUMB         1306  106  RADCADR          1366  108  SCOUNT
   1015  102  CLPASS           1100  103  SAMPLIM          1171  104  UPOLDMOD         1307  106  ATTCADR          1371  108  SKEEP1
   1016  102  NOUT             1101  103  RRTARGET         1172  104  UPVERB           1311  106  ATTPRIO          1372  108  SKEEP2
   1017  102  NOUNCADR         1101  103  RSUBC            1173  104  UPCOUNT          1312  106  MARKSTAT         1373  108  SKEEP3
   1020  102  MONSAVE          1101  103  SAMPLSUM         1174  104  UPBUFF           1313  106  DSRUPTSW         1374  108  SKEEP4
   1021  102  MONSAVE1         1101  571  RRLOSVEC         1220  105  RN               1314  106  LGYRO            1375  108  SKEEP5
   1022  102  MONSAVE2         1101  604  LOSSM            1226  105  VN               1315  106  RRRET            1376  108  SKEEP6
   1023  102  DSPTAB           1105  103  TIMEHOLD         1234  105  PIPTIME          1316  106  RDES             1377  108  SKEEP7
   1037  102  NVQTEM           1107  103  MODEA            1236  105  GDT/2            1317  106  RRINDEX       E3,1400  109  LST1
   1040  102  NVBNKTEM         1107  103  TANG             1236  960  CURSOR           1320  106  WIXA          E3,1410  109  LST2
   1041  102  VERBSAVE         1111  103  MODEB            1240  960  SPIRAL           1321  106  WIXB          E3,1432  109  [illegible]SBBQ
   1042  102  CADRSTOR         1111  103  NSAMP            1242  960  POSCODE          1322  106  ZIXA          E3,1434  109  LONGEXIT
   1043  102  DSPLIST          1113  103  DESRET           1244  105  MASS             1323  106  ZIXB          E3,1436  109  PHSNAME1
   1044  102  EXTVBACT         1113  103  OLDATAGD         1244  105  WEIGHT/G         1324  107  AGSWORD       E3,1437  109  PHSBB1
   1045  102  DSPTEM1          1114  103  DESCOUNT         1246  105  ABDELV           1325  107  RATEINDX      E3,1440  109  PHSNAME2
   1045  102  NORMTEM1         1115  104  TDEC             1247  105  PGUIDE           1326  107  DELAYLOC      E3,1441  109  PHSBB2
   1050  102  DSPTEM2          1117  104  COLREG           1251  105  DVTHRUSH         1331  107  LEMMASS       E3,1442  109  PHSNAME3
   1051  102  DSPTEMX          1120  104  LAT              1252  105  AVEGEXIT         1332  107  CSMMASS       E3,1443  109  PHSBB3
   1051  102  OPTIONX          1122  104  LONG             1252  105  AVGEXIT          1333  107  DNRRANGE      E3,1444  109  PHSNAME4
   1053  102  TBASE1           1124  104  ALT              1254  105  TEMX             1334  107  DNRRDOT       E3,1445  109  PHSBB4
   1054  102  PHSPRDT1         1126  104  YV               1255  105  TEMY             1335  107  DNINDEX       E3,1446  109  PHSNAME5
   1055  102  TBASE2           1134  104  ZV               1256  105  TEMZ             1336  107  DNLRVELX      E3,1447  109  PHSBB5
   1056  102  PHSPRDT2         1142  104  P40/RET          1257  105  PIPAGE           1337  107  DNLRVELY      E3,1450  109  PHSNAME6
   1056  829  PIPCTR           1143  104  GENRET           1257  107  W.IND            1340  107  DNLRVELZ      E3,1451  109  PHSBB6
   1057  102  TBASE3           1144  104  OPTION1          1260  105  OUTROUTE         1341  107  DNLRALT       E3,1452  109  PBIASX
   1060  102  PHSPRDT3         1145  104  OPTION2          1260  107  W.IND1           1342  107  BALLEXIT      E3,1452  109  PIPABIAS
   1060  232  MMTEMP           1146  104  OPTION3          1262  105  CH5MASK          1343  107  DAPDATR1      E3,1453  109  PIPASCF
   1061  102  TBASE4           1147  104  LONGCADR         1263  105  CH6MASK          1344  107  TEVENT        E3,1453  109  PIPASCFX
   1061  232  BASETEMP         1151  104  LONGBASE         1264  105  DTHETASM         1346  107  DB            E3,1454  109  PBIASY
   1062  102  PHSPRDT4         1153  104  LONGTIME         1264  105  ZERLINA          1346 1506  DBVAL1        E3,1455  109  PIPASCFY
   1063  102  TBASE5           1155  104  CDUTEMPX         1265  106  ELVIRA           1347  107  AZ            E3,1456  109  PBIASZ
   1064  102  PHSPRDT5         1156  104  CDUTEMPY         1266  106  AZINCR1          1350  108  EL            E3,1457  109  PIPASCFZ
   1065  102  TBASE6           1157  104  CDUTEMPZ         1267  106  ELINCR1          1351  108  WCHPHASE      E3,1460  109  NBDX
   1066  102  PHSPRDT6         1160  104  PIPATMPX         1272  105  SPNDX            1352  108  E3J22R2M      E3,1461  109  NBDY
   1067  103  NVWORD1          1161  104  PIPATMPY         1273  105  RCSFLAGS         1353  108  E32C31RM      E3,1462  109  NBDZ
   1070  103  EBANKSAV         1162  104  PIPATMPZ         1274  105  T5ADR            1354  108  RADSKAL       E3,1463  110  ADIAX
   1070 1372  DSPFLG           1163  104  DISPDEX          1276  106  PVALVEST         1356  108  SKALSKAL      E3,1464  110  ADIAY
   1071  103  MARKEBAN         1163  148  P21ORIG          1277  106  DELPEROR         1357  108  END-UE        E3,1465  110  ADIAZ
   1071 1372  MARKFLAG         1164  104  TEMPR60          1300  106  DELQEROR         1357  108  SELFERAS      E3,1466  110  ADSRAX
   1072  103  EBANKTEM         1165  104  PRIOTIME         1301  106  DELREROR         1357  108  SFAIL         E3,1467  110  ADSRAY
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL

 E3,1470  110  ADSRAZ      E3,1715  111  AXO         E4,1477  114  H           E4,1602  118  YAWANG      E4,1700  119  /R/MAG
 E3,1471  110  COMMAND     E3,1717  111  R-OTHER     E4,1501  114  GMODE       E4,1604  115  RTHETA      E4,1702  116  RACT1
 E3,1471  110  GCOMP       E3,1717  120  R(CSM)      E4,1502  114  IRETURN     E4,1604  115  TSTART82    E4,1702  117  DELTAR
 E3,1474  110  CDUIND      E3,1725  111  V-OTHER     E4,1503  114  NORMGAM     E4,1604  115  WWBIAS      E4,1702  117  DVLOS
 E3,1477  110  GCOMPSW     E3,1725  120  V(CSM)      E4,1504  114  RPQV        E4,1604  118  RLM         E4,1702  117  TINTSOI
 E3,1500  110  DIFEQCNT    E3,1733  111  REFSMMAT    E4,1504  115  BASETHV     E4,1606  115  RONE        E4,1702  119  LAXIS
 E3,1501  110  UPSVFLAG    E3,1755  111  ACTCENT     E4,1512  114  KEPRTN      E4,1606  118  RPASS36     E4,1704  117  DELTTIME
 E3,1502  110  RRECT       E3,1757  112  LS21X       E4,1512  114  ORIGEX      E4,1614  115  VONE        E4,1706  117  TARGTIME
 E3,1510  110  VRECT       E3,1760  112  LOSVEL      E4,1513  114  RQVV        E4,1614  118  UNP36       E4,1710  116  RACT2
 E3,1516  110  TET         E3,1760  112  VSUBC       E4,1513  115  BASETIME    E4,1615  117  AGSBUFFE    E4,1710  117  ULOS
 E3,1520  110  TDELTAV     E3,1760  604  LOSVDT/4    E4,1515  115  DFIG        E4,1622  116  DELVOV      E4,1710  120  YDOT
 E3,1526  110  TNUV        E3,1766  112  MLOSV       E4,1516  115  STATEXIT    E4,1630  116  E01         E4,1712  120  ZDOT
 E3,1534  110  RCV         E3,1766  604  SAVECDUT    E4,1517  114  HAPOX       E4,1630  116  GSAV        E4,1714  120  GEFF
 E3,1542  110  VCV         E3,1770  112  RANGEVAR    E4,1517  115  BASEOTV     E4,1630  116  KEL         E4,1716  117  HAPO
 E3,1550  110  TC          E3,1772  112  RATEVAR     E4,1521  114  HPERX       E4,1630  116  MFI         E4,1716  117  NOMTPI
 E3,1552  110  XKEP        E3,1774  112  RVARMIN     E4,1521  114  RPSV        E4,1630  116  MFS         E4,1716  117  RTSR1/MU
 E3,1552  125  XPREV       E3,1775  112  VVARMIN     E4,1527  114  XKEPNEW     E4,1630  116  VZBEAMNB    E4,1716  120  G(CSM)
 E3,1554  110  RRECTCSM    E3,1776  112  TCDH        E4,1531  114  VECTAB      E4,1636  116  E02         E4,1720  117  HPER
 E3,1554  110  RRECTOTH    E3,1777  112  END-E3      E4,1537  114  VACX        E4,1636  116  VYBEAMNB    E4,1720  117  RTMU
 E3,1562  110  VRECTCSM    E4,1400  113  AMEMORY     E4,1537  115  BASEOTP     E4,1636  116  YNBSAV      E4,1722  118  RINIT
 E3,1570  111  T-OTHER     E4,1400  113  WRENDPOS    E4,1537  115  V82FLAGS    E4,1644  116  VXBEAMNB    E4,1724  120  WM
 E3,1570  111  TETCSM      E4,1400  117  TRANSM1     E4,1540  115  TFF         E4,1644  116  ZNBSAV      E4,1730  118  VINIT
 E3,1570  111  TETOTHER    E4,1401  113  WRENDVEL    E4,1541  114  VACY        E4,1652  116  LRVTIME     E4,1732  120  /LAND/
 E3,1572  111  DELTACSM    E4,1402  113  WSHAFT      E4,1542  115  -TPER       E4,1652  116  T1TOT2      E4,1734  119  LRXCDUDL
 E3,1600  111  NUVCSM      E4,1403  113  WTRUN       E4,1543  114  VACZ        E4,1652  117  +MGA        E4,1734  120  Y
 E3,1606  111  RCVCSM      E4,1404  113  RMAX        E4,1545  114  XNBPIP      E4,1654  116  LRXCDU      E4,1735  119  LRYCDUDL
 E3,1614  111  VCVCSM      E4,1405  113  VMAX        E4,1553  114  YNBPIP      E4,1654  116  T2TOT3      E4,1736  118  VIPRIME
 E3,1622  111  TCCSM       E4,1406  113  WSURFPOS    E4,1561  114  ZNBPIP      E4,1655  116  LRYCDU      E4,1736  119  LRZCDUDL
 E3,1624  111  XKEPCSM     E4,1407  113  WSURFVEL    E4,1567  114  VONE'       E4,1656  116  ELEV        E4,1736  120  DRDOT
 E3,1626  111  RRECTHIS    E4,1410  113  SHAFTVAR    E4,1567  115  BASETHP     E4,1656  116  LRZCDU      E4,1737  119  LRVTIMDL
 E3,1626  111  RRECTLEM    E4,1411  113  TRUNVAR     E4,1574  114  VECTABND    E4,1657  116  PIPTEM      E4,1740  120  DYDOT
 E3,1634  111  VRECTLEM    E4,1412  113  504LM       E4,1576  115  EPSILONT    E4,1660  116  UP1         E4,1742  120  DZDOT
 E3,1642  111  TETLEM      E4,1420  113  AGSK        E4,1600  115  HPERMIN     E4,1660  117  UNRM        E4,1744  118  FDAIX
 E3,1642  111  TETTHIS     E4,1422  113  RLS         E4,1600  115  RANGE       E4,1662  119  AT          E4,1744  120  PCONS
 E3,1644  111  DELTALEM    E4,1422  117  ALFDK       E4,1600  115  WWPOS       E4,1662  119  VHORIZ      E4,1745  118  FDAIY
 E3,1652  111  NUVLEM      E4,1430  113  PBODY       E4,1600  117  AGSBUFF     E4,1664  119  ANGTERM     E4,1746  119  FDAIZ
 E3,1660  111  RCVLEM      E4,1431  114  ALPHAV      E4,1600  118  ALPHASB     E4,1664  119  VE          E4,1746  120  YCONS
 E3,1666  111  VCVLEM      E4,1437  114  BETAV       E4,1600  118  PITCHANG    E4,1666  116  DELVEET1    E4,1747  118  DELVTPF
 E3,1674  111  TCLEM       E4,1445  114  PHIV        E4,1600  118  RR-AZ       E4,1666  119  TTO         E4,1750  120  PRATE
 E3,1676  111  XKEPLEM     E4,1453  114  PSIV        E4,1600  118  RSTACK      E4,1670  119  TBUP        E4,1751  119  LMPOS
 E3,1700  111  X789        E4,1461  114  FV          E4,1602  115  RPADTEM     E4,1672  119  HBEAMNB     E4,1751  119  RTSTDEX
 E3,1706  111  TEPHEM      E4,1467  114  ALPHAM      E4,1602  115  RRATE       E4,1672  119  RDOTD       E4,1752  119  RTSTMAX
 E3,1706  112  TI1SUBL     E4,1471  114  BETAM       E4,1602  115  WWVEL       E4,1674  116  DELVEET2    E4,1752  120  YRATE
 E3,1711  111  AZO         E4,1473  114  TAU.        E4,1602  118  BETASB      E4,1674  119  YDOTD       E4,1753  119  RTSTBASE
 E3,1713  111  -AYO        E4,1475  114  DT/2        E4,1602  119  RR-ELEV     E4,1676  119  ZDOTD       E4,1754  119  RSTKLOC
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                3:15 DEC.  2,1970              PAGE 1574

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL

E4,1754   119    TSTLOC      E5,1435   121   TCGIBRAK    E5,1474   128   INTZ        E5,1550   122   ABTCOF      E5,1700   123   ZNB
E4,1754   120   ATY          E5,1436   121   RAPFG*      E5,1476   121   RIGNZ       E5,1550   128   DELM        E5,1701   125   VTARGTAG
E4,1755   119   RSAMPDT      E5,1436   127   CDUTIMEF    E5,1476   128   ANGY        E5,1560   128   WPLATI      E5,1702   125   VTARGET
E4,1756   119   RFAILCNT     E5,1436   128   WANGI       E5,1500   121   KIGNX/B4    E5,1562   128   GEOCOMPS    E5,1706   123   GACC
E4,1756   120   ATR          E5,1440   127   CDUDANG     E5,1500   128   ANGX        E5,1563   128   ERCOMP      E5,1706   123   LANDLAT
E4,1757   119   END-E4       E5,1440   127   TEMPADD     E5,1502   121   KIGNY/B8    E5,1570   122   VMIN        E5,1706   123   STARAD
E4,1757   119   LMVEL        E5,1440   128   TORQNDX     E5,1502   128   DRIFTO      E5,1571   128   ZERONDX     E5,1706   123   VEARTH
E4,1760   120   ATP          E5,1440   128   WANGT       E5,1504   121   KIGNV/B4    E5,1572   122   YLIM        E5,1706   123   XSCI
E4,1762   120   YAW          E5,1441   127   CDUREADF    E5,1504   128   DRIFTI      E5,1572   128   1SECXT      E5,1706   124   CULTRIX
E4,1764   120   PITCH        E5,1441   127   TEMP        E5,1506   121   LOWCRIT     E5,1573   128   ASECXT      E5,1706   126   VARIANCE
E4,1765   119   DELVEET3     E5,1442   127   CDUREADI    E5,1507   121   HIGHCRIT    E5,1574   122   ABTRDOT     E5,1710   123   LANDLONG
E5,1400   121   TLAND        E5,1442   127   NOBITS      E5,1510   121   V2FG        E5,1574   128   PERFDLAY    E5,1710   125   RTNAPSE
E5,1400   121   W            E5,1442   128   DRIFTT      E5,1510   128   VLAUN       E5,1576   122   COSTHET1    E5,1710   125   RTNLAMB
E5,1400   127   AZIMUTH      E5,1443   127   CDULIMIT    E5,1512   128   ACCWD       E5,1576   128   OVFLOWCK    E5,1710   125   RTNTR
E5,1402   121   RBRFG        E5,1443   127   CHAN        E5,1516   121   TAUVERT     E5,1600   122   COSTHET2    E5,1710   125   RTNTT
E5,1402   127   LATITUDE     E5,1444   121   VAPFG       E5,1520   121   DELQFIX     E5,1602   122   CG          E5,1711   125   U2
E5,1402   826   RDG          E5,1444   127   LOS1        E5,1520   128   POSNV       E5,1624   122   RANGEDSP    E5,1711   126   GRP2SVQ
E5,1404   127   ERVECTOR     E5,1444   128   ALX1S       E5,1522   121   LRALPHA     E5,1626   122   OUTOFPLN    E5,1712   123   LANDALT
E5,1410   121   VBRFG        E5,1445   128   CMPX1       E5,1522   128   DPIPAY      E5,1630   122   R60VSAVE    E5,1712   126   OMEGAM1
E5,1410   826   VDG          E5,1446   128   ALK         E5,1523   122   LRBETA1     E5,1630   122   VBIAS       E5,1714   123   GOUT
E5,1412   127   LENGTHOT     E5,1452   121   AAPFG       E5,1524   122   LRALPHA2    E5,1636   122   RGU         E5,1714   123   VSUN
E5,1413   127   LOSVEC       E5,1452   127   LOS2        E5,1525   122   LRBETA2     E5,1642   121   ENDW        E5,1714   123   YSCI
E5,1414   127   NDXCTR       E5,1452   128   THETAN      E5,1526   122   LRVMAX      E5,1642   122   XSM         E5,1714   124   ZSCI
E5,1415   127   PIPINDEX     E5,1460   121   VAPFG*      E5,1526   128   DPIPAZ      E5,1642   125   DELX        E5,1717   125   MAGVEC2
E5,1416   121   ABRFG        E5,1460   127   CALCDIR     E5,1527   122   LRVF        E5,1642   126   ZI          E5,1717   125   R2
E5,1416   127   POSITON      E5,1460   128   FILDELV     E5,1530   122   LRWVZ       E5,1644   123   -COSB       E5,1720   126   OMEGAM2
E5,1416   826   ADG          E5,1461   127   CDUFLAG     E5,1530   128   ALTIM       E5,1644   125   DFLT        E5,1721   125   UR1
E5,1417   127   QPLACE       E5,1462   121   AAPFG*      E5,1531   122   LRWVY       E5,1646   123   SINB        E5,1722   123   VMOON
E5,1420   127   QPLACES      E5,1462   127   GYTOBETQ    E5,1531   128   ALTIMS      E5,1646   125   URRECT      E5,1722   124   VEC1
E5,1421   127   SOUTHDR      E5,1462   128   INTVEC      E5,1532   122   LRWVX       E5,1650   122   YSM         E5,1726   126   OMEGAM3
E5,1424   121   VBRFG*       E5,1462   128   VLAUNS      E5,1532   128   ALDK        E5,1654   125   RVEC        E5,1727   125   SNTH
E5,1424   826   VDG2TTF      E5,1463   127   OPTNREG     E5,1533   122   LRWVFZ      E5,1654   125   R1VEC       E5,1730   123   SAX
E5,1426   121   ABRFG*       E5,1464   121   JAPFG*      E5,1534   122   LRWVFY      E5,1656   122   ZSM         E5,1730   123   STAR
E5,1426   826   ADG2TTF      E5,1464   127   SAVE        E5,1534   127   MASKREG     E5,1662   125   R2VEC       E5,1730   124   VEC2
E5,1430   121   JBRFG*       E5,1464   128   WPLATO      E5,1535   122   LRWVFX      E5,1664   122   XDC         E5,1731   125   CSTH
E5,1430   127   TEMPTIME     E5,1466   121   GAINAPPR    E5,1536   122   LRWVFF      E5,1664   123   XNB         E5,1733   125   1-CSTH
E5,1430   826   JDG2TTF      E5,1467   127   SFCONST1    E5,1536   127   CDUNDX      E5,1664   126   DELTAX      E5,1734   126   HOLDW
E5,1432   121   GAINBRAK     E5,1470   121   TCGFAPPR    E5,1537   122   RODSCALE    E5,1664   126   TRIPA       E5,1735   125   CSTH-RHO
E5,1432   127   TMARK        E5,1470   127   TIMER       E5,1537   127   RESULTCT    E5,1667   126   TEMPVAR     E5,1736   123   GCTR
E5,1434   121   TCGFBRAK     E5,1470   128   INTY        E5,1540   122   TAUROD      E5,1670   125   TDESIRED    E5,1737   123   OGC
E5,1434   127   CDUTIMEI     E5,1471   121   TCGIAPPR    E5,1542   122   LAG/TAU     E5,1672   122   YDC         E5,1737   125   P
E5,1434   127   GENPL        E5,1472   121   VIGN        E5,1542   127   COUNTPL     E5,1672   123   YNB         E5,1741   123   IGC
E5,1434   127   RDSP         E5,1472   127   DATAPL      E5,1543   127   CDUANG      E5,1672   125   GEOMSGN     E5,1741   125   R1A
E5,1434   128   AINLA        E5,1472   128   ANGZ        E5,1544   122   MINFORCE    E5,1673   125   UN          E5,1743   123   MGC
E5,1434   128   WANGO        E5,1474   121   RIGNX       E5,1546   122   MAXFORCE    E5,1700   122   ZDC         E5,1743   125   VVEC
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL          DEF    PAGE  SYMBOL

 E5,1745   123   QMIN         E6,1421   129   OMEGAP       E6,1472   130   NEXTP        E6,1545   133   AOSQTERM     E6,1647   136   QCDUWUSR
 E5,1746   123   QMAJ         E6,1422   129   OMEGAQ       E6,1473   130   NEXTU        E6,1546   133   AOSRTERM     E6,1650   136   NDXCDUW
 E5,1747   124   OGCT         E6,1423   129   OMEGAR       E6,1474   130   NEXTV        E6,1547   134   ACCSWU       E6,1651   136   FLAGOODW
 E5,1751   125   ECC          E6,1424   129   ALPHAQ       E6,1475   130   -2JETLIM     E6,1547   134   BLOCKTOP     E6,1652   136   FLPAUTNO
 E5,1753   125   RTNPRM       E6,1425   129   ALPHAR       E6,1476   130   -RATEDB      E6,1550   134   ACCSWV       E6,1653   136   UNFC/2
 E5,1754   125   SGNRDOT      E6,1426   129   OMEGAU       E6,1476   130   TARGETDB     E6,1551  1505   1/ANETP      E6,1661   136   UNWC/2
 E5,1755   124   BESTI        E6,1426   130   URATEDIF     E6,1477   131   RETJADR      E6,1553  1505   1/ACCSTP     E6,1667   136   UNFV/2
 E5,1755   125   RDESIRED     E6,1427   129   OMEGAV       E6,1500   131   SENSETYP     E6,1555   134   FLAT         E6,1667   136   UNFVX/2
 E5,1756   124   BESTJ        E6,1427   130   EDOTP        E6,1501   132   NEGUQ        E6,1556   134   ZONE3LIM     E6,1670   135   COF
 E5,1756   126   TDPOS        E6,1427   130   VRATEDIF     E6,1502   134   ALLOWGTS     E6,1557  1505   PACCFUN      E6,1671   136   UNFVY/2
 E5,1757   124   STARIND      E6,1427   133   EDOT         E6,1503   132   NEGUR        E6,1561  1505   PDB1         E6,1673   136   UNFVZ/2
 E5,1757   125   DELDEP       E6,1430   129   TRAPEDP      E6,1504   132   KQ           E6,1562  1505   PDB2         E6,1675   136   -DELGMB
 E5,1757   125   TERRLAMB     E6,1431   129   TRAPEDQ      E6,1505   132   AXISCTR      E6,1563  1505   PDB4         E6,1676   135   BCDU
 E5,1760   124   STARSAV1     E6,1432   129   TRAPEDR      E6,1505   132   SAVESR       E6,1564  1505   PDB3         E6,1701   135   KSPNDX
 E5,1761   125   DEPREV       E6,1433   129   NPTRAPS      E6,1506   132   KRDAP        E6,1565  1505   PAXDIST      E6,1702   135   KDPNDX
 E5,1761   125   TPREV        E6,1434   130   NQTRAPS      E6,1507   132   ACCDOTQ      E6,1567   134   1/ANET1      E6,1703   135   KV1
 E5,1763   125   EPSILONL     E6,1435   130   NRTRAPS      E6,1510   132   QACCDOT      E6,1570   134   1/ANET2      E6,1703   135   K1
 E5,1764   126   TDVEL        E6,1436   130   EDOTQ        E6,1511   132   ACCDOTR      E6,1573   134   1/ACCAST     E6,1703   135   MFISYM
 E5,1765   125   COGA         E6,1436   130   QRATEDIF     E6,1512   132   RACCDOT      E6,1575   134   ACCFCTZ1     E6,1703   135   NCDU
 E5,1765   125   INDEP        E6,1437   130   EDOTR        E6,1513   132   DOWNTORK     E6,1576   134   ACCFCTZ5     E6,1703   135   P21
 E5,1766   124   STARSAV2     E6,1437   130   RRATEDIF     E6,1513   132   POSTORKP     E6,1601   134   FIREDB       E6,1703   135   TMFI
 E5,1772   126   EGRESS       E6,1440   130   OLDXFORP     E6,1514   132   NEGTORKP     E6,1603   134   COASTDB      E6,1703   135   TMIS
 E5,1773   126   ORIGIN       E6,1441   130   OLDYFORP     E6,1515   132   POSTORKU     E6,1605   134   AXISDIST     E6,1705   135   D21
 E5,1773   126   P30EXIT      E6,1442   130   OLDZFORQ     E6,1516   133   NEGTORKU     E6,1627   134   COEFFQ       E6,1706   135   NEXTIME
 E5,1774   124   TALIGN       E6,1443   130   CH31TEMP     E6,1517   133   POSTORKV     E6,1630   134   COEFFR       E6,1707   135   G21
 E5,1774   128   END-E5       E6,1444   130   STIKSENS     E6,1520   133   NEGTORKV     E6,1631   134   COTROLER     E6,1707   135   TTEMP
 E5,1776   124   RTX1         E6,1445   130   TCP          E6,1521   133   NO.PJETS     E6,1632   134   QGIMTIMR     E6,1711   135   BIASTEMP
 E5,1777   124   RTX2         E6,1446   130   DXERROR      E6,1522   133   NO.UJETS     E6,1633   134   INGTS        E6,1711   135   C2SQP
 E6,1400   129   HIASCENT     E6,1450   130   DYERROR      E6,1523   133   NO.VJETS     E6,1634   134   RGIMTIMR     E6,1711   135   KV2
 E6,1401   129   ROLLTIME     E6,1450   130   QERROR       E6,1524   133   TJP          E6,1635   134   CDUXD        E6,1711   135   K2
 E6,1402   129   PITTIME      E6,1451   132   QDIFF        E6,1525   133   TJU          E6,1635   136   DCDU         E6,1713   135   C2SQM
 E6,1403   129   DKTRAP       E6,1452   130   DZERROR      E6,1525   134   TJETU        E6,1636   134   CDUYD        E6,1715   135   C2PP
 E6,1404   129   DKOMEGAN     E6,1452   130   RERROR       E6,1526   133   TJV          E6,1637   134   CDUZD        E6,1717   135   C2MP
 E6,1405   129   DKKAOSN      E6,1452   132   RDIFF        E6,1527   133   L,PVT-CG     E6,1640   134   DELCDUX      E6,1717   135   KV3
 E6,1406   129   LMTRAP       E6,1454   130   PLAST        E6,1530   133   1JACC        E6,1640   136   DELDCDU      E6,1717   135   K3
 E6,1407   129   LMOMEGAN     E6,1455   130   QLAST        E6,1531   133   1JACCQ       E6,1641   134   DELCDUY      E6,1717   135   OGF
 E6,1410   129   LMKAOSN      E6,1456   130   RLAST        E6,1532   133   1JACCR       E6,1641   136   DELDCDU1     E6,1721   135   C1PP
 E6,1411   129   DKDB         E6,1457   130   TCQR         E6,1533   133   1JACCU       E6,1642   134   DELCDUZ      E6,1723   135   C1MP
 E6,1412   129   IGNAOSQ      E6,1460   130   OLDPMIN      E6,1534   133   1JACCV       E6,1642   136   DELDCDU2     E6,1725   135   BRATE
 E6,1413   129   IGNAOSR      E6,1461   130   OLDQRMIN     E6,1535   133   SKIPU        E6,1643   134   OMEGAPD      E6,1725   135   COFSKEW
 E6,1414   129   M11          E6,1462   130   SAVEHAND     E6,1536   133   SKIPV        E6,1644   134   OMEGAQD      E6,1725   135   IG
 E6,1415   129   M21          E6,1464   130   PERROR       E6,1537   133   AOSQ         E6,1645   134   OMEGARD      E6,1725   136   VECQTEMP
 E6,1416   129   M31          E6,1465   130   NXT6ADR      E6,1541   133   AOSR         E6,1646   134   MIS          E6,1733   135   CAM
 E6,1417   129   M22          E6,1466   130   T6NEXT       E6,1543   133   AOSU         E6,1646   136   ECDUW        E6,1733   135   TM
 E6,1420   129   M32          E6,1470   130   T6FURTHA     E6,1544   133   AOSV         E6,1646   136   ECDUWUSR     E6,1735   135   AM
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

  DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL

E6,1737  130   TEMP31     E6,1751  131   UERROR     E7,1456  139   LOSCOUNT   E7,1526  147   DELVREF    E7,1601  141   POSTCSI
E6,1737  131   ABSEDOTP   E6,1751  132   FUNCTION   E7,1457  139   AIG        E7,1526  147   V          E7,1603  141   HAFPA1
E6,1737  131   ABSTJ      E6,1751  137   DAPTREG5   E7,1460  139   AMG        E7,1527  141   VPASS2     E7,1603  141   POSTCDH
E6,1737  131   ROTEMP1    E6,1752  131   VERROR     E7,1461  139   AOG        E7,1527  141   VPPREC     E7,1605  141   DELTEEO
E6,1737  132   GTSTEMPS   E6,1752  133   E          E7,1462  139   MARKCTR    E7,1534  147   HCALC      E7,1605  141   LOOPCT
E6,1737  132   K2THETA    E6,1752  137   DAPTREG6   E7,1462  139   TRKMKCNT   E7,1535  141   RACT3      E7,1605  141   POSTTPI
E6,1737  133   EDOTSQ     E6,1753  137   DAPARUPT   E7,1463  140   /AFC/      E7,1536  147   UNIT/R/    E7,1606  147   XSCREF
E6,1737  136   DAPTEMP1   E6,1754  137   DAPLRUPT   E7,1463  140   NORMEX     E7,1543  141   UNVEC      E7,1606  147   XSMD
E6,1740  131   ROTEMP2    E6,1755  137   DAPBQRPT   E7,1464  140   QSAVED     E7,1543  141   VACT3      E7,1606  149   PIFPSET
E6,1740  133   ROTSENSE   E6,1757  137   DAPZRUPT   E7,1465  140   FCODD      E7,1544  147   RN1        E7,1607  141   GAMPREV
E6,1740  136   DAPTEMP2   E6,1761  137   AK         E7,1465  140   RTRN       E7,1544  149   LANDTEMP   E7,1607  142   INTIME
E6,1741  131   POLYTEMP   E6,1762  137   AK1        E7,1466  140   NN         E7,1544  149   OURTEMPS   E7,1607  149   RTNHOLD
E6,1741  132   KCENTRAL   E6,1763  137   AK2        E7,1467  140   FP         E7,1546  145   DELTAQ     E7,1610  149   FWEIGHT
E6,1741  132   SHFTFLAG   E6,1764  137   EDRIVEX    E7,1470  140   SUBEXIT    E7,1550  145   MARKCNTR   E7,1611  141   DELDV
E6,1741  133   FIREFCT    E6,1765  137   EDRIVEY    E7,1471  140   E7OVERLA   E7,1551  141   RPASS3     E7,1611  141   DELTEE
E6,1741  136   DAPTEMP3   E6,1766  137   EDRIVEZ    E7,1471  140   WHOCARES   E7,1551  145   XYMARK     E7,1611  141   TSTRT
E6,1742  131   TEMPNUM    E6,1767  137   PJETCTR    E7,1471  141   VACT1      E7,1552  145   MKDEX      E7,1611  142   X1INPUT
E6,1742  132   K2CNTRAL   E6,1770  137   UJETCTR    E7,1471  144   RTARG1     E7,1552  147   VN1        E7,1612  149   PIF
E6,1742  133   TIOAXIS    E6,1771  137   END-E6     E7,1471  145   TX789      E7,1552  149   TTF/8TMP   E7,1613  141   CSIALRM
E6,1742  136   DAPTEMP4   E6,1771  137   VJETCTR    E7,1471  147   ABVEL      E7,1553  145   PLANVEC    E7,1613  141   TITER
E6,1743  131   NUMBERT    E7,1400  138   ATIGINC    E7,1473  120   RDOT       E7,1554  149   ELINCR     E7,1614  147   YSCREF
E6,1743  132   WCENTRAL   E7,1402  138   PTIGINC    E7,1473  147   HDOTDISP   E7,1556  149   AZINCR     E7,1614  147   YSMD
E6,1743  136   DAPTEMP5   E7,1404  138   AOTAZ      E7,1475  147   TTFDISP    E7,1557  141   VPASS3     E7,1614  149   PSEUDO55
E6,1744  131   ROTINDEX   E7,1412  138   AOTEL      E7,1477  141   RAPREC     E7,1560  147   PIPTIME1   E7,1615  141   VERBNOUN
E6,1744  132   ACENTRAL   E7,1420  138   LRHMAX     E7,1477  141   RPASS1     E7,1560  149   KEEP-2     E7,1615  149   FC
E6,1744  132   ININDEX    E7,1421  138   LRWH       E7,1477  145   GAMMA      E7,1561  145   TSIGHT     E7,1616  141   RDOTV
E6,1744  133   ADRSDIF2   E7,1422  138   ZOOMTIME   E7,1477  147   SAVET-30   E7,1562  147   GDT1/2     E7,1616  142   ITCTR
E6,1744  136   DAPTEMP6   E7,1423  138   TENDBRAK   E7,1501  147   DELVCTL    E7,1562  149   TABLTTF    E7,1617  149   TTHROT
E6,1745  132   DEL        E7,1423  139   REPOSCNT   E7,1501  147   VGBODY     E7,1565  141   VACT4      E7,1620  141   CENTANG
E6,1745  132   JETRATE    E7,1424  138   TENDAPPR   E7,1501  835   TGO1       E7,1565  142   VTPRIME    E7,1620  149   FCOLD
E6,1745  133   HOLDQ      E7,1424  139   REPOSTM    E7,1502  145   OMEGA      E7,1570  147   MASS1      E7,1621  149   E2DPS
E6,1745  136   DAPTREG1   E7,1425  138   DELTTFAP   E7,1505  141   VAPREC     E7,1570  855   1/DVO      E7,1621  149   OURPERMS
E6,1745  1509  OLDSENSE   E7,1426  138   LEADTIME   E7,1505  141   VPASS1     E7,1570  864   DVCNTR1    E7,1621  149   WCHPHOLD
E6,1746  132   A2CNTRAL   E7,1426  139   DELTATM    E7,1505  144   VPASS4     E7,1572  147   RIS        E7,1622  142   DELVIMU
E6,1746  132   JETRATEQ   E7,1427  138   RPCRTIME   E7,1507  147   DVTOTAL    E7,1573  141   DELVCSI    E7,1622  147   ZSMD
E6,1746  132   SCRATCH    E7,1430  138   RPCRTQSW   E7,1511  147   GOBLTIME   E7,1573  141   SECMAX     E7,1622  148   ZSCREF
E6,1746  133   ADRSDIF1   E7,1431  138   TNEWA      E7,1513  141   VACT2      E7,1573  141   TDEC2      E7,1622  149   FILLER
E6,1746  136   DAPTREG2   E7,1433  139   DELVLVC    E7,1513  147   ABDVCONV   E7,1573  149   TPIPOLD    E7,1623  149   FLPASS0
E6,1747  132   HALFARG    E7,1433  139   DELVSLV    E7,1515  147   DVCNTR     E7,1575  141   DELEL      E7,1624  149   TPIP
E6,1747  132   JETRATER   E7,1441  139   TIG        E7,1516  147   TGO        E7,1575  141   DELVMID    E7,1626  149   VGU
E6,1747  133   HH         E7,1443  139   RTARG      E7,1520  147   R          E7,1575  141   DELVTPI    E7,1630  142   TPASS4
E6,1747  136   DAPTREG3   E7,1451  139   DELLT4     E7,1520  147   UNITGOBL   E7,1575  141   DVPREV     E7,1630  144   TINT
E6,1750  131   DPSBURN    E7,1453  139   TFI        E7,1521  141   RPASS2     E7,1575  141   KT         E7,1630  148   END-ALIG
E6,1750  132   QRCNTR     E7,1453  139   TTOGO      E7,1521  141   RPPREC     E7,1577  141   DIFFALT    E7,1630  148   RSUBL
E6,1750  137   DAPTREG4   E7,1455  139   WHICH      E7,1524  145   BVECTOR    E7,1600  147   VIS        E7,1630  152   END-E7.3
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

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 E7,1630  152  RCO         E7,1665  142  QTEMP1      E7,1711  144  LOSDESRD   E7,1745  146  R65CNTR     4201   452  PINSUPBT
 E7,1632  142  QTEMP       E7,1665  142  RGEXIT      E7,1711  148  P21VEL     E7,1745  146  WHCHREAD    4242   209  V00N34
 E7,1632  152  YCO         E7,1665  142  SAVQR52     E7,1711  151  ALTRATE    E7,1745  151  LASTLADW    4303   456  ENDBUFF
 E7,1633  142  TCSI        E7,1666  142  COZY4       E7,1712  145  MZ         E7,1745  152  END-E7.0    4317  1073  FOURTEEN
 E7,1634  149  LAND        E7,1666  150  FUELNEED    E7,1712  151  ALTSAVE    E7,1746  145  N49FLAG     4317  1073  OCT16
 E7,1634  152  1/DV1       E7,1666  150  FUNNYDSP    E7,1713  148  P21GAM     E7,1746  146  RDOTMSAV    4320  1095  OCT11
 E7,1635  142  TTPI        E7,1666  150  TREDES      E7,1714  143  RMAG       E7,1746  151  RODCOUNT    4320  1099  NINE
 E7,1636  148  UCSM        E7,1667  150  LOOKANGL    E7,1714  151  LADQSAVE   E7,1747  152  END-E7.1    4350  1010  FBANKMSK
 E7,1636  152  1/DV2       E7,1670  142  XXXALT      E7,1714  829  PIPCTR1    E7,1750  146  RDOTM       4350  1099  BANKMASK
 E7,1637  142  TTPIO       E7,1670  150  FOURPERM    E7,1715  148  P21ALT     E7,1752  146  TANGNB      4350  1286  -MAXADRS
 E7,1640  152  1/DV3       E7,1670  150  LRLCTR      E7,1715  151  DT         E7,1754  146  MKTIME      4355   218  OCT30000
 E7,1641  142  FTIG        E7,1671  150  LRRCTR      E7,1716  143  MUASTEER   E7,1756  146  RM          4355  1099  BIT13-14
 E7,1642  149  TTF/8       E7,1672  142  END-IN/M    E7,1716  151  DALTRATE   E7,1756  151  RODSCAL1    4355  1099  PRIO30
 E7,1642  152  XRANGE      E7,1672  143  UT          E7,1717  144  UXVECT     E7,1757  151  LASTTPIP    4356   461  B12-1
 E7,1644  148  NEWVEL      E7,1672  144  FRADM       E7,1717  151  QAXIS      E7,1760  146  RANGRDOT    4357  1286  S8BITS
 E7,1644  149  ELIDUMMY    E7,1672  150  LRMCTR      E7,1717  151  UHYP       E7,1761  151  THISTPIP    4360  1099  OCT23
 E7,1644  150  VDGVERT     E7,1673  150  LRSCTR      E7,1720  143  MU/A       E7,1762  143  TIGSAVE     4361   381  DEC17
 E7,1644  152  ENGOFFDT    E7,1674  144  INCORPEX    E7,1720  145  SCALSHFT   E7,1762  146  P21TIME     4361   892  170MS
 E7,1645  149  AZIDUMMY    E7,1674  150  STILBADH    E7,1721  145  RXZ        E7,1763  151  OLDPIPAX    4362   789  ASTNDEX
 E7,1645  152  VGVECT      E7,1675  144  RLMSRCH     E7,1722  143  RTMAG      E7,1764  143  TIGSAVEP    4362  1099  OCT25
 E7,1646  149  ZERDUMMY    E7,1675  145  IGRET       E7,1723  143  ULC        E7,1764  146  SCAXIS      4362  1391  UP21
 E7,1646  150  NIGNLOOP    E7,1675  145  LGRET       E7,1724  143  RIC        E7,1764  151  OLDPIPAY    4363  1099  TEN
 E7,1647  142  VTIG        E7,1675  145  RDRET       E7,1725  120  ZAXIS1     E7,1765  151  OLDPIPAZ    4512   465  ENDPINBF
 E7,1647  149  ELVDUMMY    E7,1675  148  P21BASER    E7,1725  144  UYVECT     E7,1766  143  MUSCALE     4616   525  ENDRMODF
 E7,1647  150  NGUIDSUB    E7,1675  150  STILBADV    E7,1725  151  UHZP       E7,1766  151  DELVROD     4733  1506  1/.03
 E7,1647  150  WCHVERT     E7,1676  145  E0          E7,1731  145  SINTHETA   E7,1772  146  POINTVSM    4734  1095  LIMITS
 E7,1650  149  LRADRET     E7,1676  145  MX          E7,1732  143  SS         E7,1774  151  HCALC1      4735    67  NJETSBIT
 E7,1651  149  VSELECT     E7,1676  150  LATVMETR    E7,1733  144  DATAGOOD   E7,1777  152  END-E7      4735    68  DRFTBIT
 E7,1652  148  NEWPOS      E7,1677  150  FORVMETR    E7,1733  146  RRTRUN     E7,1777  152  END-E7.4    4735    72  MRKIDBIT
 E7,1652  149  VMEAS       E7,1700  143  VGPREV      E7,1733  151  DELVS         4000    28  FFTAG1      4735    73  DSKYFBIT
 E7,1653  152  TXO         E7,1700  143  VGTIG       E7,1734  143  F             4000    28  FFTAG10     4735    75  S32BIT1
 E7,1654  149  HMEAS       E7,1700  145  E1          E7,1734  144  OMEGAD        4000    28  FFTAG11     4735    77  ITSWBIT
 E7,1655  142  DELVSIN     E7,1700  150  LATVEL      E7,1734  144  OMEGDISP      4000    28  FFTAG12     4735    78  RPQFLBIT
 E7,1655  143  IC          E7,1701  150  FORVEL      E7,1735  146  RRSHAFT       4000    28  FFTAG13     4735    83  LRBYBIT
 E7,1655  152  END-E7.5    E7,1702  145  E2          E7,1736  143  MDOT          4000    28  FFTAG2      4735    85  CDESBIT
 E7,1656  149  VN2         E7,1702  150  TRAKLATV    E7,1736  144  NSRCHPNT      4000    28  FFTAG3      4735    87  PULSES
 E7,1656  150  GNUR        E7,1703  144  VXRCM       E7,1737  144  SAVLEMV       4000    28  FFTAG4      4735  1099  NEGMAX
 E7,1656  150  GNUV        E7,1703  148  P21BASEV    E7,1737  146  LRS22.1X      4000    28  FFTAG7      4735  1099  VLOADCOD
 E7,1656  150  LRADRET1    E7,1703  150  TRAKFWDV    E7,1740  143  TDECAY        4000    28  FFTAG8      4735  1285  SBIT15
 E7,1660  148  LNCHTM      E7,1704  145  E3          E7,1740  146  RRBORSIT      4000    28  FFTAG9      4736    65  JSWCHBIT
 E7,1662  148  TRANSTM     E7,1704  145  MY          E7,1741  151  ALTBITS       4000    28  RADARFF     4736    67  DIDFLBIT
 E7,1663  142  DELVSAB     E7,1704  150  VHY         E7,1742  143  VEX           4000   152  END-E7.2    4736    68  SRCHOBIT
 E7,1663  142  VGDISP      E7,1705  151  VHZ         E7,1742  772  2VEXHUST      4060   154  UPRPTBB     4736    70  GLOKFBIT
 E7,1664  148  NCSMVEL     E7,1706  143  VG          E7,1743  151  RUNIT         4101  1095  OCT60000    4736    72  PRIODBIT
 E7,1664  150  DELTAH      E7,1706  151  VVECT       E7,1744  143  IRETURN1      4144  1372  VERBMASK    4736    75  S32BIT2
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL

    4736   77  MANUFBIT      4741   69  STEERBIT      4744   67  VEHUPBIT      4747   68  TRACKBIT      4751 1285  S+4
    4736   80  FLVRBIT       4741   70  NR29FBIT      4744   69  XDELVBIT      4747   69  AVFLBIT       4751 1285  SBIT3
    4736   82  INTFLBIT      4741   72  MWAITBIT      4744   71  PRECIBIT      4747   71  STATEBIT      4752   37  DELAYNUM
    4736   85  REMODBIT      4741   74  R77FLBIT      4744   72  NRMNVBIT      4747   73  MPUPTBIT      4752   66  R10FLBIT
    4736   87  USEQRJTS      4741   77  SWANDBIT      4744   76  MUNFLBIT      4747   78  AVEGFBIT      4752   68  GUESSBIT
    4736 1099  HALF          4741   79  LMOONBIT      4744   77  V67FLBIT      4747   79  APSESBIT      4752   70  CALC2BIT
    4736 1099  POS1/2        4741   80  FLPIBIT       4744   79  SURFFBIT      4747   81  QUITBIT       4752   71  D6OR9BIT
    4736 1099  PRIO20        4741   83  PSTHIBIT      4744   81  FLAPBIT       4747   84  READVBIT      4752   75  MGLVFBIT
    4736 1285  SBIT14        4741   85  REPOSBIT      4744   84  LRINHBIT      4747   86  LRALTBIT      4752   76  AUXFLBIT
    4737   40  HIRTHROT      4741   87  ACC4OR2X      4744   86  LRVELBIT      4747   88  AORBSYST      4752   78  V82EMBIT
    4737   65  MIDFLBIT      4741  131  QRBIT         4744   87  DRIFTBIT      4747  613  HLITE         4752   80  INITABIT
    4737   67  ERADFBIT      4741 1099  EBANK4        4744 1285  SBIT8         4747  749  OCT20         4752   81  MIDAVBIT
    4737   68  ACMODBIT      4741 1099  PRIO2         4744 1331  IMUSEFLG      4747  751  LSTLIM        4752   84  VFLSHBIT
    4737   70  REFSMBIT      4741 1099  2K            4744 1506  .0125RS       4747  821  +AZBIT        4752   86  AUTOMBIT
    4737   72  NRMIDBIT      4741 1285  SBIT11        4745   66  RNDVZBIT      4747 1285  SBIT5         4752   88  AUTRATE2
    4737   74  SNUFFBIT      4742   65  FSPASBIT      4745   67  UPDATBIT      4747 1412  CALLGMBL      4752  746  BLANKDEX
    4737   75  S32BIT3A      4742   67  R61FLBIT      4745   69  ETPIBIT       4750   66  NEEDLBIT      4752  821  +ELBIT
    4737   77  IGNFLBIT      4742   70  VFLAGBIT      4745   69  OPTNBIT       4750   69  PFRATBIT      4752 1099  TWO
    4737   79  NEWIBIT       4742   72  NWAITBIT      4745   71  CULTBIT       4750   71  INTYPBIT      4752 1285  S+2
    4737   82  APSFLBIT      4742   74  RNGSCBIT      4745   73  PRONVBIT      4750   73  NFUPTBIT      4752 1285  SBIT2
    4737   85  CDUOBIT       4742   76  GMBDRBIT      4745   74  ENGONBIT      4750   75  NORFMBIT      4752 1389  UP72
    4737   87  CSMDOCKD      4742   77  NORMSBIT      4745   78  IDLEFBIT      4750   78  UPLOCBIT      4753   66  OLDESBIT
    4737  218  OCT10000      4742   79  FLUNDBIT      4745   79  INFINBIT      4750   80  COGAFBIT      4753   70  NODOBIT
    4737  797  FEXTRA        4742   80  FLRCSBIT      4745   82  REINTBIT      4750   84  RNGEDBIT      4753   71  DIMOBIT
    4737 1099  PRIO10        4742   84  NOLRRBIT      4745   84  VELDABIT      4750   86  RRDATABT      4753   73  XDSPBIT
    4737 1099  QUARTER       4742   85  DESIGBIT      4745   86  RCDUFBIT      4750   88  DBSELECT      4753   75  RENDWBIT
    4737 1285  SBIT13        4742   87  AFFBITAN      4745   87  RHCSCALE      4750  232  OCT00010      4753   77  ATTFLBIT
    4740   65  MOONBIT       4742  131  PBIT          4745 1096  SUPER100      4750  827  TSCALINV      4753   78  TFFSWBIT
    4740   67  RODFLBIT      4742 1099  PRIO1         4745 1285  SBIT7         4750 1099  EIGHT         4753   80  360SWBIT
    4740   68  LOSCMBIT      4742 1285  SBIT10        4746   66  RRNBBIT       4750 1285  SBIT4         4753   81  AVEMDBIT
    4740   70  LUNABIT       4743   66  P25FLBIT      4746   67  NOUPFBIT      4750 1419  DSPLYALT      4753   85  HFLSHBIT
    4740   72  PDSPFBIT      4743   69  IMPULBIT      4746   69  FINALBIT      4751   66  FREEFBIT      4753   86  TURNONBT
    4740   74  NOTHRBIT      4743   71  READRBIT      4746   71  ORBWFBIT      4751   68  SLOPEBIT      4753   88  AUTRATE1
    4740   75  S32BIT3B      4743   71  R04FLBIT      4746   73  PINBRBIT      4751   70  CALC3BIT      4753  209  LAGSLIST
    4740   77  ASTNBIT       4743   72  MRKNVBIT      4746   74  3AXISBIT      4751   71  VINTFBIT      4753  821  -ELBIT
    4740   79  CMOONBIT      4743   74  DMENFBIT      4746   76  REDFLBIT      4751   73  MKOVBIT       4753 1099  ONE
    4740   80  FLPCBIT       4743   77  RVSWBIT       4746   78  V37FLBIT      4751   75  SOLNSBIT      4753 1285  S+1
    4740   83  VXINHBIT      4743   79  P39SWBIT      4746   79  ORDERBIT      4751   76  NTARGBIT      4753 1285  SBIT1
    4740   85  ANTENBIT      4743   81  LETABBIT      4746   81  ROTFLBIT      4751   78  VERIFBIT      4753 1389  UP71
    4740   87  OURRCBIT      4743   84  XORFLBIT      4746   84  READLBIT      4751   81  MID1FBIT      4754 1286  S-ZERO
    4740  827  TTFSCALE      4743   85  ALTSCBIT      4746   86  LRPOSBIT      4751   84  SCABBIT       4755  235  DNLADP00
    4740 1099  PRIO4         4743   87  XOVINHIB      4746   88  ULLAGER       4751   86  ERRSBIT       4755 1285  S+ZERO
    4740 1285  SBIT12        4743 1285  SBIT9         4746  821  -AZBIT        4751   88  ACCSOKAY      4755 1389  UP70
    4741   43  MINCSM        4743 1309  SPSCODE       4746 1285  SBIT6         4751  613  VLITE         4756  223  NUMGRPS
    4741   65  P21FLBIT      4744   66  IMUSEBIT      4747   66  LOKONBIT      4751 1099  FOUR          4756 1285  S+5
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL

   4756 1391  UPDTPHAS      5472  263  TERMEXTV   01,2000   28  RESTART   05,2154  199  LMREND04  10,2000   29  RTBCODES
   4757  444  DSPMSK        5472  264  ENDEXTVB   01,2000  239  PRDTTAB   05,2154  200  LMDSAS04  10,2000   29  SLCTMU
   4757 1099  LOW3          5472 1372  ENDEXT     01,2001  239  CADRTAB   05,2154  202  LMLSAL04  10,2330 1372  GOXDSP
   4757 1286  S+7           5644 1384  ABORT      01,2016  239  2.2SPOT   05,2154  204  LMAGSI04  10,2334 1372  GOXDSPF
   4757 1374  OCT7          5660  232  NEG7       01,2016  240  3.2SPOT   05,2157  196  LMCSTA05  10,2350 1372  GOXDSPR
   4760  745  VB99DEX       5660 1286  S-7        01,2016  243  6.2SPOT   05,2157  199  LMREND05  10,2353 1372  GOXDSPFR
   4760 1099  NOUTCON       5751  181  120MS      01,2516 1094  SW/       05,2157  200  LMDSAS05  10,3050 1372  GOAGIN
   4761 1073  THIRTEEN      5751 1331  BITS3&4    04,2000   28  AOTMARK2  05,2157  202  LMLSAL05  10,3070 1372  GOPLAY
   4762  745  CNTDNDEX      5751 1484  TWELVE     04,2000   28  CONICS1   05,2157  204  LMAGSI05  11,2000   29  F2DPS*11
   4764 1096  DEC27         6000   28  FFTAG5     04,2000   28  E/PROG    05,2170  200  LMDSAS06  11,2000   29  INTVEL
   4765  745  VB97DEX       6000   28  FFTAG6     04,2000   28  KEYRUPT   05,2170  202  LMLSAL06  11,2000   29  ORBITAL
   4765 1096  DEC29         6001  749  ?          04,2000   28  PINBALL4  05,2172  193  NOMDNLST  12,2000   29  CONICS
   4766  279  250MS+1       6010  209  VOON25     04,2000   28  R02       05,2172  196  LMCSTADL  12,2000   29  ORBITAL1
   4766 1510  RATELIM1      6074 1308  OCT177     04,2000   28  R36LM     05,2224  199  LMREND06  12,2000   30  INTPRET2
   4767 1510  RATEDB1       6107 1099  VLOAD*     04,2000   28  UPDATE2   05,2224  201  LMDSAS09  12,2000   37  LOUNITZ
   4771  304  MIXCON        6112 1286  S-4        04,2000   28  VERB37    05,2224  202  LMLSAL08  12,2002   37  LOUNITY
   4771 1286  CNTRCON       6242 1099  SIX        04,2040  447  MODROUTB  05,2226  202  LMLSAL09  12,2004   37  LODPHALF
   4771 1331  BITS4&6       6242 1285  S+6        04,3036   37  LODP1/4   05,2232  198  LMRENDDL  12,2004   37  LOUNITX
   4774 1335  OCT62         6245  563  BIN3       04,3041 1185  BEE19     05,2276  202  LMLSAL07  12,2004 1101  HALFDP
   4775 1099  OCT120        6245 1099  LOW2       04,3045 1185  BEE22     05,2303  200  LMDSASDL  12,2004 1136  DP1/2
   4776 1099  OCT140        6245 1099  THREE      04,3401 1389  UPPART2   05,2357  202  LMLSALDL  12,2004 1148  1B1
   4777  381  1SECX         6245 1285  S+3        04,3520 1391  UPSTORE   05,2407  193  AGSLIST   12,2006   37  LO6ZEROS
   4777  763  SEC01         6245 1389  UP73       04,3562 1392  UPPART3   05,2407  193  UPDNLIST  12,2006 1101  ZERODP
   5006  930  VB05N09       6471 1099  OCT30002   04,3711 1394  UPOUT     05,2407  204  LMAGSIDL  12,2006 1137  2DZERO
   5007  223  STARTEB       6741 1025  Q+2        04,3712 1391  UPOUT4    06,2000   29  EARTHLOC  12,2006 1185  KEPZERO
   5007 1099  EBANK3        6742 1294  TCQ        05,2000   29  ABORTS1   06,2000   29  IMUCOMP   12,2006 1246  DPZERO
   5007 1286  ERASCON6      7663 1099  OCT10001   05,2000   29  ASENT3    06,2000   29  MIDDGIM   12,2017   37  RMM
   5007 1429  QGIMBITS      7712  552  BIT12,14   05,2000   29  DOWNTELM  06,2000   29  RCSMONT   12,2017 1202  LDPOSMAX
   5011   37  ERASID        7716 1441  25/32      05,2000   29  EPHEM1    06,2000   29  T4RUP     12,2021   37  RME
   5012 1286  S10BITS       7722 1099  B12T14     05,2000   29  FRANDRES  06,2703  180  ICDUFAIL  12,3755 1246  DQUARTER
   5014  595  NR29&RDR      7727  155  10CMRUPT   05,2066  194  LMORBMDL  06,2703  180  IMUFAIL   12,3755 1246  POS1/4
   5014 1433  BITS9,11      7727 1413  MS100      05,2127  196  LMCSTA01  06,3132  188  DAPT4S    12,3773 1246  2/3
   5015 1099  EBANK6        7731  159  20MRUPT    05,2127  198  LMREND01  06,3132  189  NORRGMON  13,2000   30  ABTFLGS
   5020  907  BITSET        7740  532  -45DEGSR   05,2127  202  LMLSAL01  06,3156  191  RCSMONIT  13,2000   30  INTINIT
   5020 1286  SBNK03        7740 1372  PINMASK    05,2136  196  LMCSTA02  06,3242  192  5FAILTAB  13,2000   30  LATLONG
   5020 1429  ?GIMBITS      7741  528  -BIT12     05,2136  198  LMREND02  06,3252  192  6FAILTAB  13,2000   30  LEMGEOM
   5024 1300  OCT14000      7741  994  MINB12     05,2136  200  LMDSAS02  07,2000   29  AOTMARK1  13,2000   30  ORBITAL2
   5025  181  OCT15000      7745 1286  S-3        05,2136  202  LMLSAL02  07,2000   29  ASENT2    13,2000   30  P76LOC
   5026  181  33RDMSK       7746 1286  S-2        05,2136  204  LMAGSI02  07,2000   29  MODESW    13,2661   37  ATOPOTH
   5026  223  IM33INIT      7746 1308  MINUS2     05,2145  196  LMCSTA03  07,2667  851  SETXFLAG  13,2734   37  ATOPTHIS
   5155 1384  DOALARM       7747 1099  MINUS1     05,2145  198  LMREND03  07,3210 1331  IMUFIN20  13,2747   37  MOVATHIS
   5270  181  CLOCKOK       7747 1099  NEG1       05,2145  200  LMDSAS03  07,3712 1330  OPTSTALL  13,3043   37  OTHPREC
   5270  189  ENDDAPT4      7747 1286  S-1        05,2145  202  LMLSAL03  10,2000   29  DISPLAYS  13,3057   37  THISPREC
   5270  190  RCSMONEX   00,2000   28  DLAYJOB    05,2145  204  LMAGSI03  10,2000   29  FLESHLOC  14,2000   31  ASENT4
   5464 1373  LINUS      01,2000   28  LOADDAP1   05,2154  196  LMCSTA04  10,2000   29  PHASETAB  14,2000   31  P50S1
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF   PAGE   SYMBOL          DEF   PAGE   SYMBOL          DEF   PAGE   SYMBOL          DEF   PAGE   SYMBOL          DEF   PAGE   SYMBOL

14,2000    31   STARTAB     23,2000    32   APOPERI     24,2000   492   PROG22      31,2000    34   F2DPS*31    36,2777   745   V99RECYC
14,2506   935   S50         23,2000    32   ASENT7      25,2000    32   PLANTIN3    31,2000    34   VB67        37,2000    36   IMUSUPER
14,2611   937   R56         23,2000    32   EXTVB1      25,2000    32   P20S1       32,2000    34   ABORTS      37,2000    36   IMU2
14,3256   945   R54         23,2000    32   INFLIGHT    25,2000    32   P20S2       32,2000    34   F2DPS*32    37,2000    36   IMU4
15,2000    31   EPHEM       23,2000    32   INTPRET1    25,2000    32   RADARUPT    32,2000    34   LRS22       37,2000    36   P05P06
15,2000    31   P50S        23,2000    32   MEASINC     25,2000    32   RRLEADIN    32,2000    34   P20S4       37,2000    36   R31
15,2465   251   DP1/12      23,2000    32   MEASINC1    25,2000    32   R29S1       32,2000    34   P66LOC      37,2000    36   SERV1
15,3664   985   LUNPOS      23,2000    32   NORMLIZ     26,2000    33   BAWLANGS    32,2000    34   R47         37,3544   962   PIPSRINE
16,2000    31   DAPS1       23,2000    32   POWFLITE    26,2000    33   MANUVER     32,2000    34   SERV        40,2000    36   PINBALL1
16,3572  1440   INDXYZ      23,2000    32   POWFLIT1    26,2000    33   MANUVER1    33,2000    34   ASENT6      40,2000    36   PINSUPER
17,2000    31   DAPS2       23,2000    32   P12A        26,2000    33   PLANTIN1    33,2000    34   R29/SERV    40,2000    36   R31LOC
17,2000    31   P40S3       23,2000    32   R61         26,2000    33   PLANTIN2    33,2000    34   SERVICES    40,2000    36   SELFSUPR
17,2022   742   ZOOM        23,2000    32   R62         26,2000    33   P20S3       33,2677   878   ALTCRIT     40,3322   443   ENDECVN
17,2661  1452   ATTSTEER    23,2103   485   R62DISP     27,2000    33   ASENT1      33,3146   855   100CS       40,3505   450   ENDRELDS
17,3107  1446   14MS        23,2314  1283   RPAD1       27,2000    33   P40S1       33,3514   889   ENDVDAT     40,3534   457   ENDBSUB1
20,2000    31   DAPS3       23,2511    37   HIDP1/4     27,2000    33   SERV3       34,2000    34   ASCFILT     40,3534  1294   DSPMMJOB
20,2000    31   LOADDAP     23,2511  1283   TFF1/4      27,2000    33   TOF-FF      34,2000    34   CSI/CDH1    40,3674   471   ENDPINS1
20,2000    31   RODTRAP     23,2513    37   HIUNITZ     27,2000    33   TOF-FF1     34,2000    34   P30S1       41,2000    36   PINBALL2
21,2000    31   DAPS4       23,2513    37   NB1NB2      27,2000    33   VECPT       34,2000    34   R12STUFF    41,2616   417   ENDRTOUT
21,2000    31   R10         23,2513    37   THISAXIS    27,3753  1282   TCDANZIG    34,2000    34   SERV4       41,3230   431   ENDRUTIN
21,2000    31   R11         23,2515    37   HIUNITY     30,2000    34   ASENT       34,2000    34   STBLEORB    41,3731   469   ENDPINS2
22,2000    32   KALCMON1    23,2517    37   HIDPHALF    30,2000    34   ASENT5      35,2000    35   CSI/CDH     42,2000    36   PINBALL3
22,2000    32   KALCMON2    23,2517    37   HIUNITX     30,2000    34   FCDUW       35,2000    35   CLM         42,2000    36   SBAND
22,2000    32   LANDCNST    23,2517   593   COS60DEG    30,2000    34   FLOGSUB     35,2000    35   P30S        42,3606   436   ENDHMSS
22,2000    32   RENDEZ      23,2517  1100   DPHALF      30,2000    34   LOWSUPER    35,2000    35   P40S2       43,2000    36   EXTVERBS
22,2000    32   R30LOC      23,2521    37   HI6ZEROS    30,2000    34   P12         36,2000    36   P40S        43,2000    36   SELFCHEC
22,2000    32   SERV2       23,2521   593   ZERO/SP     30,2000    34   VB67A       36,2055   763   ACADN85     43,2002   466   PINTEST
22,2744   364   LOCSKIRT    23,2521  1157   ZEROO       30,3022   855   T2A         36,2105   749   SERVCADR    43,2226   269   OPTCOARV
22,3541    37   DELRSPL     23,2521  1283   TFFZEROS    30,3767   925   DAZMAX      36,2146   733   P12SPOT     43,3045   288   V74
22,3541   718   SPLRET      24,2000    32   PLANTIN     30,3771   925   DELERLIM    36,2146   733   P42SPOT     43,3100   290   GOSHOSUM
22,3707   864   OUTGOAVE    24,2000    32   P20S        31,2000    34   FTHROT      36,2151   733   P63SPOT     43,3740  1388   CKMDMORE
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SUMMARY OF SYMBOL TABLE LISTINGS

            4927  DEFINED NORMALLY

            2178  DEFINED BY EQUALS
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TOTAL:      7105
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MEMORY TYPE & AVAILABILITY DISPLAY

   0000 TO    0057  SPECIAL OR NONEXISTENT MEMORY           23,2000 TO 23,3771  RESERVED SWITCHABLE FIXED MEMORY
                                                            23,3772 TO 23,3777  AVAILABLE SWITCHABLE FIXED MEMORY
              0060  AVAILABLE ERASABLE MEMORY               24,2000 TO 25,3772  RESERVED SWITCHABLE FIXED MEMORY
   0061 TO    1377  RESERVED ERASABLE MEMORY                25,3773 TO 25,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            26,2000 TO 27,3774  RESERVED SWITCHABLE FIXED MEMORY
E3,1400 TO E4,1756  RESERVED SWITCHABLE ERASABLE MEMORY     27,3775 TO 27,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E4,1757 TO E4,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    30,2000 TO 31,3763  RESERVED SWITCHABLE FIXED MEMORY
E5,1400 TO E5,1641  RESERVED SWITCHABLE ERASABLE MEMORY     31,3764 TO 31,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E5,1642 TO E5,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    32,2000 TO 32,3775  RESERVED SWITCHABLE FIXED MEMORY
E6,1400 TO E6,1771  RESERVED SWITCHABLE ERASABLE MEMORY     32,3776 TO 32,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E6,1772 TO E6,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    33,2000 TO 36,3767  RESERVED SWITCHABLE FIXED MEMORY
E7,1400 TO E7,1744  RESERVED SWITCHABLE ERASABLE MEMORY     36,3770 TO 36,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E7,1745 TO E7,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    37,2000 TO 37,3776  RESERVED SWITCHABLE FIXED MEMORY
                                                                       37,3777  AVAILABLE SWITCHABLE FIXED MEMORY
   4000 TO    7760  RESERVED FIXED MEMORY                   40,2000 TO 40,3715  RESERVED SWITCHABLE FIXED MEMORY
   7761 TO    7777  AVAILABLE FIXED MEMORY                  40,3716 TO 40,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            41,2000 TO 41,3733  RESERVED SWITCHABLE FIXED MEMORY
00,2000 TO 00,3776  RESERVED SWITCHABLE FIXED MEMORY        41,3734 TO 41,3777  AVAILABLE SWITCHABLE FIXED MEMORY
           00,3777  AVAILABLE SWITCHABLE FIXED MEMORY       42,2000 TO 42,3774  RESERVED SWITCHABLE FIXED MEMORY
01,2000 TO 01,3777  RESERVED SWITCHABLE FIXED MEMORY        42,3775 TO 42,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            43,2000 TO 43,3754  RESERVED SWITCHABLE FIXED MEMORY
02,2000 TO 03,3777  SPECIAL OR NONEXISTENT MEMORY           43,3755 TO 43,3777  AVAILABLE SWITCHABLE FIXED MEMORY

04,2000 TO 04,3773  RESERVED SWITCHABLE FIXED MEMORY        44,2000 TO 57,3777  SPECIAL OR NONEXISTENT MEMORY
04,3774 TO 04,3777  AVAILABLE SWITCHABLE FIXED MEMORY
05,2000 TO 05,3774  RESERVED SWITCHABLE FIXED MEMORY        60,2000 TO 67,3777  AVAILABLE SWITCHABLE FIXED MEMORY
05,3775 TO 05,3777  AVAILABLE SWITCHABLE FIXED MEMORY
06,2000 TO 06,3766  RESERVED SWITCHABLE FIXED MEMORY        70,2000 TO 73,3777  SPECIAL OR NONEXISTENT MEMORY
06,3767 TO 06,3777  AVAILABLE SWITCHABLE FIXED MEMORY
07,2000 TO 07,3775  RESERVED SWITCHABLE FIXED MEMORY
07,3776 TO 07,3777  AVAILABLE SWITCHABLE FIXED MEMORY
10,2000 TO 13,3771  RESERVED SWITCHABLE FIXED MEMORY
13,3772 TO 13,3777  AVAILABLE SWITCHABLE FIXED MEMORY
14,2000 TO 14,3776  RESERVED SWITCHABLE FIXED MEMORY
           14,3777  AVAILABLE SWITCHABLE FIXED MEMORY
15,2000 TO 16,3774  RESERVED SWITCHABLE FIXED MEMORY
16,3775 TO 16,3777  AVAILABLE SWITCHABLE FIXED MEMORY
17,2000 TO 17,3746  RESERVED SWITCHABLE FIXED MEMORY
17,3747 TO 17,3777  AVAILABLE SWITCHABLE FIXED MEMORY
20,2000 TO 20,3774  RESERVED SWITCHABLE FIXED MEMORY
20,3775 TO 20,3777  AVAILABLE SWITCHABLE FIXED MEMORY
21,2000 TO 21,3772  RESERVED SWITCHABLE FIXED MEMORY
21,3773 TO 21,3777  AVAILABLE SWITCHABLE FIXED MEMORY
22,2000 TO 22,3775  RESERVED SWITCHABLE FIXED MEMORY
22,3776 TO 22,3777  AVAILABLE SWITCHABLE FIXED MEMORY
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES             3:15 DEC.  2,1970                  PAGE 1583

ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL          ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

              REF   0 LAST      TO   28:     0     0     0      04/KEYUP     REF   1 LAST 1338 TO 1354:    69    69  4353
BANKSUM       REF   1 LAST   29 TO   38:    65    65    65      04/LT-LG     REF   1 LAST   45 TO   45:     4     4  4357
00/DELAY      REF   1 LAST 1377 TO 1379:    31    31    96      04/MARK      REF   1 LAST  249 TO  250:    32    32  4389
00/INTER      REF   1 LAST 1047 TO 1087:   974   974  1070      04/PIN       REF   2 LAST  464 TO  464:     7    16  4405

01/EXEC       REF   1 LAST 1106 TO 1116:   280   280  1350      04/P00       REF   1 LAST  224 TO  236:   330   330  4735
01/INTER      REF   1 LAST 1087 TO 1095:   157   157  1507      04/P07       REF   2 LAST  372 TO  373:     5    32  4767
01/RSEQU      REF   3 LAST 1307 TO 1309:    55   168  1675      04/P27       REF   1 LAST 1389 TO 1397:   248   248  5015
01/RSTAB      REF   1 LAST  239 TO  244:   132   132  1807      04/P57       REF   1 LAST  983 TO  985:    12    12  5027

01/R03        REF   2 LAST  293 TO  297:    94    96  1903      04/R02       REF   1 LAST 1332 TO 1335:    17    17  5044
01/WAIT       REF   2 LAST 1131 TO 1133:    44   189  2092      04/R36       REF   1 LAST  701 TO  703:    93    93  5137
02/ALARM      REF   2 LAST 1382 TO 1385:    79   116  2208      05/ASENT     REF   1 LAST  852 TO  852:     4     4  5141
02/BANK       REF   1 LAST  998 TO 1002:    76    76  2284      05/DLIST     REF   1 LAST  193 TO  206:   242   242  5383

02/DAPT6      REF   1 LAST 1404 TO 1405:    18    18  2302      05/DPROG     REF   1 LAST  991 TO  998:   180   180  5563
02/DSPLA      REF   1 LAST 1354 TO 1354:    16    16  2318      05/EPHEM     REF   2 LAST  987 TO  991:     0    52  5615
02/EXEC       REF   2 LAST 1116 TO 1119:     6    65  2383      05/P70       REF   1 LAST  830 TO  832:    64    64  5679
02/EXTVB      REF   1 LAST 1380 TO 1381:     4     4  2387      05/START     REF   2 LAST  211 TO  224:   475   476  6155

02/FCONS      REF   1 LAST 1095 TO 1097:    64    64  2451      06/ICOMP     REF   1 LAST  326 TO  339:   282   282  6437
02/FLAG       REF   1 LAST 1375 TO 1377:    32    32  2483      06/LURDT     REF   1 LAST 1147 TO 1149:     9     9  6446
02/IMODE      REF   1 LAST 1309 TO 1310:     5     5  2488      06/MIDG      REF   1 LAST  692 TO  693:    30    30  6476
02/INTER      REF   1 LAST 1102 TO 1103:    32    32  2520      06/T4RCS     REF   1 LAST  191 TO  193:    69    69  6545

02/PHASE      REF   1 LAST 1298 TO 1300:    71    71  2591      06/T4RPT     REF   2 LAST  156 TO  191:   612   622  7167
02/PIN        REF   6 LAST  464 TO  467:    37   246  2837      07/ASENT     REF   1 LAST  851 TO  852:    21    21  7188
02/P07        REF   1 LAST  381 TO  383:    18    18  2855      07/IMODE     REF   1 LAST 1310 TO 1332:   559   559  7747
02/RFSUB      REF   1 LAST  520 TO  526:    68    68  2923      07/MARK      REF   2 LAST  251 TO  261:   286   407  8154

02/RSEQU      REF   2 LAST 1306 TO 1307:    10    17  2940      07/R59       REF   1 LAST  261 TO  262:    32    32  8186
02/RUFTS      REF   1 LAST  153 TO  155:    54    54  2994      10/DSPLA     REF   3 LAST 1382 TO 1382:     9   677  8863
02/TRAN       REF   1 LAST 1379 TO 1380:    15    15  3009      10/MIDG      REF   1 LAST  693 TO  695:    24    24  8887
02/T4RPT      REF   1 LAST  155 TO  156:    12    12  3021      10/PHASE     REF   2 LAST 1300 TO 1302:    66    75  8962

02/WAIT       REF   2 LAST 1129 TO 1131:    24    78  3099      10/POWFL     REF   1 LAST 1265 TO 1271:   115   115  9077
03/DAP        REF   1 LAST 1459 TO 1461:     2     2  3101      10/RTB       REF   1 LAST 1397 TO 1404:   130   130  9207
03/FCONS      REF   1 LAST 1097 TO 1100:    32    32  3133      11/F2DPS     REF   1 LAST  820 TO  822:    65    65  9272
03/INTER      REF   3 LAST 1014 TO 1047:   732   952  4085      11/INITV     REF   1 LAST  686 TO  692:   189   189  9461

03/KILL       REF   1 LAST  750 TO  750:     8     8  4093      11/ORBIT     REF   1 LAST 1227 TO 1249:   841   841 10302
03/PHASE      REF   1 LAST 1302 TO 1303:     4     4  4097      12/CONIC     REF   3 LAST 1189 TO 1209:   494   978 11280
03/P00        REF   1 LAST  224 TO  224:     8     8  4105      12/ICONS     REF   1 LAST 1101 TO 1102:    19    19 11299
03/P20        REF   1 LAST  593 TO  595:     5     5  4110      13/ALARM     REF   1 LAST 1385 TO 1388:    10    10 11309

03/P40        REF   1 LAST   40 TO   40:     1     1  4111      13/GEOM      REF   1 LAST  320 TO  324:    79    79 11388
03/P24        REF   1 LAST  516 TO  516:     9     9  4120      13/INTIN     REF   4 LAST 1221 TO 1225:   134   605 11993
04/CONIC      REF   3 LAST 1186 TO 1189:    65   110  4230      13/LT-LG     REF   1 LAST 1133 TO 1140:   155   155 12148
04/INTIN      REF   1 LAST 1225 TO 1227:    54    54  4284      13/ORBIT     REF   1 LAST   46 TO   46:    20    20 12168
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL        ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

13/P76      REF  1 LAST  709 TO  713:   98    98 12266          22/R30      REF  2 LAST  713 TO  720:  199   203 19289
14/ASENT    REF  1 LAST  852 TO  854:   63    63 12329          22/SERV     REF  1 LAST  863 TO  865:   24    24 19313
14/INFLT    REF  1 LAST  948 TO  949:    0     0 12329          22/SR30S    REF  1 LAST  720 TO  724:   62    62 19375
14/LOSAM    REF  2 LAST  935 TO  937:   67    75 12404          23/EXTVB    REF  1 LAST  271 TO  271:   33    33 19408

14/P51      REF  1 LAST  949 TO  953:  120   120 12524          23/GEOM     REF  1 LAST  324 TO  326:   34    34 19442
14/R50      REF  1 LAST  947 TO  948:   64    64 12588          23/ICONS    REF  1 LAST 1100 TO 1101:   16    16 19458
14/R51      REF  1 LAST  941 TO  945:  135   135 12723          23/INCOR    REF  2 LAST 1153 TO 1157:  196   334 19792
14/R52      REF  1 LAST  955 TO  957:   68    68 12791          23/INFLT    REF  1 LAST 1249 TO 1259:  184   184 19976

14/R54      REF  1 LAST  946 TO  947:   41    41 12832          23/PERAP    REF  1 LAST  695 TO  701:   78    78 20054
14/R55      REF  1 LAST  945 TO  946:   26    26 12858          23/POWFL    REF  1 LAST 1259 TO 1265:  152   152 20206
14/R56      REF  1 LAST  937 TO  941:  132   132 12990          23/P12      REF  1 LAST  841 TO  843:   23    23 20229
14/STARS    REF  1 LAST   47 TO   51:  223   223 13213          23/R61      REF  1 LAST  517 TO  520:  126   126 20355

14/S52.1    REF  1 LAST  953 TO  954:   25    25 13238          23/R62      REF  1 LAST  485 TO  486:   11    11 20366
14/S52.3    REF  1 LAST  954 TO  955:   16    16 13254          23/SERV     REF  1 LAST  866 TO  867:   24    24 20390
15/EPHEM    REF  1 LAST  985 TO  987:   74    74 13328          24/LPS20    REF  1 LAST  565 TO  566:   46    46 20436
15/P51      REF  1 LAST  961 TO  964:   67    67 13395          24/LUROT    REF  1 LAST 1141 TO 1144:   69    69 20505

15/P52      REF  1 LAST  927 TO  935:  157   157 13552          24/P20      REF  2 LAST  495 TO  501:  230   260 20765
15/P57      REF  2 LAST  968 TO  983:  440   567 14119          24/P21      REF  1 LAST  655 TO  661:  115   115 20880
15/R59      REF  2 LAST  957 TO  961:  149   189 14308          24/P22      REF  2 LAST  507 TO  508:    5     5 20885
16/DAP      REF  1 LAST 1470 TO 1472:   60    60 14368          24/P25      REF  1 LAST  502 TO  504:   37    37 20922

16/DAPID    REF  1 LAST 1410 TO 1414:  139   139 14507          24/R21      REF  1 LAST  508 TO  513:  161   161 21083
16/DAPP     REF  1 LAST 1421 TO 1442:  790   790 15297          24/R22      REF  1 LAST  504 TO  507:  142   142 21225
17/DAPQR    REF  1 LAST 1442 TO 1459:  624   624 15921          24/R23      REF  1 LAST  513 TO  515:   41    41 21266
17/DAPTJ    REF  1 LAST 1461 TO 1470:  314   314 16235          24/R24      REF  2 LAST  516 TO  517:   17    39 21305

17/DAPT6    REF  2 LAST 1405 TO 1406:    5    35 16270          24/R29      REF  2 LAST  605 TO  608:   69    87 21392
17/P40      REF  1 LAST  741 TO  742:   23    23 16293          25/LPS20    REF  1 LAST  566 TO  569:   12    12 21404
20/DAPAO    REF  4 LAST 1497 TO 1508:  354   727 17020          25/LUROT    REF  1 LAST 1144 TO 1146:   63    63 21467
20/DAPIF    REF  1 LAST 1406 TO 1410:   67    67 17087          25/RLEAD    REF  1 LAST  490 TO  492:   47    47 21514

20/F2DPS    REF  1 LAST  822 TO  822:    6     6 17093          25/RRUPT    REF  3 LAST  612 TO  614:   50   262 21776
20/NEEDL    REF  1 LAST 1414 TO 1421:  145   145 17238          25/RSUB     REF  2 LAST  561 TO  565:   60   626 22402
20/R03      REF  1 LAST  292 TO  293:   73    73 17311          26/BALL     REF  1 LAST  477 TO  481:   50    50 22452
21/DAPBU    REF  1 LAST 1508 TO 1508:   82    82 17393          26/LPS24    REF  1 LAST  588 TO  593:  172   172 22624

21/DAPGT    REF  1 LAST 1472 TO 1486:  388   388 17781          26/LSR22    REF  1 LAST  575 TO  588:  536   536 23160
21/P70      REF  2 LAST  835 TO  836:   16    30 17811          26/LUROT    REF  3 LAST 1146 TO 1147:   26    65 23225
21/R10      REF  2 LAST  898 TO  910:  467   473 18284          26/R06      REF  1 LAST  473 TO  477:   99    99 23324
21/R11      REF  1 LAST  829 TO  830:   52    52 18336          26/R63      REF  1 LAST  339 TO  351:   65    65 23389

21/SERV     REF  1 LAST  872 TO  873:   20    20 18356          27/ASENT    REF  2 LAST  854 TO  855:   21    36 23425
22/F2DPS    REF  1 LAST  827 TO  829:   10    10 18366          27/KILL     REF  1 LAST  750 TO  753:   38    38 23463
22/INCOR    REF  1 LAST 1157 TO 1174:   50    50 18416          27/P12      REF  1 LAST   44 TO   44:    4     4 23467
22/KALC     REF  1 LAST  351 TO  370:  670   670 19086          27/P40      REF  2 LAST  753 TO  755:   83    93 23560
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL         ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

27/P70        REF   1 LAST   38 TO   39:     8     8 23568       34/P3879      REF   1 LAST  724 TO  731:   233   233 29548
27/SERV       REF   1 LAST  865 TO  866:    31    31 23599       34/SERV       REF   2 LAST  894 TO  894:    14    47 29595
27/S40.1      REF   1 LAST  765 TO  769:   101   101 23700       34/S30S       REF   1 LAST  616 TO  621:    47    47 29642
27/S40.2      REF   1 LAST  769 TO  770:    28    28 23728       35/P30        REF   1 LAST  614 TO  616:    23    23 29665

27/S40.6      REF   1 LAST  781 TO  784:    40    40 23768       35/P31        REF   1 LAST  652 TO  655:    61    61 29726
27/S40.8      REF   1 LAST  770 TO  773:    57    57 23825       35/P3272      REF   1 LAST  621 TO  627:   119   119 29845
27/S40.9      REF   2 LAST  776 TO  781:   200   202 24027       35/P3373      REF   1 LAST  627 TO  632:   140   140 29985
27/S41.1      REF   1 LAST  784 TO  785:     4     4 24031       35/P3474      REF   1 LAST  661 TO  666:   112   112 30097

27/TFF        REF   2 LAST 1271 TO 1285:   266   268 24299       35/P3575      REF   2 LAST  666 TO  686:   530   544 30641
27/VECPT      REF   1 LAST  481 TO  485:   136   136 24435       35/P40        REF   1 LAST  748 TO  749:    23    23 30664
27/40.13      REF   1 LAST  773 TO  776:   103   103 24538       36/P40        REF   6 LAST  759 TO  765:   163   778 31442
30/ASENT      REF   3 LAST  854 TO  854:    17   321 24859       36/P41        REF   1 LAST  755 TO  757:    78    78 31520

30/EXTVB      REF   1 LAST  610 TO  612:    47    47 24906       36/P42        REF   1 LAST  757 TO  758:    22    22 31542
30/FCDUW      REF   1 LAST  910 TO  927:   441   441 25347       36/P47        REF   1 LAST  758 TO  759:    52    52 31594
30/P12        REF   1 LAST  838 TO  841:   160   160 25507       37/P05        REF   1 LAST 1336 TO 1338:    32    32 31626
31/EXTVB      REF   1 LAST  608 TO  610:    93    93 25600       37/P06        REF   1 LAST 1335 TO 1336:    47    47 31673

31/F2DPS      REF   4 LAST  822 TO  827:   134   665 26265       37/P07        REF   3 LAST  383 TO  398:   267   587 32260
31/P6567      REF   1 LAST  791 TO  793:    42    42 26307       37/R31        REF   1 LAST  703 TO  709:   189   189 32449
31/R13        REF   1 LAST  800 TO  801:    74    74 26381       37/SERV       REF   2 LAST  869 TO  872:    76   165 32614
31/THROT      REF   2 LAST  793 TO  798:   130   135 26516       40/EXTVB      REF   1 LAST  299 TO  304:    63    63 32677

32/F2DPS      REF   2 LAST  816 TO  820:   173   174 26690       40/PIN        REF  10 LAST  470 TO  473:    57   893 33570
32/LRS22      REF   2 LAST  569 TO  575:   132   136 26826       40/R31        REF   1 LAST  703 TO  703:    15    15 33585
32/P20        REF   1 LAST  493 TO  495:   103   103 26929       41/PIN        REF   8 LAST  467 TO  470:    78   985 34570
32/P63        REF   1 LAST  785 TO  791:   181   181 27110       42/EXTVB      REF   2 LAST  287 TO  288:    23    38 34608

32/P70        REF   2 LAST  836 TO  838:    25   152 27262       42/NOUNS      REF   1 LAST  304 TO  320:   597   597 35205
32/R29        REF   1 LAST  600 TO  605:   151   151 27413       42/PIN        REF   2 LAST  434 TO  437:    92   238 35443
32/R47        REF   1 LAST  206 TO  211:   138   138 27551       42/R05        REF   2 LAST  486 TO  490:   116   118 35561
32/SERV       REF   1 LAST  866 TO  866:     3     3 27554       42/R33        REF   1 LAST  275 TO  276:    27    27 35588

33/ASENT      REF   1 LAST  855 TO  857:    44    44 27598       43/EXTVB      REF   6 LAST  297 TO  299:    56   478 36066
33/R29        REF   1 LAST  595 TO  599:    97    97 27695       43/PHASE      REF   1 LAST 1294 TO 1294:    14    14 36080
33/SERV       REF   8 LAST  894 TO  898:    71   926 28621       43/P27        REF   1 LAST 1388 TO 1389:    22    22 36102
34/ASENT      REF   1 LAST  843 TO  845:    44    44 28665       43/R0477      REF   1 LAST  276 TO  280:   188   188 36290

34/CSI        REF   1 LAST  632 TO  650:   650   650 29315       43/SELF       REF   1 LAST 1285 TO 1294:   314   314 36604
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

    4000  TO     4377      PARAGRAPH # 010          ROPE MODULE 1, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
    4400  TO     4777      PARAGRAPH # 011          ROPE MODULE 1, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
    5000  TO     5377      PARAGRAPH # 012          ROPE MODULE 1, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
    5400  TO     5777      PARAGRAPH # 013          ROPE MODULE 1, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
    6000  TO     6377      PARAGRAPH # 014          ROPE MODULE 1, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
    6400  TO     6777      PARAGRAPH # 015          ROPE MODULE 1, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
    7000  TO     7377      PARAGRAPH # 016          ROPE MODULE 1, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
    7400  TO     7777      PARAGRAPH # 017          ROPE MODULE 1, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
 00,2000  TO 00,2377      PARAGRAPH # 020          ROPE MODULE 1, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
 00,2400  TO 00,2777      PARAGRAPH # 021          ROPE MODULE 1, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
 00,3000  TO 00,3377      PARAGRAPH # 022          ROPE MODULE 1, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
 00,3400  TO 00,3777      PARAGRAPH # 023          ROPE MODULE 1, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
 01,2000  TO 01,2377      PARAGRAPH # 024          ROPE MODULE 1, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
 01,2400  TO 01,2777      PARAGRAPH # 025          ROPE MODULE 1, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
 01,3000  TO 01,3377      PARAGRAPH # 026          ROPE MODULE 1, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
 01,3400  TO 01,3777      PARAGRAPH # 027          ROPE MODULE 1, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)

 04,2000  TO 04,2377      PARAGRAPH # 040          ROPE MODULE 1, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
 04,2400  TO 04,2777      PARAGRAPH # 041          ROPE MODULE 1, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
 04,3000  TO 04,3377      PARAGRAPH # 042          ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
 04,3400  TO 04,3777      PARAGRAPH # 043          ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
 05,2000  TO 05,2377      PARAGRAPH # 044          ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
 05,2400  TO 05,2777      PARAGRAPH # 045          ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
 05,3000  TO 05,3377      PARAGRAPH # 046          ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
 05,3400  TO 05,3777      PARAGRAPH # 047          ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
 06,2000  TO 06,2377      PARAGRAPH # 050          ROPE MODULE 2, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
 06,2400  TO 06,2777      PARAGRAPH # 051          ROPE MODULE 2, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
 06,3000  TO 06,3377      PARAGRAPH # 052          ROPE MODULE 2, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
 06,3400  TO 06,3777      PARAGRAPH # 053          ROPE MODULE 2, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
 07,2000  TO 07,2377      PARAGRAPH # 054          ROPE MODULE 2, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
 07,2400  TO 07,2777      PARAGRAPH # 055          ROPE MODULE 2, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
 07,3000  TO 07,3377      PARAGRAPH # 056          ROPE MODULE 2, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
 07,3400  TO 07,3777      PARAGRAPH # 057          ROPE MODULE 2, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
 10,2000  TO 10,2377      PARAGRAPH # 060          ROPE MODULE 2, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
 10,2400  TO 10,2777      PARAGRAPH # 061          ROPE MODULE 2, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
 10,3000  TO 10,3377      PARAGRAPH # 062          ROPE MODULE 2, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
 10,3400  TO 10,3777      PARAGRAPH # 063          ROPE MODULE 2, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
 11,2000  TO 11,2377      PARAGRAPH # 064          ROPE MODULE 2, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
 11,2400  TO 11,2777      PARAGRAPH # 065          ROPE MODULE 2, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
 11,3000  TO 11,3377      PARAGRAPH # 066          ROPE MODULE 2, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
 11,3400  TO 11,3777      PARAGRAPH # 067          ROPE MODULE 2, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
 12,2000  TO 12,2377      PARAGRAPH # 070          ROPE MODULE 2, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
 12,2400  TO 12,2777      PARAGRAPH # 071          ROPE MODULE 2, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
 12,3000  TO 12,3377      PARAGRAPH # 072          ROPE MODULE 2, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

12,3400   TO 12,3777        PARAGRAPH # 073          ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
13,2000   TO 13,2377        PARAGRAPH # 074          ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
13,2400   TO 13,2777        PARAGRAPH # 075          ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
13,3000   TO 13,3377        PARAGRAPH # 076          ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400   TO 13,3777        PARAGRAPH # 077          ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
14,2000   TO 14,2377        PARAGRAPH # 100          ROPE MODULE 3, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
14,2400   TO 14,2777        PARAGRAPH # 101          ROPE MODULE 3, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
14,3000   TO 14,3377        PARAGRAPH # 102          ROPE MODULE 3, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
14,3400   TO 14,3777        PARAGRAPH # 103          ROPE MODULE 3, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
15,2000   TO 15,2377        PARAGRAPH # 104          ROPE MODULE 3, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
15,2400   TO 15,2777        PARAGRAPH # 105          ROPE MODULE 3, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
15,3000   TO 15,3377        PARAGRAPH # 106          ROPE MODULE 3, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
15,3400   TO 15,3777        PARAGRAPH # 107          ROPE MODULE 3, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
16,2000   TO 16,2377        PARAGRAPH # 110          ROPE MODULE 3, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
16,2400   TO 16,2777        PARAGRAPH # 111          ROPE MODULE 3, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
16,3000   TO 16,3377        PARAGRAPH # 112          ROPE MODULE 3, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
16,3400   TO 16,3777        PARAGRAPH # 113          ROPE MODULE 3, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
17,2000   TO 17,2377        PARAGRAPH # 114          ROPE MODULE 3, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
17,2400   TO 17,2777        PARAGRAPH # 115          ROPE MODULE 3, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
17,3000   TO 17,3377        PARAGRAPH # 116          ROPE MODULE 3, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
17,3400   TO 17,3777        PARAGRAPH # 117          ROPE MODULE 3, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
20,2000   TO 20,2377        PARAGRAPH # 120          ROPE MODULE 3, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
20,2400   TO 20,2777        PARAGRAPH # 121          ROPE MODULE 3, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
20,3000   TO 20,3377        PARAGRAPH # 122          ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400   TO 20,3777        PARAGRAPH # 123          ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
21,2000   TO 21,2377        PARAGRAPH # 124          ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400   TO 21,2777        PARAGRAPH # 125          ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000   TO 21,3377        PARAGRAPH # 126          ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400   TO 21,3777        PARAGRAPH # 127          ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
22,2000   TO 22,2377        PARAGRAPH # 130          ROPE MODULE 4, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
22,2400   TO 22,2777        PARAGRAPH # 131          ROPE MODULE 4, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
22,3000   TO 22,3377        PARAGRAPH # 132          ROPE MODULE 4, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
22,3400   TO 22,3777        PARAGRAPH # 133          ROPE MODULE 4, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
23,2000   TO 23,2377        PARAGRAPH # 134          ROPE MODULE 4, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
23,2400   TO 23,2777        PARAGRAPH # 135          ROPE MODULE 4, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
23,3000   TO 23,3377        PARAGRAPH # 136          ROPE MODULE 4, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
23,3400   TO 23,3777        PARAGRAPH # 137          ROPE MODULE 4, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
24,2000   TO 24,2377        PARAGRAPH # 140          ROPE MODULE 4, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
24,2400   TO 24,2777        PARAGRAPH # 141          ROPE MODULE 4, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
24,3000   TO 24,3377        PARAGRAPH # 142          ROPE MODULE 4, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
24,3400   TO 24,3777        PARAGRAPH # 143          ROPE MODULE 4, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
25,2000   TO 25,2377        PARAGRAPH # 144          ROPE MODULE 4, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
25,2400   TO 25,2777        PARAGRAPH # 145          ROPE MODULE 4, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
25,3000   TO 25,3377        PARAGRAPH # 146          ROPE MODULE 4, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
25,3400   TO 25,3777        PARAGRAPH # 147          ROPE MODULE 4, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

26,2000  TO 26,2377      PARAGRAPH # 150        ROPE MODULE 4, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
26,2400  TO 26,2777      PARAGRAPH # 151        ROPE MODULE 4, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
26,3000  TO 26,3377      PARAGRAPH # 152        ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
26,3400  TO 26,3777      PARAGRAPH # 153        ROPE MODULE 4, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
27,2000  TO 27,2377      PARAGRAPH # 154        ROPE MODULE 4, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
27,2400  TO 27,2777      PARAGRAPH # 155        ROPE MODULE 4, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
27,3000  TO 27,3377      PARAGRAPH # 156        ROPE MODULE 4, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
27,3400  TO 27,3777      PARAGRAPH # 157        ROPE MODULE 4, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
30,2000  TO 30,2377      PARAGRAPH # 160        ROPE MODULE 5, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
30,2400  TO 30,2777      PARAGRAPH # 161        ROPE MODULE 5, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
30,3000  TO 30,3377      PARAGRAPH # 162        ROPE MODULE 5, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
30,3400  TO 30,3777      PARAGRAPH # 163        ROPE MODULE 5, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
31,2000  TO 31,2377      PARAGRAPH # 164        ROPE MODULE 5, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
31,2400  TO 31,2777      PARAGRAPH # 165        ROPE MODULE 5, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
31,3000  TO 31,3377      PARAGRAPH # 166        ROPE MODULE 5, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
31,3400  TO 31,3777      PARAGRAPH # 167        ROPE MODULE 5, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
32,2000  TO 32,2377      PARAGRAPH # 170        ROPE MODULE 5, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
32,2400  TO 32,2777      PARAGRAPH # 171        ROPE MODULE 5, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
32,3000  TO 32,3377      PARAGRAPH # 172        ROPE MODULE 5, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
32,3400  TO 32,3777      PARAGRAPH # 173        ROPE MODULE 5, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
33,2000  TO 33,2377      PARAGRAPH # 174        ROPE MODULE 5, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
33,2400  TO 33,2777      PARAGRAPH # 175        ROPE MODULE 5, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
33,3000  TO 33,3377      PARAGRAPH # 176        ROPE MODULE 5, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
33,3400  TO 33,3777      PARAGRAPH # 177        ROPE MODULE 5, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
34,2000  TO 34,2377      PARAGRAPH # 200        ROPE MODULE 5, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
34,2400  TO 34,2777      PARAGRAPH # 201        ROPE MODULE 5, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
34,3000  TO 34,3377      PARAGRAPH # 202        ROPE MODULE 5, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
34,3400  TO 34,3777      PARAGRAPH # 203        ROPE MODULE 5, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
35,2000  TO 35,2377      PARAGRAPH # 204        ROPE MODULE 5, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
35,2400  TO 35,2777      PARAGRAPH # 205        ROPE MODULE 5, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
35,3000  TO 35,3377      PARAGRAPH # 206        ROPE MODULE 5, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
35,3400  TO 35,3777      PARAGRAPH # 207        ROPE MODULE 5, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
36,2000  TO 36,2377      PARAGRAPH # 210        ROPE MODULE 6, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
36,2400  TO 36,2777      PARAGRAPH # 211        ROPE MODULE 6, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
36,3000  TO 36,3377      PARAGRAPH # 212        ROPE MODULE 6, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
36,3400  TO 36,3777      PARAGRAPH # 213        ROPE MODULE 6, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
37,2000  TO 37,2377      PARAGRAPH # 214        ROPE MODULE 6, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
37,2400  TO 37,2777      PARAGRAPH # 215        ROPE MODULE 6, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
37,3000  TO 37,3377      PARAGRAPH # 216        ROPE MODULE 6, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
37,3400  TO 37,3777      PARAGRAPH # 217        ROPE MODULE 6, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
40,2000  TO 40,2377      PARAGRAPH # 220        ROPE MODULE 6, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
40,2400  TO 40,2777      PARAGRAPH # 221        ROPE MODULE 6, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
40,3000  TO 40,3377      PARAGRAPH # 222        ROPE MODULE 6, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
40,3400  TO 40,3777      PARAGRAPH # 223        ROPE MODULE 6, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
41,2000  TO 41,2377      PARAGRAPH # 224        ROPE MODULE 6, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

41,2400  TO 41,2777      PARAGRAPH # 225          ROPE MODULE 6, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
41,3000  TO 41,3377      PARAGRAPH # 226          ROPE MODULE 6, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
41,3400  TO 41,3777      PARAGRAPH # 227          ROPE MODULE 6, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
42,2000  TO 42,2377      PARAGRAPH # 230          ROPE MODULE 6, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
42,2400  TO 42,2777      PARAGRAPH # 231          ROPE MODULE 6, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
42,3000  TO 42,3377      PARAGRAPH # 232          ROPE MODULE 6, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
42,3400  TO 42,3777      PARAGRAPH # 233          ROPE MODULE 6, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
43,2000  TO 43,2377      PARAGRAPH # 234          ROPE MODULE 6, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
43,2400  TO 43,2777      PARAGRAPH # 235          ROPE MODULE 6, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
43,3000  TO 43,3377      PARAGRAPH # 236          ROPE MODULE 6, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
43,3400  TO 43,3777      PARAGRAPH # 237          ROPE MODULE 6, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
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OCTAL LISTING FOR PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  4000        00004 0      34054 1      56006 1      12667 0      52011 0      00006 1      34056 0      52006 0
  4010        52011 0      00006 1      31275 0      52006 0      52011 0      34057 1      56006 1      13407 0
  4020        52011 0      34064 1      56006 1      12000 1      52011 0      34060 0      56006 1      13274 1
  4030        52011 0      34061 1      56006 1      12332 0      52011 0      34060 0      56006 1      13317 0

  4040        52011 0      34062 1      56006 1      13506 0      52011 0      34063 0      56006 1      13150 1
  4050        52011 0      34065 0      56006 1      12275 1   C: 12103 0   C: 02065 0   C: 36106 0   C: 02103 1
  4060     C: 10100 1   C: 16107 0   C: 12100 0   C: 52100 1   C: 14106 0   C: 22102 1   C: 04025 1   C: 10003 0
  4070     C: 14031 0   C: 20033 0   C: 24017 1   C: 30036 1   C: 34034 1   C: 40023 1   C: 44035 1   C: 50037 0

  4100     C: 54000 0   C: 60000 1      00004 0      00006 1      00004 0      54001 1      00006 1      06004 0
  4110        00006 1      14115 1      00006 1      00004 0      54001 1      44733 0      60001 0      00006 1
  4120        14103 0      00006 1      00003 1      00002 0      34144 1      71022 1      00006 1      14131 1
  4130        04132 0      31020 1      54023 1      30023 0      04616 1   C: 62337 1      34755 1      55013 0

  4140        31022 0      04255 1      04143 0      05155 0   C: 37600 0      04364 1      41041 1      55013 0
  4150        04616 1   C: 62337 1      04635 0   C: 62002 1      22007 0      54123 0      34736 1      71021 1
  4160        61012 0      10000 0      00002 0      34753 1      60002 0      55037 0      23022 0      04204 0
  4170        34201 0      56006 1      00006 1      04007 1      55040 0      34201 0      00006 1      01007 1

  4200        02000 0   C: 62101 0      53040 0      05165 0      34735 1      55021 1      00002 0      22002 0
  4210        04220 0      04224 1      30001 0      75012 0      60004 0      55042 1      05133 0      05155 0
  4220        11042 1      04227 1      00002 0      04227 1      11043 0      04227 1      00002 0      05652 0
  4230     C: 01206 1      34201 0      00006 1      01007 1      34242 1      55013 0      44360 1      54777 1

  4240        04635 0   C: 61450 1   C: 00042 1      34201 0      00006 1      01007 1      34254 0      55013 0
  4250        44360 1      54777 1      04635 0   C: 61442 1   C: 00041 1      74757 1      54123 0      34736 1
  4260        71021 1      61012 0      10000 0      00002 0      24002 0      10123 0      14270 1      00002 0
  4270        22002 0      34302 1      56006 1      00006 1      04007 1      52131 0      34201 0      00006 1

  4300        01007 1      03505 1   C: 60101 1      55017 1      54003 0      74357 0      65007 0      54145 0
  4310        00002 0      31017 0      14304 0      54003 0      74357 0      65007 0      00002 0   C: 00016 0
  4320     C: 00011 1   C: 00004 0      54020 1      40020 1      40020 1      40020 1      40020 1      56020 0
  4330        00002 0      54022 0      40022 0      40022 0      40022 0      40022 0      56022 1      00002 0

  4340        60000 1      60000 1      60000 1      60000 1      60000 1      00002 0   C: 00037 0   C: 01740 0
  4350     C: 76000 0      05072 1      05203 0      05261 1      05105 0   C: 30000 1   C: 03777 0   C: 00377 1
  4360     C: 00023 0   C: 00021 1   C: 00025 0   C: 00012 1      34745 0      00006 1      05011 1      00002 0
  4370        44745 1      00006 1      03011 1      00002 0      34747 1      00006 1      05011 1      00002 0
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OCTAL LISTING FOR PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  4400        00006 1     30025 0     52014 0     00002 0     00006 1     30156 0     20156 1     60154 1
  4410        26154 0     54007 1     00002 0     54162 0     00002 0     54135 1     10000 0     30135 0
  4420        17310 0     14417 0     44755 0     54154 0     54155 1     54156 1     00002 0     34746 0
  4430        00006 1     05011 1     00002 0     44746 1     00006 1     03011 1     00002 0     44444 0

  4440        60002 0     60004 0     04635 0  C: 10647 0  C: 02003 0     22007 0     54123 0     34736 1
  4450        71021 1     61012 0     10000 0     14455 0     14164 1     24002 0     14437 1     56002 0
  4460        54144 1     44736 0     00004 0     71021 1     55021 1     11043 0     04470 0     04473 0
  4470        34755 1     57043 1     05137 1     00003 1     44747 0     00006 1     03011 1     34755 1

  4500        55012 1     00144 0     56002 0     54144 1     11043 0     04507 1     04473 0     34755 1
  4510        55012 1     00144 0     00006 1     64515 1     14516 0     40000 0     50002 0     60000 1
  4520        00006 1     66741 0     16737 0     00006 1     50002 0     50000 1     30001 0     24002 0
  4530        52062 1     22002 0     34740 0     70110 0     10000 0     14550 1     30061 0     04512 0

  4540     C: 66161 1     00001 0     34562 1     60062 0     04512 0  C: 64420 0     00001 0     04560 0
  4550        34563 0     60062 0     04512 0  C: 65673 0     00001 0     30061 0     04512 0  C: 51615 1
  4560        50001 0     00001 0  C: 00765 0  C: 16450 1     34753 1     71303 1     10000 0     00002 0
  4570        34744 1     54001 1     34615 1     70110 0     00006 1     14601 0     34750 1     70110 0

  4600        10000 0     30001 0     61036 0     70001 1     00006 1     16742 1     31036 0     00006 1
  4610        06001 0     74733 0     64735 1     55036 1     00002 0  C: 10102 0     52134 0     50002 0
  4620        30000 1     24002 0     54001 1     22004 0     75012 0     56002 0     52134 0     50002 0
  4630        02000 0     56134 1     56004 0     56134 1     00133 0     56002 0     50000 1     30000 1

  4640        54004 1     75012 0     56002 0     50002 0     12000 1     35012 1     70133 1     60134 1
  4650        00002 0     54135 1     56004 0     00006 1     04007 1     56135 0     75012 0     56001 0
  4660        00004 0     00006 1     01007 1     50001 0     32000 0     56135 0     00006 1     01007 1
  4670        00003 1     54004 1     30135 0     00002 0     52073 1     50002 0     30000 1     24002 0

  4700        54001 1     22004 0     75012 0     56002 0     52073 1     50002 0     02000 0     56073 0
  4710        56004 0     56073 0     00072 1     54164 0     34744 1     54023 1     30006 1     54165 1
  4720        50002 0     30000 1     54004 1     75012 0     56002 0     56164 1     14643 0     00006 1
  4730        01007 1     00002 0  C: 37777 1  C: 37777 1  C: 57777 1  C: 40000 0  C: 20000 0  C: 10000 0

  4740     C: 04000 0  C: 02000 0  C: 01000 0  C: 00400 0  C: 00200 0  C: 00100 0  C: 00040 0  C: 00020 0
  4750     C: 00010 0  C: 00004 0  C: 00002 0  C: 00001 0  C: 77777 0  C: 00000 1  C: 00005 1  C: 00007 0
  4760     C: 00013 0  C: 00015 0  C: 00017 1  C: 00030 1  C: 00033 1  C: 00035 1  C: 00032 0  C: 00045 0
  4770     C: 00046 0  C: 00050 1  C: 00055 1  C: 00060 1  C: 00062 0  C: 00120 1  C: 00140 1  C: 00144 0
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OCTAL LISTING FOR PARAGRAPH # 012, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  5000      C: 00310 0   C: 00401 1   C: 00454 1   C: 00620 0   C: 00777 0   C: 01124 1   C: 01211 1   C: 01400 1
  5010      C: 01426 0   C: 01776 0   C: 01777 1   C: 02177 1   C: 02400 1   C: 03000 1   C: 03400 0   C: 05000 1
  5020      C: 06000 1   C: 07000 0   C: 11000 1   C: 13000 0   C: 14000 1   C: 15000 0   C: 16000 0   C: 17000 1
  5030      C: 17770 1   C: 21000 1      64736 1      55076 0      15036 0      41076 0      60000 1      55076 0

  5040         15051 1      57076 1      51076 1      64734 0      40000 0      61076 1      55076 0      15051 1
  5050         15067 1      00006 1      71076 0      55077 1      00006 1      75005 0      67737 0      00006 1
  5060         71077 1      67717 1      00006 1      71076 0      20001 1      55076 0      00002 0      50000 1
  5070         44734 1      00002 0      00004 0      65164 1      54063 0      00006 1      50002 0      30001 0

  5100         52066 0      35163 0      56004 0      54061 1      12625 0      00004 0      54063 0      00006 1
  5110         50002 0      30001 0      52066 0      35163 0      56004 0      12601 0      56002 0      67746 0
  5120         56002 0      15112 1      22002 0      35163 0      56006 1      12706 0      40164 0      54001 1
  5130         35163 0      54006 0      12705 0      54164 0      35163 0      54004 1      12776 1      00004 0

  5140         54065 0      44752 1      26002 1      35163 0      56004 0      13023 1      00004 0      54063 0
  5150         35163 0      56006 1      54165 1      30002 0      13072 0      35163 0      54004 1      13103 1
  5160         30061 0      54004 1      16741 1   C: 02601 1   C: 00110 1      56001 0      00006 1      01007 1
  5170         54006 0      00001 0   C: 77677 1      00004 0      54001 1      34733 1      26002 1      30006 1

  5200         00006 1      04007 1      56001 0      00004 0      56002 0      54061 1      00006 1      50061 0
  5210         30001 0      54063 0      35220 1      56006 1      13231 0      52062 1      64752 0      52006 0
  5220      C: 02063 0      50002 0      30000 1      24002 0      56002 0      54063 0      30006 1      00006 1
  5230         04007 1      54001 1      35235 0      54061 1      15212 1      15257 0   C: 72537 0   C: 73714 1

  5240         10076 1      15261 0      15261 0      15244 1      11304 0      15256 1      15251 0      15256 1
  5250         15256 1      37723 0      05072 1   C: 03555 1   C: 14063 1      15261 0      05221 0   C: 00764 1
  5260         05240 1      10734 0      35220 1      54006 0      13414 1      30016 0      00006 1      01007 1
  5270         00006 1      22012 1      30016 0      56006 1      52011 0      00003 1      50017 1      53154 1

  5300         00006 1      50002 0      30001 0      53150 0      00006 1      35310 0      52006 0   C: 03452 1
  5310      C: 02063 0      50002 0      30000 1      24002 0      55011 1      35320 0      22006 1      14640 0
  5320      C: 20213 0      50002 0      40000 0      61011 0      00006 1      16741 1      16737 0      00004 0
  5330         50002 0      30000 1      24002 0      54072 0      74757 1      60000 1      54071 0      30072 1

  5340         75030 0      00006 1      74740 1      56072 1      74735 0      54066 0      50002 0      30000 1
  5350         24002 0      54065 0      15363 0      00004 0      50002 0      30000 1      24002 0      00004 0
  5360         54065 0      34753 1      54066 0      00006 1      35367 0      52006 0   C: 02224 1   C: 20103 1
  5370         22073 0      22006 1      22073 0      75024 0      10000 0      17750 0      30062 0      74745 1
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OCTAL LISTING FOR PARAGRAPH # 013, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

   5400          10000 0       15423 0       50061 0       31052 1       54070 1       30062 0       74744 0       10000 0
   5410          15427 1       30002 0       54063 0       30006 1       00006 1       04007 1       54064 1       35422 0
   5420          22073 0       52006 0    C: 02312 0       50002 0       30000 1       24002 0       15404 0       00006 1
   5430          50002 0       30001 0       52064 1       34752 0       26002 1       15417 1       22706 0       22006 1

   5440          50000 1       30001 0       22006 1       22706 0       13601 1       22706 0       22006 1       22706 0
   5450          00006 1       50000 1       30001 0       22706 0       22006 1       22706 0       13707 0       34755 1
   5460          54032 1       54033 0       54034 1       00002 0       54162 0       40160 1       70162 0       50161 1
   5470          26160 1       00002 0       04635 0    C: 20326 1       34755 1       55044 1       00004 0       44753 0

   5500          70100 1       54100 1       00003 1       00002 0       30002 0       05522 1       40000 0       00006 1
   5510          04001 1       50061 0       54074 0       22063 1       00003 1       00001 0       30002 0       05522 1
   5520          70001 1       15511 0       64753 1       00004 0       54063 0       34762 0       54061 1       50063 1
   5530          27777 0       54001 1       34755 1       00006 1       10061 1       52062 1       50061 0       30074 1

   5540          54001 1       50062 0       44735 0       00002 0       00004 0       54061 1       50002 0       60000 1
   5550          50000 1       30000 1       54001 1       30061 0       50002 0       60001 0       50000 1       22000 1
   5560          10061 1       15545 1       16741 1       44747 0       71044 1       55044 1       05155 0       00004 0
   5570          30002 0       55363 1       50002 0       30000 1       54001 1       30006 1       00006 1       04007 1

   5600          55364 0       30002 0       54061 1       10375 1       15607 1       22375 0       15621 0       10376 1
   5610          15613 1       22376 0       15624 0       30377 1       74733 0       10000 0       15630 0       22377 1
   5620          15624 0       41036 1       75642 0       27036 1       56061 0       00003 1       50000 1       00001 0
   5630          30001 0       64735 1       54377 0       15624 0       00004 0       30002 0       55363 1       50002 0

   5640          30000 1       05574 1    C: 40400 1       00004 0       34752 0       60005 1       54017 0       50017 1
   5650          04635 0    C: 12765 0       00004 0       30002 0       55363 1       60002 0       30000 1       05574 1
   5660       C: 77770 1       34765 1       54001 1       40000 0       52761 0       00004 0       04616 1    C: 27755 0
   5670          30103 0       74745 1       10000 0       15701 0       04616 1    C: 12652 0       04616 1    C: 12643 0

   5700          15644 0       35743 1       04727 1       04616 1    C: 57321 0       00004 0       30002 0       05654 0
   5710       C: 01103 1       00004 0       30002 0       05571 1    C: 00217 0       01363 0       00004 0       53364 0
   5720          35742 0       54061 1       50002 0       30000 1       54001 1       15603 0       00004 0       53364 0
   5730          35741 0       15721 1       00004 0       53364 0       00004 0       50002 0       30000 1       54001 1

   5740          15601 1       15660 0       15642 0    C: 56067 0       00004 0       54001 1       30002 0       55363 1
   5750          05575 0    C: 00014 1       01363 0       31472 1       00006 1       01006 0       00002 0       31473 0
   5760          54001 1       45774 1       00006 1       02005 0       60001 0       00006 1       01005 0       00002 0
   5770          31474 1       54001 1       35774 0       15762 0    C: 00314 1    C: 05775 1    C: 05776 1  CKSM 67044 0
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OCTAL LISTING FOR PARAGRAPH # 014,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

    6000     C: 00464 1     34764 0     54001 1     40000 0     52761 0     04635 0  C: 10024 0  C: 00024 1
    6010     C: 00031 0     46021 0     00004 0     70110 0     54110 0     44752 1     00006 1     03012 1
    6020        00002 0  C: 41000 1     00006 1     36026 0     15165 1  C: 03024 1  C: 66107 1     36036 1
    6030        00004 0     22000 1     50002 0     30000 1     22006 1     12200 0  C: 56063 1     00003 1

    6040        00006 1     22164 1     30006 1     54165 1     74735 0     54115 0     54023 1     16070 1
    6050        22006 1     16042 0     00006 1     50116 1     30001 0     52155 1     34755 1     54156 1
    6060        54163 1     30165 0     54006 0     10023 1     16077 0     10067 1     15126 0     24164 1
    6070        50164 1     30000 1     10000 0     16362 1  C: 00177 0     54023 1     76074 0     54020 1

    6100        10020 1     16247 1     16743 0     74753 0     10000 0     16146 0     50164 1     40001 1
    6110        10000 0     16215 0  C: 77773 1     24164 1     54116 0     66251 1     10000 0     67743 0
    6120        16125 0     30120 1     26116 0     50020 0     76273 0     00006 1     66136 0     75012 0
    6130        75012 1     56116 1     60115 1     54004 1     50020 0     76273 0     74357 0     65007 0

    6140        56116 1     54003 0     50020 0     76273 0     37733 1     54020 1     30120 1     54130 1
    6150        24164 1     50164 1     40000 0     10000 0     24130 0     16155 1     54116 0     77742 0
    6160        00006 1     16154 0     30115 1     26116 0     50130 0     40046 1     26116 0     77744 0
    6170        00006 1     16204 0     77742 0     00006 1     16206 1     30116 1     54004 1     75012 0

    6200        64741 1     54116 0     50020 0     36273 1     30120 1     16212 1     35007 0     56116 1
    6210        54003 0     74357 0     26116 0     50020 0     36273 1     34360 0     70020 1     66222 0
    6220        10000 0     16233 1  C: 77767 1     66112 0     10000 0     50000 1     46244 1     16235 1
    6230        50163 0     46242 1     16235 1     50163 0     46244 1     26166 1     54116 0     50020 0

    6240        76273 0  C: 00002 0  C: 00006 1  C: 00006 1  C: 00002 0  C: 00003 1  C: 00006 1     10020 1
    6250        16263 1  C: 77722 0     24164 1     50164 1     30000 1     54117 1     35013 0     54004 1
    6260        70020 1     50000 1     16334 1     54004 1     10020 1     50000 1     12000 1     10163 1
    6270        12017 1     12017 1     12121 0  C: 00122 0     16505 0     17071 1     17655 1     17401 1

    6300        16703 1     16470 0     16052 1     17624 1     16501 1     16620 1     16523 1     17334 0
    6310        16557 1     16626 1     17337 0     17616 0     17574 1     17577 1     17603 1     17621 1
    6320        16751 0     16747 1     17036 1     17331 0     17460 0     17425 1     17005 1     17062 0
    6330        16775 0     16331 1     17572 1     17613 0     12344 1     12351 0     12354 0     12360 1

    6340        12364 0     12372 1     12406 0     12415 1     12400 0     12411 0     12467 1     12474 0
    6350        12447 0     12507 0     12516 0     12457 1     30165 0     54004 1     24164 1     50164 1
    6360        40000 0     67747 1     54116 0     74356 1     56116 1     77722 0     00006 1     74747 0
    6370        50000 1     16372 0     06422 0     16061 1     06414 0     16061 1     06417 0     16061 1
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OCTAL LISTING FOR PARAGRAPH # 015, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  6400      06422 0     16460 1     06422 0     16144 1     06422 0     16463 1     06422 0     16466 1
  6410      06422 0     34766 1     54020 1     16252 0     50120 1     40046 1     16421 1     50120 1
  6420      40047 0     26116 0     40116 0     64772 1     10000 0     30120 1     16433 1     35007 0
  6430      56116 1     54003 0     74357 0     26116 0     00006 1     30155 0     50116 1     52001 1

  6440      10163 1     16454 0     00002 0     00006 1     30160 0     50116 1     52003 0     00006 1
  6450      30162 1     50116 1     52005 0     00002 0     30156 0     50116 1     54002 1     00002 0
  6460      37732 0     54020 1     16106 1     34735 1     54020 1     16106 1     36107 1     16145 0
  6470      50116 1     30002 0     54156 1     00006 1     50116 1     30001 0     52155 1     34753 1

  6500      16060 0     22007 0     50116 1     30000 1     16055 0     00006 1     50116 1     30001 0
  6510      52155 1     00006 1     50116 1     30003 1     52160 1     00006 1     50116 1     30005 1
  6520      52162 0     44753 0     16060 0     00006 1     50116 1     30001 0     52155 1     50166 0
  6530      52001 1     50163 0     36244 0     26166 1     10163 1     16552 1     16550 0     54163 1

  6540      54156 1     52160 1     50166 0     51775 0     52162 0     50166 0     51777 1     16061 1
  6550      54156 1     16061 1     54163 1     56156 0     50166 0     53777 0     16061 1     00006 1
  6560      50116 1     30001 0     52155 1     50166 0     52001 1     50163 0     36244 0     26166 1
  6570      10163 1     16610 1     16511 0     00006 1     50116 1     30003 1     52160 1     50166 0

  6600      51775 0     00006 1     50116 1     30005 1     52162 0     50166 0     51777 1     16061 1
  6610      00006 1     50116 1     30003 1     52160 1     30156 0     50166 0     53777 0     16515 1
  6620      24164 1     54164 1     30000 1     50116 1     54000 0     16061 1     24164 1     50164 1
  6630      30000 1     50116 1     60000 1     54004 1     75012 0     50000 1     32000 0     54117 1

  6640      30165 0     74350 1     64350 0     60164 1     50120 1     54052 1     30117 0     77742 0
  6650      00006 1     16662 1     30165 0     54006 0     30117 0     54004 1     75012 0     64741 1
  6660      54164 0     16042 0     30117 0     66251 1     10000 0     30117 0     16675 1     30120 1
  6670      60117 0     50000 1     30000 1     54117 1     16647 0     54003 0     74357 0     50000 1

  6700      31400 1     54117 1     16647 0     50164 1     30001 0     50116 1     60000 1     54004 1
  6710      75012 0     50000 1     32000 0     54117 1     16647 0     30165 0     54004 1     50164 1
  6720      30001 0     54117 1     16647 0     10154 0     00002 0     16727 1     16741 1     10155 1
  6730      00002 0     16733 1     16741 1     10156 1     00002 0     16737 0     16741 1     50002 0

  6740      00001 0     50002 0     00002 0     30165 0     54006 0     50164 1     00001 0     34735 1
  6750      16752 0     34355 0     26116 0     00006 1     50116 1     00003 1     20160 1     00006 1
  6760      16762 0     07014 0     00006 1     50116 1     00005 1     20162 0     00006 1     16771 1
  6770      07011 0     00006 1     50116 1     00001 0     17000 1     00006 1     50116 1     30001 0
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OCTAL LISTING FOR PARAGRAPH # 016,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  7000      20155 1     00006 1     16061 1     07017 0     16061 1     00006 1     50116 1     40001 1
  7010      17000 1     54001 1     34756 1     17016 0     54001 1     36245 1     56001 0     50000 1
  7020      44734 1     54130 1     00006 1     24000 1     50001 0     26155 1     54007 1     34755 1
  7030      60130 0     50001 0     26154 0     54007 1     00002 0     17152 1     00006 1     50116 1

  7040      30003 1     52160 1     00006 1     40001 1     20160 1     00006 1     17050 1     07014 0
  7050      00006 1     50116 1     30005 1     52162 0     00006 1     40001 1     20162 0     00006 1
  7060      17062 0     07011 0     00006 1     50116 1     30001 0     52155 1     00006 1     40001 1
  7070      17000 1     00006 1     50116 1     30002 0     20156 1     50116 1     60000 1     60154 1

  7100      54154 0     16061 1     17003 1     50002 0     30000 1     24002 0     54116 0     50116 1
  7110      30001 0     54156 1     34755 1     56155 0     54135 1     00006 1     70156 1     56156 0
  7120      00006 1     70154 0     20156 1     50116 1     30000 1     56135 0     00006 1     70135 1
  7130      20156 1     56154 1     00006 1     70135 1     20155 1     00002 0     34755 1     54163 1

  7140      56156 0     60000 1     54001 1     00002 0     60155 0     54155 1     00002 0     60154 1
  7150      54154 0     00002 0     54121 1     00002 0     34752 0     54136 1     00006 1     22137 1
  7160      07107 0     52160 1     52155 1     52131 0     30156 0     54132 0     30136 0     26116 0
  7170      07107 0     52156 1     20132 0     60154 1     60130 0     54130 1     17200 0     54121 1

  7200      52162 0     52155 1     30136 0     26116 0     07107 0     52132 0     20156 1     60154 1
  7210      60130 0     54154 0     00137 1     07017 0     00137 1     00006 1     22141 0     54117 1
  7220      22140 1     17232 1     50002 0     30000 1     54140 0     60000 1     60002 0     54117 1
  7230      64756 1     54141 1     36273 1     54116 0     00006 1     50117 0     30004 0     52155 1

  7240      52123 0     17245 1     54140 0     44752 1     26117 1     07107 0     00006 1     50117 0
  7250      30002 0     20155 1     10140 0     17242 0     00141 0     34755 1     54156 1     22002 0
  7260      06723 1     17265 0     17305 1     44733 0     17266 0     34733 1     54002 1     00006 1
  7270      24000 1     60156 0     54156 1     34755 1     60002 0     60155 0     54155 1     34755 1

  7300      60002 0     60154 1     54154 0     54155 1     00001 0     54156 1     17302 0     54135 1
  7310      00006 1     70156 1     54156 1     34755 1     56155 0     17126 1     54135 1     00006 1
  7320      70155 1     52155 1     00006 1     70135 1     30001 0     26154 0     00006 1     30155 0
  7330      00002 0     07154 0     34755 1     16060 0     34752 0     54140 0     17342 1     44363 1

  7340      54140 0     36242 0     54136 1     07532 1     07156 1     00006 1     30123 1     52155 1
  7350      52134 0     00006 1     30125 1     52160 1     00006 1     30127 0     52162 0     30140 1
  7360      26116 0     07156 1     52123 0     52155 1     52125 0     52160 1     52127 1     52162 0
  7370      30140 1     26116 0     07156 1     52134 0     52155 1     52162 0     52125 0     52160 1
```

```
OCTAL LISTING FOR PARAGRAPH # C17,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

 7400        16061 1     10163 1     17430 0     17430 0     07107 0     07140 0     52160 1     52155 1
 7410        52160 1     07107 0     07140 0     52162 0     52155 1     52162 0     07107 0     07140 0
 7420        52155 1     52162 0     52160 1     52155 1     16061 1     07154 0     44751 1     26116 0
 7430        00006 1     30155 0     52160 1     07107 0     07140 0     34752 0     26116 0     00006 1

 7440        30160 0     52155 1     52162 0     07107 0     07140 0     34752 0     26116 0     52160 1
 7450        52155 1     52160 1     07107 0     07140 0     52155 1     52162 0     52155 1     16521 0
 7460        00006 1     30162 1     52155 1     52123 0     07107 0     00006 1     40160 1     52155 1
 7470        52125 0     07107 0     34752 0     26116 0     00006 1     40162 0     52155 1     52162 0

 7500        07107 0     00006 1     30123 1     52155 1     52127 1     07107 0     34752 0     26116 0
 7510        00006 1     40123 0     52155 1     20162 0     00006 1     17517 1     07011 0     07107 0
 7520        52125 0     52160 1     52155 1     20160 1     00006 1     17527 1     07014 0     07107 0
 7530        52127 1     17000 1     00006 1     30155 0     52123 0     00006 1     30160 0     52125 0

 7540        00006 1     30162 1     52127 1     00002 0     10000 0     17551 0     00002 0     17561 0
 7550        00002 0     56001 0     64736 1     64736 1     54000 0     17557 0     24001 0     56001 0
 7560        00002 0     56001 0     64735 1     67747 1     54000 0     17567 0     24001 0     56001 0
 7570        40000 0     00002 0     07107 0     16061 1     07107 0     07137 0     16061 1     00006 1

 7600        50116 1     30001 0     17607 0     00006 1     50116 1     30001 0     52155 1     52131 0
 7610        34755 1     54004 1     12353 1     30116 1     54166 1     16063 0     34755 1     54004 1
 7620        12172 0     36074 1     54004 1     12214 0     10163 1     17636 1     17636 1     00006 1
 7630        50116 1     30001 0     52131 0     34755 1     54004 1     12654 0     00006 1     50116 1

 7640        30003 1     52160 1     00006 1     50116 1     30005 1     52162 0     44753 0     54163 1
 7650        00006 1     50116 1     30001 0     52155 1     17632 0     50116 1     10000 0     16061 1
 7660        17662 0     17670 0     50116 1     10001 1     16061 1     16061 1     17670 0     16061 1
 7670        00006 1     40155 1     52155 1     10163 1     17705 0     17705 0     00006 1     40160 1

 7700        52160 1     00006 1     40162 0     52162 0     16061 1     40156 1     54156 1     16061 1
 7710     C: 22000 1  C: 23000 0  C: 24000 1  C: 25000 0  C: 26000 0  C: 27000 1  C: 31000 0  C: 31103 1
 7720     C: 32000 0  C: 33000 1  C: 34000 0  C: 35000 1  C: 36000 1  C: 37000 0  C: 37401 0  C: 37766 1
 7730     C: 37774 1  C: 37776 0  C: 40014 0  C: 40015 1  C: 40040 1  C: 40200 1  C: 57777 1  C: 65552 0

 7740     C: 70000 0  C: 73777 1  C: 74000 1  C: 74056 1  C: 77700 0  C: 77774 0  C: 77775 1  C: 77776 1
 7750        74740 1     10000 0     15423 0     15402 0     00006 1     07754 0  C: 07756 1  C: 07757 0
 7760   CKSM 61751 0        @           @           @           @           @           @           @
 7770           @           @           @           @           @           @           @           @
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OCTAL LISTING FOR PARAGRAPH # 020, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2000        13207 0     13530 0     13517 0     13610 1     13612 0     13174 1     12116 1     17670 0
00,2010        13232 0     13023 1     13176 0     13245 0     16354 1     13274 1     13247 1     36242 0
00,2020        70020 1     54021 0     10020 1     12101 1  C: 00024 1     50021 1     34736 1     54135 1
00,2030        10020 1     02050 0     16060 0     30135 0     00006 1     70155 1     54156 1     30135 0

00,2040        00006 1     70154 0     52155 1     30135 0     00006 1     70001 1     20156 1     16061 1
00,2050        30156 0     00006 1     70135 1     56155 0     00006 1     70135 1     56155 0     60001 0
00,2060        60000 1     54156 1     12064 0     26155 1     34755 1     54156 1     56154 1     00006 1
00,2070        70135 1     20155 1     00002 0     30135 0     00006 1     70155 1     54155 1     56001 0

00,2100        12060 1     30021 1     54135 1     00006 1     30156 0     20156 1     60154 1     60154 1
00,2110        54154 0     12113 1     54121 1     10135 1     12102 1     10020 1     07136 1     16061 1
00,2120        16061 1     34757 0     70020 1     54135 1     10020 1     12145 1  C: 00176 1     50135 0
00,2130        34736 1     54135 1     02073 1     52155 1     52160 1     52155 1     02073 1     52155 1

00,2140        52162 0     52155 1     02073 1     17420 1     54135 1     00006 1     30155 0     20155 1
00,2150        00006 1     12153 0     07017 0     00006 1     30160 0     20160 1     00006 1     12161 1
00,2160        07014 0     00006 1     30162 1     20162 0     00006 1     12167 1     07011 0     10135 1
00,2170        12144 0     16061 1     54135 1     06723 1     12176 1     12212 0     07257 0     30154 1

00,2200        12207 1     24135 0     00006 1     30156 0     20156 1     60154 1     26154 0     60000 1
00,2210        54000 0     12201 1     40135 1     16623 1     70116 0     10000 0     12224 0     34742 1
00,2220        70116 0     10000 0     07136 1     16061 1     54135 1     34744 1     00006 1     70116 0
00,2230        76245 0     50000 1     12233 0     12332 0     12342 1     12336 1     10163 1     12277 0

00,2240        12277 0     30135 0     63733 0     00006 1     62127 1     67747 1     54135 1     34755 1
00,2250        54001 1     56154 1     56155 0     02272 1     20155 1     56157 1     56160 0     02272 1
00,2260        20160 1     56161 1     56162 1     02272 1     20162 0     10135 1     54135 1     12242 0
00,2270     C: 04604 1     16061 1     60000 1     54156 1     34755 1     56001 0     00002 0     30135 0

00,2300        63733 0     00006 1     62322 0     67747 1     54135 1     34755 1     56154 1     56155 0
00,2310        54156 1     10135 1     54135 1     02300 0  C: 22650 1     34742 1     70116 0     10000 0
00,2320        07136 1     16061 1     50135 0     34736 1     54135 1     34742 1     70116 0     10000 0
00,2330        12031 0     12033 1     40135 1     62126 0     54135 1     12236 0     42126 1     60135 0

00,2340        40000 0     54135 1     10163 1     12346 0     12346 0     12145 1     40116 0     00006 1
00,2350        74746 1     54020 1     12103 0     44753 0     54136 1     54137 0     54140 0     10130 1
00,2360        12516 0     12363 1     12531 0     54156 1     07257 0     10154 0     12414 0     12371 1
00,2370        12413 1     56131 1     56130 0     56155 0     56154 1     10130 1     12422 0     12401 1
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OCTAL LISTING FOR PARAGRAPH # 021,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2400      12416 1     40154 0     00006 1     62405 1     24136 0     34733 1     54154 0     02630 0
00,2410      34753 1     54121 1     06061 0     24136 0     40131 0     12402 1     00006 1     40131 0
00,2420      52131 0     24136 0     10154 0     12437 1     12426 1     12433 0     10155 1     12437 1
00,2430      16061 1     12433 0     16061 1     00006 1     40155 1     52155 1     24136 0     40154 0

00,2440      67747 1     60130 0     10000 0     12505 1  C: 60001 0     12446 1     34736 1     60000 1
00,2450      60155 0     54155 1     34755 1     64733 1     26154 0     34736 1     60000 1     60131 1
00,2460      54131 0     34755 1     64733 1     26130 1     40154 0     60130 0     10000 0     12505 1
00,2470   C: 00133 0     12405 0     54140 0     40155 1     60131 1     00006 1     62405 1     12505 1

00,2500      00006 1     24137 1     00006 1     30131 1     20131 0     30130 0     60000 1     54000 0
00,2510      12500 1     52155 1     50137 1     02565 0     54156 1     16061 1     10000 0     12422 0
00,2520      40131 0     00006 1     62422 1     34736 1     60000 1     26131 0     34755 1     54130 1
00,2530      12363 1     10000 0     12416 1     30131 1     00006 1     62416 0     44736 0     12524 1

00,2540      22021 1     00006 1     74736 0     56001 0     60021 1     56001 0     12571 1     20001 1
00,2550      20001 1     20001 1     20001 1     20001 1     20001 1     20001 1     20001 1     20001 1
00,2560      20001 1     20001 1     20001 1     20001 1     52155 1     10140 0  C: 06552 0     12642 1
00,2570      52155 1     00006 1     10130 1     52155 1     40154 0     00006 1     70131 0     60155 0

00,2600      54000 0     12606 1     00006 1     60130 0     24154 1     12610 0     00006 1     62620 1
00,2610      00006 1     60130 0     00006 1     12616 0     00006 1     62624 0     24154 1     12625 0
00,2620      00006 1     12630 1     00006 1     26154 0     60130 0     22007 0     00006 1     10130 1
00,2630      54155 1     10136 1     00002 0     00002 0     00002 0     00006 1     40155 1     52155 1

00,2640      34755 1     00002 0     40154 0     60130 0     00006 1     12647 1     12570 0     34733 1
00,2650      54154 0     40131 0     60155 0     12624 1     44753 0     54137 0     54127 1     03010 0
00,2660      52131 0     07544 0     52131 0     10130 1     12721 0     12667 0     12715 1     56131 1
00,2670      56130 0     56155 0     56154 1     00006 1     12676 0     12405 0     56160 0     56157 1

00,2700      00006 1     12703 0     12405 0     56162 1     56161 1     00006 1     12710 1     12405 0
00,2710      10130 1     12721 0     12405 0     12715 1     12405 0     00006 1     40131 0     52131 0
00,2720      24127 0     00006 1     30131 1     52134 0     12732 1     00006 1     24137 1     00006 1
00,2730      30131 1     20131 0     30130 0     60000 1     54000 0     12725 1     02750 1     52160 1

00,2740      52155 1     52160 1     02750 1     52162 0     52155 1     52162 0     02750 1     17420 1
00,2750      30127 0     54136 1     10154 0     12767 1     12756 0     12763 0     10155 1     12767 1
00,2760      00002 0     12763 0     00002 0     00006 1     40155 1     52155 1     24136 0     44753 0
00,2770      54140 0     40154 0     60133 0     10000 0     13004 1     12777 0     12405 0     54140 0
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OCTAL LISTING FOR PARAGRAPH # 022,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3000       40155 1     60134 1     00006 1     62405 1     52155 1     50137 1     12565 1  C: 32506 0
00,3010       56002 0     52155 1     07544 0     52155 1     52160 1     07544 0     52160 1     52162 0
00,3020       07544 0     52162 0     00000 1     03010 0     07532 1     34755 1     56121 0     54141 1
00,3030       03317 1     30141 0     56121 0     00006 1     13036 0     12405 0     00006 1     30155 0

00,3040       50120 1     52043 1     03343 0     10154 0     13051 1     54001 1     50120 1     52045 1
00,3050       12405 0     44317 1     60135 0     10000 0     40000 0     13133 1     13065 0     44761 1
00,3060       54135 1     30154 1     54001 1     34755 1     13112 1     10135 1     13074 0     42024 1
00,3070       54135 1     00006 1     30155 0     13112 1     40000 0     54135 1     40000 0     50000 1

00,3100       34736 1     54130 1     00006 1     70155 1     56130 0     00006 1     70154 0     56001 0
00,3110       60130 0     56001 0     50120 1     52045 1     44753 0     54140 0     52123 0     52155 1
00,3120       52131 0     03151 1     52125 0     52155 1     52160 1     03151 1     52127 1     52155 1
00,3130       52162 0     03151 1     17420 1     54135 1     34755 1     56123 1     56122 0     56125 1

00,3140       56124 0     56127 0     56126 1     40135 1     50000 1     34736 1     00006 1     70154 0
00,3150       13062 1     10154 0     13170 0     13155 1     13162 0     10155 1     13170 0     00002 0
00,3160       13162 0     00002 0     44755 0     54136 1     00006 1     40155 1     50135 0     12564 0
00,3170       54136 1     52155 1     50135 0     12564 0     03300 1     16061 1     10163 1     13226 0

00,3200       13226 0     03317 1     22163 0     00006 1     30155 0     50120 1     52043 1     03343 0
00,3210       10135 1     13213 0     16061 1     63733 0     00006 1     63221 0     22007 0     22116 1
00,3220       12303 1     50135 0     34735 1     54135 1     34755 1     12036 1     06723 1     16061 1
00,3230       16061 1     17670 0     44751 1     26166 1     00006 1     50000 1     30003 1     52160 1

00,3240       00006 1     50166 0     30001 0     52162 0     16521 0     03317 1     17332 0     00006 1
00,3250       30155 0     50166 0     52001 1     50163 0     36244 0     26166 1     10163 1     13272 1
00,3260       16061 1     00006 1     30160 0     50166 0     51775 0     00006 1     30162 1     50166 0
00,3270       51777 1     16061 1     30156 0     16554 1     50120 1     30052 0     54117 1     16652 1

00,3300       30155 0     00006 1     70000 0     54156 1     34755 1     56155 0     00006 1     70154 0
00,3310       20001 1     20156 1     56154 1     00006 1     70000 0     20155 1     00002 0     00006 1
00,3320       22137 1     03300 1     52160 1     52155 1     52131 0     30156 0     54132 0     03300 1
00,3330       52156 1     20132 0     60154 1     60130 0     54130 1     13337 1     54121 1     52162 0

00,3340       52155 1     03300 1     17205 0     34755 1     54135 1     10154 0     13405 1     13351 1
00,3350       13373 1     56156 0     56155 0     54154 0     34757 0     54135 1     10154 0     13405 1
00,3360       13362 1     13376 1     56155 0     54154 0     34757 0     26135 1     10154 0     13405 1
00,3370       00002 0     13376 1     13453 1     10000 0     13402 0     10155 1     34755 1     13453 1
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OCTAL LISTING FOR PARAGRAPH # 023,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3400      13402 0     13453 1     52165 1     05726 1  C: 01302 1     62444 1     00006 1     63456 0
00,3410      52155 1     22021 1     00006 1     74736 0     52155 1     56021 1     26155 1     32314 0
00,3420      00006 1     70154 0     62566 0     54130 1     30154 1     22007 0     00006 1     10130 1
00,3430      00006 1     74736 0     26130 1     00006 1     74736 0     52155 1     00006 1     10130 1

00,3440      54131 0     34755 1     56001 0     00006 1     10130 1     54001 1     30131 1     20155 1
00,3450      00006 1     13455 1     34733 1     54154 0     54155 1     00002 0     64737 0     00006 1
00,3460      63502 0     52155 1     22021 1     00006 1     74736 0     52155 1     56021 1     26155 1
00,3470      33007 0     00006 1     70154 0     62270 0     13423 0     00006 1     30156 0     20156 1

00,3500      60154 1     26154 0     24135 0     00006 1     30156 0     20156 1     60154 1     26154 0
00,3510      60000 1     54022 0     10022 0     10022 0     13475 0     13417 1     13470 0     06723 1
00,3520      13523 1     13526 1     13526 1     00006 1     40155 1     52155 1     34737 0     26154 0
00,3530      52155 1     20001 1     54000 0     13536 0     00006 1     40001 1     52155 1     30154 1

00,3540      60000 1     54001 1     13553 0     50000 1     34735 1     60000 1     00006 1     60154 1
00,3550      54154 0     40155 1     54155 1     00006 1     30155 0     52134 0     03300 1     07222 1
00,3560   C: 00003 1  C: 14441 0  C: 37325 1  C: 53250 0  C: 60764 1  C: 12146 1  C: 21276 1  C: 75466 1
00,3570   C: 71471 0  C: 00236 0  C: 32757 0     32470 0     07106 1     00006 1     30156 0     20156 1

00,3600      60154 1     26154 0     00006 1     30156 0     20156 1     60154 1     26154 0     16061 1
00,3610      33631 0     13613 1     33713 1     54136 1     06723 1     13625 1     13731 0     00006 1
00,3620      40155 1     52155 1     33734 1     56136 0     54137 0     44736 0     60154 1     10000 0
00,3630      13721 1     13707 0     13642 0     10155 1     34755 1     13637 1     13642 0     54155 1

00,3640      54154 0     00136 0     00006 1     40155 1     64736 1     52155 1     52134 0     03343 0
00,3650      10135 1     13714 1     52155 1     52134 0     52155 1     07222 1  C: 00006 1  C: 13240 0
00,3660   C: 23630 0  C: 74721 0  C: 47775 1  C: 02440 0  C: 20237 0  C: 75067 1  C: 70742 1  C: 03436 0
00,3670   C: 26756 1  C: 74037 0  C: 57640 1  C: 03046 0  C: 07143 0  C: 75654 1  C: 42244 0     32470 0

00,3700      07106 1     00136 0     00006 1     40155 1     64736 1     52155 1     00137 1     00006 1
00,3710      40155 1     64737 0     52155 1     16061 1     50000 1     34736 1     54135 1     02073 1
00,3720      13652 1     00006 1     13637 1     00006 1     30165 0     05732 1  C: 01301 1     34755 1
00,3730      13637 1     34737 0     13640 1  C: 77763 0     13702 0     00004 0     54002 1     34752 0

00,3740      54070 1     50000 1     31326 1     00006 1     13752 0     10070 1     13740 0     52134 0
00,3750      05716 1  C: 01104 0     33772 0     54061 1     30004 0     60070 0     54001 1     33773 1
00,3760      15211 1     04645 1     50070 0     55326 0     05133 0     34755 1     50006 1     57326 1
00,3770      05137 1     05261 1  C: 03757 1  C: 03765 0  C: 03774 0  C: 03775 1  CKSM 77716 1      @
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OCTAL LISTING FOR PARAGRAPH # 024, WITH PARITY BIT IN BIT A Y AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2000    C: 76466 1    C: 76731 0       00010 0       00020 0       00010 0       00023 0       00010 0       00053 1
01,2010       00057 0       00067 0       00142 0       00160 0       00010 0       00171 0    C: 21000 1    C: 05155 0
01,2020    C: 04060 0    C: 00144 0    C: 05261 1    C: 04060 0    C: 76300 0    C: 75431 0    C: 03710 1    C: 02630 0
01,2030    C: 75173 0    C: 26063 0    C: 05000 1    C: 02613 1    C: 26063 0    C: 02734 0    C: 75533 0    C: 27710 1

01,2040    C: 14000 1    C: 02416 0    C: 50067 0    C: 10000 0    C: 02217 1    C: 54067 1    C: 26000 0    C: 02653 0
01,2050    C: 50067 0    C: 77777 0    C: 75440 0    C: 03710 1    C: 00031 0    C: 75771 1    C: 35710 1    C: 76355 0
01,2060    C: 75755 1    C: 41710 1    C: 20000 0    C: 02540 1    C: 56067 0    C: 04704 0    C: 75425 0    C: 03710 1
01,2070    C: 77777 0    C: 75435 1    C: 03710 1    C: 25000 0    C: 03540 0    C: 64067 1    C: 00062 0    C: 75215 0

01,2100    C: 03710 1    C: 00764 1    C: 75374 0    C: 03710 1    C: 76260 1    C: 74235 0    C: 03710 1    C: 12000 1
01,2110    C: 03223 1    C: 74067 0    C: 00764 1    C: 75501 1    C: 03710 1    C: 77777 0    C: 75425 0    C: 03710 1
01,2120    C: 13000 0    C: 03020 0    C: 30065 1    C: 77777 0    C: 75351 1    C: 03710 1    C: 01477 1    C: 75537 1
01,2130    C: 74067 0    C: 52777 1    C: 02073 1    C: 42067 0    C: 52777 1    C: 02076 1    C: 42067 0    C: 46777 1

01,2140    C: 02024 0    C: 10067 1    C: 46777 1    C: 05665 1    C: 04067 1    C: 52777 1    C: 02571 0    C: 74067 0
01,2150    C: 22000 1    C: 02461 0    C: 46067 1    C: 00310 0    C: 74163 0    C: 01710 0    C: 00310 0    C: 74163 0
01,2160    C: 01710 0    C: 20000 0    C: 02206 1    C: 66067 0    C: 00310 0    C: 74163 0    C: 01710 0    C: 77777 0
01,2170    C: 74324 1    C: 01710 0    C: 77777 0    C: 74361 0    C: 01710 0    C: 00144 0    C: 75060 0    C: 03710 1

01,2200    C: 30000 1    C: 03601 0    C: 10063 0    C: 17000 1    C: 03350 1    C: 74067 0       35015 0       54003 0
01,2210       34745 0       70111 1       10000 0       32337 1       62340 1       55444 0       32342 0       55476 1
01,2220       34737 0       70111 1       00006 1       12232 1       31444 1       00006 1       72341 1       55444 0
01,2230       32343 1       55476 1       00003 1       32334 1       04616 1    C: 20353 0       12244 0       12250 0

01,2240       12233 0       34751 0       05464 1       15155 1       00004 0       04674 0    C: 40123 0       15472 1
01,2250       40106 1       74737 1       10000 0       32000 0       62001 1       61331 1       00006 1       62233 1
01,2260       30111 0       74737 1       00006 1       12271 0       44741 0       61332 1       00006 1       62233 1
01,2270       31332 1       61331 1       22007 0       53245 1       00004 0       04674 0    C: 40123 0       00003 1

01,2300       40106 1       74737 1       00006 1       15472 1       32335 0       04616 1    C: 20353 0       05472 0
01,2310       12315 0       12304 0       34751 0       05464 1       15155 1       34753 1       00004 0       05203 0
01,2320    C: 03217 0    C: 56066 1       15155 1       32336 0       04616 1    C: 20361 1       05472 0       05472 0
01,2330       05472 0       36007 0       05464 1       15155 1    C: 01457 0    C: 01460 1    C: 14460 0    C: 25101 0

01,2340    C: 05220 1    C: 03146 1    C: 77445 1    C: 77622 1       02441 1       30117 0       50130 0       54046 1
01,2350       16061 1       02441 1       40117 1       02346 1       02427 1       50117 0       30000 1       12346 0
01,2360       02427 1       50117 0       40000 0       12346 0       02427 1       50130 0       30046 0       50117 0
01,2370       54000 0       16061 1       02427 1       50117 0       30000 1       50130 0       56046 0       12367 0
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OCTAL LISTING FOR PARAGRAPH # 025, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
01,2400      02427 1     50117 0     30000 1     50130 0     26046 1     16061 1     02441 1     30117 0
01,2410      12403 0     02427 1     50117 0     40000 0     12403 0     02441 1     50130 0     40050 0
01,2420      50130 0     60046 0     00006 1     66061 0     50130 0     56046 0     16646 1     40117 1
01,2430      64772 1     10000 0     30120 1     12440 1     35007 0     56117 0     54003 0     74357 0

01,2440      25117 1     30120 1     54130 1     10020 1     24130 0     00002 0     00002 0     10020 1
01,2450      30117 0     04621 0     10154 0     16061 1     16646 1     16061 1     16646 1     10121 1
01,2460      12462 1     16061 1     54121 1     10020 1     12450 0  C: 00360 1     16646 1     10020 1
01,2470      06723 1     16061 1     16646 1     16061 1     10020 1     12503 1  C: 12000 1     06723 1

01,2500      16061 1     16061 1     16646 1     06723 1     16646 1     16646 1     16061 1     10020 1
01,2510      16640 1     05705 0     02427 1     50120 1     30052 0     12367 0     34762 0     70117 1
01,2520      50000 1     34735 1     54131 0     34745 0     00006 1     70117 1     54130 1     00004 0
01,2530      50000 1     30074 1     54002 1     34741 1     00006 1     70117 1     72576 0     50000 1

01,2540      12541 1     30131 1     00006 1     04002 1     12553 1     30131 1     00006 1     06002 0
01,2550      12553 1     40131 0     70002 1     50130 0     54074 0     00003 1     34737 0     00006 1
01,2560      70117 1     72576 0     50000 1     12564 0     40002 1     70131 0     10000 0     12577 1
01,2570      16715 0     12577 1     05705 0     05705 0     30002 0     12565 1  C: 00014 1     24164 1

01,2600      16061 1     54061 1     10400 1     12620 0     10454 0     12620 0     10530 0     12620 0
01,2610      10604 1     12620 0     10660 0     12620 0     22061 0     30002 0     05716 1  C: 01201 0
01,2620      64752 0     22007 0     50000 1     21777 0     26063 0     34755 1     54064 1     32634 1
01,2630      54062 1     50064 0     10167 0     12674 1  C: 00007 0     12674 1     30063 1     50064 0

01,2640      54167 0     75004 1     50064 0     54166 1     10064 1     12661 0     54121 1     30166 0
01,2650      54120 0     10067 1     12661 0     05705 0     05705 0     54067 1     52066 0     52165 1
01,2660      15160 1     52066 0     50064 0     52165 1     50067 0     40167 0     60063 1     00006 1
01,2670      65160 0     30064 0     54067 1     15160 1     33033 1     26064 1     10062 1     12630 1

01,2700      22061 0     30002 0     05716 1  C: 01202 0     22164 1     30165 0     00004 0     00006 1
01,2710      04007 1     56001 0     50067 0     52165 1     52165 1     30165 0     00006 1     01007 1
01,2720      52155 1     50067 0     52155 1     52155 1     52157 0     50067 0     52157 0     52157 0
01,2730      52161 0     50067 0     52161 0     52161 0     52163 1     50067 0     52163 1     52163 1

01,2740      34755 1     56121 0     00006 1     12746 1     40166 1     54166 1     52167 0     50067 0
01,2750      52167 0     52167 0     35004 0     70167 0     54120 0     10166 1     34755 1     12764 1
01,2760      40166 1     54166 1     34753 1     56121 0     54067 1     00003 1     52165 1     00006 1
01,2770      52772 1     52006 0     40000 0     64753 1     54164 0     16050 0     00004 0     40167 0
```

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OCTAL LISTING FOR PARAGRAPH # 026, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3000       54167 0     36074 1     70006 0     00006 1     04007 1     54165 1     44755 0     54131 0
01,3010       13120 0     00004 0     10067 1     13016 1     00003 1     13216 0     34752 0     00006 1
01,3020       05011 1     52165 1     12712 0     54061 1     34755 1     54064 1     32634 1     54062 1
01,3030       50064 0     10167 0     13035 0  C: 00014 1     13044 0     33033 1     26064 1     10062 1

01,3040       13027 0     44753 0     54064 1     15160 1     40065 0     50064 0     60164 1     00006 1
01,3050       13052 1     13035 0     50064 0     40167 0     54063 0     50064 0     54167 0     44350 1
01,3060       70065 0     64741 1     56065 1     74350 1     50064 0     60165 0     54066 0     10064 1
01,3070       12661 0     12651 0     54164 0     34755 1     54130 1     35004 0     70167 0     60063 1

01,3100       54167 0     40000 0     13007 1     00004 0     44755 0     54131 0     56167 1     75004 1
01,3110       54001 1     45164 0     60001 0     00006 1     63120 1     10001 1     50000 1     54000 0
01,3120       10203 1     03171 0     05705 0     13124 1     10217 1     03171 0     05705 0     13130 1
01,3130       10233 1     03171 0  C: 67610 1     13134 0     10247 1     03171 0     05705 0     13140 0

01,3140       10263 1     03171 0     05705 0     13144 1     10277 1     03171 0     05705 0     13150 1
01,3150       10313 1     03171 0     05705 0     13154 0     10131 0     05705 0     05705 0     13161 0
01,3160       13206 1     10130 1     13164 0     12764 1     50000 1     27777 0     63132 1     54067 1
01,3170       12704 1     54132 0     60131 1     10000 0     40132 0     13201 0     13177 1     50002 0

01,3200       00002 0     54131 0     00006 1     22130 0     50130 0     00002 0     44755 0     54067 1
01,3210       00003 1     44752 1     00006 1     03011 1     10067 1     13011 0     34752 0     13225 0
01,3220       31361 1     54001 1     33224 0     15166 1  C: 66102 1     00006 1     05011 1     52165 1
01,3230       15165 1     54062 1     30002 0     00006 1     63523 0     40026 1     64744 1     10000 0

01,3240       66107 1     40000 0     63370 0     60002 0     10000 0     61400 1     13310 1     13250 1
01,3250       40002 1     64736 1     64736 1     56026 0     64735 1     60002 0     00006 1     22007 0
01,3260       57400 1     57401 0     57402 0     57403 1     57404 0     57405 1     57406 1     57407 0
01,3270       30063 1     50002 0     13273 0     53411 0     53413 1     53415 1     53417 0     53421 0

01,3300       53423 1     53425 1     53427 0     53431 1     65236 0     00006 1     15215 0     13363 0
01,3310       10000 0     61401 0     13316 1     64753 1     03374 1  C: 00001 0     10000 0     61402 0
01,3320       13324 0     64753 1     03374 1  C: 00002 0     10000 0     61403 1     13332 1     64753 1
01,3330       03374 1  C: 00003 1     10000 0     61404 0     13340 1     64753 1     03374 1  C: 00004 0

01,3340       10000 0     61405 1     13346 1     64753 1     03374 1  C: 00005 1     10000 0     61406 1
01,3350       13354 1     64753 1     03374 1  C: 00006 1     10000 0     61407 0     13362 1     64753 1
01,3360       03374 1  C: 00007 0     10000 0     03371 1     13365 0     64753 1     03374 1  C: 00010 0
01,3370    C: 40201 0     52062 1     05716 1  C: 01203 1     54064 1     50002 0     30000 1     54002 1
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OCTAL LISTING FOR PARAGRAPH # 027,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3400        34753 1     60064 0     50002 0     27377 1     40064 1     50002 0     13260 1     00006 1
01,3410        04007 1     54016 1     00006 1     22012 1     34734 0     57407 0     57406 1     57405 1
01,3420        57404 0     57403 1     57402 0     57401 0     57400 1     64733 1     26026 1     54734 0
01,3430        44755 0     54734 0     00006 1     45237 0     53431 1     53427 0     53425 1     53423 1

01,3440        53421 0     53417 0     53415 1     53413 1     53411 0     56001 0     00006 1     01007 1
01,3450        56001 0     52006 0     23435 1     34752 0     26002 1     55434 1     31153 1     10000 0
01,3460        13466 1     13463 1     13521 0     31154 0     00006 1     63521 1     00006 1     43500 0
01,3470        21154 1     11164 1     13511 0     13474 1     13475 0     11153 0     13511 0  C: 00000 1

01,3500     C: 20000 0     34736 1     27154 1     05203 0  C: 03516 0  C: 02063 0     33520 0     53435 0
01,3510        52006 0     34736 1     05203 0  C: 03466 0  C: 02063 0     13506 0     53150 0     52006 0
01,3520     C: 05261 1     53435 0     13524 0     52062 1     05726 1  C: 01204 0     30161 1     60000 1
01,3530        54155 1     33770 1     54157 0     33565 1     54707 0     30154 1     75007 1     10000 0

01,3540        13551 1     10154 0     10000 0     13651 1     35024 1     05105 0  C: 03037 0  C: 20103 1
01,3550        03565 1     75007 1     10000 0     13622 0     00006 1     50155 0     31437 0     52706 1
01,3560        30154 1     74757 1     67746 0     10000 0     13734 0     04631 1     13570 1     13635 0
01,3570        33774 0     54704 0     50155 0     31054 1     10000 0     24000 1     13601 1     15436 1

01,3600        13620 1     40000 0     54001 1     50155 0     41053 1     00006 1     60025 0     10000 0
01,3610        40000 0     67731 0     64753 1     60001 0     10000 0     34755 1     13620 1     13620 1
01,3620        64753 1     00704 1     33565 1     54157 0     33771 0     54707 0     30154 1     76074 0
01,3630        54154 0     00006 1     50155 0     31437 0     52706 1     50155 0     31054 1     54704 0

01,3640        00006 1     63645 0     33773 1     56704 1     00704 1     33775 1     56704 1     40000 0
01,3650        00704 1     54020 1     10020 1     13654 1     13752 0     33565 1     54707 0     30154 1
01,3660        54021 0     60021 1     50155 0     62003 0     54156 1     00006 1     50156 0     32002 1
01,3670        22706 0     10000 0     24000 1     13746 0     24000 1     54705 1     33774 0     54704 0

01,3700        30706 0     74742 0     10000 0     13741 1     50156 0     32000 0     15445 0     53154 1
01,3710        00006 1     40025 1     21154 1     00006 1     31152 0     21154 1     11153 0     13727 1
01,3720        13722 1     13615 1     11154 1     13727 1     13725 0     13615 1     13620 1     33772 0
01,3730        54704 0     00006 1     31154 0     00704 1     33774 0     54704 0     50155 0     41054 0

01,3740        15445 0     40706 1     54706 1     50156 0     32000 0     13574 0     56705 0     50156 0
01,3750        32000 0     13637 1     30157 1     54707 0     50155 0     32002 1     60154 1     60154 1
01,3760        60154 1     54156 1     13665 0     36245 1     26156 1     33565 1     54707 0     13665 0
01,3770     C: 03763 0  C: 03541 1  C: 05277 0  C: 05105 0  C: 05203 0  C: 05072 1  C: 03776 1  CKSM 55151 1
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OCTAL LISTING FOR PARAGRAPH # 040,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2000      C: 00302 0    C: 17755 0    C: 00065 1    C: 01265 1    C: 22437 1    C: 16067 1    C: 15625 1    C: 21042 1
04,2010      C: 30276 1    C: 04773 0    C: 25004 1    C: 06702 1    C: 16471 1    C: 01352 1    C: 21412 0    C: 20500 0
04,2020      C: 25477 1    C: 03367 0    C: 27533 1    C: 07571 0       05516 0    C: 00311 1       05516 0    C: 00314 1
04,2030         05476 1       32037 1       04616 1    C: 20476 0       12031 0       12031 0       12031 0    C: 11343 0

04,2040         54775 0       34355 0       54366 0       31302 1       74746 1       10000 0       12065 1       40775 0
04,2050         62400 1       00006 1       12373 0       64753 1       00006 1       12372 1       30775 1       00006 1
04,2060         12107 1       40076 1       74753 0       10000 0       12072 1       05567 0    C: 01520 1       04457 0
04,2070         04635 0    C: 21050 1       32477 1       54155 1       50155 0       32441 1       76074 0       40000 0

04,2100         60775 1       10000 0       10155 1       12073 0       12322 1       30155 0       54774 1       40103 1
04,2110         74746 1       10000 0       12134 1       05516 0    C: 00163 0       32366 0       55260 0       15155 1
04,2120         40074 0       74745 1       10000 0       12125 1       12132 1       40074 0       74743 1       10000 0
04,2130         32367 1       64747 1       62370 1       05357 0       34755 1       00006 1       01007 1       32365 0

04,2140         54374 0       05353 1    C: 00014 1       06037 0    I: 77624 1    C: 27414 0    I: 77776 1       05516 0
04,2150      C: 00124 0       34735 1       54107 0       05516 0    C: 00063 1       05516 0    C: 00141 0       05516 0
04,2160      C: 00311 1       10775 0       12310 0       04457 0       35017 1       55056 1       06011 1       44753 0
04,2170         70076 1       54076 1       34756 1       54001 1       40000 0       52755 1       42371 1       70074 0

04,2200         54074 0       34755 1       54332 1       55324 1       04674 0    C: 75555 0       04674 0    C: 40204 0
04,2210         44775 1       55072 1       70075 1       54075 1       04674 0    C: 12652 0       10775 0       12226 1
04,2220         04674 0    C: 12647 1       30775 1       55011 1       04635 0    C: 12770 1       41011 1       62326 1
04,2230         00006 1       12250 0       40775 0       62326 1       00006 1       12250 0       67746 0       00006 1

04,2240         12262 1       64756 1       00006 1       12262 1       32324 0       70074 0       10000 0       12257 1
04,2250         42371 1       70074 0       54074 0       06011 1       00006 1       34755 1       52755 1       32364 1
04,2260         54374 0       12224 0       41011 1       66007 0       00006 1       12254 1       64756 1       00006 1
04,2270         12254 1       32324 0       70074 0       60775 1       40000 0       62327 0       00006 1       12304 0

04,2300         62325 1       00006 1       12304 0       12254 1       40075 1       74775 1       26075 1       12220 1
04,2310         32324 0       70074 0       10000 0       12316 0       05516 0    C: 00007 0       50774 0       32500 0
04,2320         00004 0       12202 1       04364 1       12067 0    C: 00500 1    C: 00305 1    C: 00026 0    C: 00124 0
04,2330         00004 0       50774 0       32441 1       55060 1       54020 1       30020 0       77725 1       55062 0

04,2340         54063 0       31060 0       00006 1       74744 0       74757 1       54001 1       50774 0       32403 1
04,2350         55061 0       74350 1       26001 1       31061 1       75012 0       64741 1       05116 1       31060 0
04,2360         76074 0       05314 1       04457 0       05155 0    C: 10333 0    C: 10146 0    C: 10120 0    C: 37667 1
04,2370      C: 40072 0    C: 00700 0       36245 1       54002 1       00006 1       32402 0       60002 0       52006 0
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OCTAL LISTING FOR PARAGRAPH # 041,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2400     C: 00106 0   C: 02072 0   C: 42067 0   C: 71526 0   C: 71274 0   C: 26207 0   C: 72731 1   C: 72547 1
04,2410     C: 72220 1   C: 72031 0   C: 62144 1   C: 64776 0   C: 33314 1   C: 32050 0   C: 31427 1   C: 75436 1
04,2420     C: 75410 0   C: 75272 1   C: 75147 1   C: 71521 1   C: 71271 0   C: 72725 1   C: 72545 0   C: 72216 1
04,2430     C: 72027 1   C: 72450 0   C: 72000 1   C: 50404 1   C: 50000 1   C: 51505 0   C: 50000 1   C: 60061 0

04,2440     C: 77655 1   C: 27717 0   C: 27716 1   C: 27714 0   C: 27713 1   C: 27712 0   C: 27711 0   C: 27710 1
04,2450     C: 27704 1   C: 27677 1   C: 27271 0   C: 27264 1   C: 27263 0   C: 27657 0   C: 27652 0   C: 27651 0
04,2460     C: 27650 1   C: 27647 1   C: 27646 0   C: 27643 0   C: 27642 1   C: 27641 1   C: 27640 0   C: 27637 0
04,2470     C: 27636 1   C: 27631 0   C: 27626 0   C: 27625 0   C: 27624 1   C: 27614 1   C: 27006 1   C: 00035 1

04,2500     C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00004 0
04,2510     C: 00004 0   C: 00005 1   C: 00000 1   C: 00000 1   C: 00003 1   C: 00003 1   C: 00003 1   C: 00003 1
04,2520     C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0
04,2530     C: 00002 0   C: 00005 1   C: 00002 0   C: 00002 0   C: 00004 0   C: 00000 1   I: 44001 0   C: 00001 0

04,2540     C: 02736 1   I: 47135 0   C: 00012 1   C: 21576 0   I: 71406 0   I: 73525 1   I: 77626 0   C: 60012 1
04,2550     C: 00011 1   I: 77634 0   C: 21576 0   I: 71406 0   C: 00025 0   I: 73525 1   I: 57406 1   C: 14027 1
04,2560     C: 24007 0   C: 14023 0   I: 72405 0   C: 00001 0   C: 17767 1   I: 72405 0   I: 77626 0   C: 50006 1
04,2570     C: 00023 0   I: 53435 0   C: 03765 0   C: 00031 0   I: 77650 1   C: 02736 1      52134 0      53170 1

04,2600        25167 0      30006 1      75012 0      27170 1      51167 0      27777 0      04622 0      02613 1
04,2610        02612 0      25167 0      25167 0      53170 1      52006 0      22164 1      50001 0      30001 0
04,2620        24001 0      24001 0      53170 1      06037 0   I: 77624 1   C: 01167 0   I: 77776 1      23170 0
04,2630        16041 0      05137 1      44741 0      50064 0      26164 0      00072 1      56002 0      54154 0

04,2640        00004 0      34355 0      05072 1   C: 03534 0   C: 60101 1      00003 1      00154 1      54001 1
04,2650        04220 0      04224 1      04374 0      30001 0      55043 0      05133 0      22007 0      34755 1
04,2660        53052 0      33011 1      04616 1   C: 20334 1      15472 1      12667 0      12661 0      53052 0
04,2670        00006 1      13000 0      52155 1      06037 0   I: 77634 0   C: 21716 1   C: 34041 0   C: 27043 0

04,2700     I: 63375 0   C: 00067 0   C: 00001 0   C: 02207 0   I: 63256 0   I: 53435 0   I: 77626 0   C: 61562 1
04,2710     C: 00015 0   C: 34041 0   C: 27057 0   I: 63375 0   C: 00007 0   C: 00001 0   I: 77725 1   C: 00015 0
04,2720     C: 24037 0   I: 41406 0   I: 63245 1   C: 02207 0   I: 72441 0   C: 02215 0   C: 26201 0   C: 00001 0
04,2730     I: 72441 0   C: 02215 0   C: 26203 1   C: 00007 0   I: 41456 0   I: 47235 0   C: 00001 0   C: 00023 0

04,2740     I: 53552 0   I: 77656 1   C: 24001 0   C: 00023 0   I: 74241 0   C: 00015 0   I: 77752 1   I: 53445 1
04,2750     I: 77656 1   I: 50206 0   C: 00001 0   I: 65552 0   C: 26205 1   I: 50235 0   C: 00001 0   I: 71244 0
04,2760     C: 10765 1   C: 24020 0   I: 77625 0   C: 02205 1   C: 02205 1   I: 47145 1   C: 00037 0   C: 21612 1
04,2770     C: 01052 1   I: 77776 1      33012 1      04616 1   C: 20334 1      15472 1      15472 1      12661 0
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OCTAL LISTING FOR PARAGRAPH # 042, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3000      56001 0      00006 1      13005 0      56001 0      12672 1      06037 0   I: 52034 1   C: 21573 0
04,3010   C: 10676 1   C: 01420 0   C: 01532 1   I: 77220 1   C: 02746 0   C: 01555 0   I: 47235 0   C: 01563 0
04,3020   C: 03607 0   I: 77656 1   C: 03623 0   I: 53435 0   C: 03607 0   C: 37615 1   C: 02746 0   C: 00000 1
04,3030   C: 04000 0   C: 00000 1   C: 00200 0   C: 00000 1   C: 00400 0   C: 00000 1   C: 10000 0   C: 00000 1

04,3040   C: 02000 0   C: 00000 1   C: 01000 0   C: 00000 1   C: 00020 0   C: 00000 1   C: 00100 0   C: 00000 1
04,3050   C: 34631 1   C: 23146 0   C: 77467 1   C: 77777 0   C: 03110 1   C: 17665 1   C: 00000 1   C: 00001 0
04,3060   C: 37767 0   C: 37737 0   C: 40010 1   C: 40040 1   I: 43020 1   C: 02753 1   C: 03665 1   I: 77614 1
04,3070   C: 04273 0   I: 45131 0   C: 02673 1   C: 27777 0   C: 11130 0   C: 14045 0   I: 56261 1   C: 20606 0

04,3100   C: 00045 0   C: 32766 1   C: 10005 0   C: 14017 1   C: 02720 0   I: 60316 0   C: 00047 1   I: 41275 1
04,3110   C: 00017 1   C: 00041 1   I: 77657 0   C: 21576 0   I: 44206 0   C: 11043 0   C: 16742 1   I: 60205 0
04,3120   C: 00045 0   C: 00047 1   I: 53605 1   C: 00045 0   C: 20575 1   C: 02740 0   I: 77650 1   C: 02753 1
04,3130   I: 77656 1   C: 16712 1   C: 00045 0   C: 26720 0   I: 77656 1   C: 02722 1   I: 72441 0   C: 02712 1

04,3140   I: 77725 1   C: 00045 0   C: 24041 1   C: 02722 1   I: 76435 1   C: 02712 1   I: 75214 1   C: 03705 0
04,3150   C: 11162 1   C: 02673 1   I: 40056 0   C: 11160 0   C: 16674 0   C: 00045 0   I: 43565 0   C: 02673 1
04,3160   I: 52162 0   C: 11154 1   I: 75246 0   C: 02673 1   I: 77616 0      00003 1      00006 1      23167 0
04,3170      06037 0   I: 53135 0   C: 01502 1   C: 11232 1   I: 77775 1   C: 01503 0   C: 25535 0   C: 01511 0

04,3200   I: 77624 1   C: 23456 1   I: 51535 0   C: 01502 1   I: 53025 0   C: 11243 1   C: 11213 1   I: 43174 1
04,3210   C: 00000 1   C: 00223 1   C: 11216 1   I: 43174 1   C: 00002 0   C: 00063 1   I: 50135 0   C: 01502 1
04,3220   C: 11226 1   I: 77624 1   C: 26661 1   I: 52014 0   C: 01671 0   C: 11230 0   I: 77624 1   C: 26734 0
04,3230   I: 77614 1   C: 02676 1   I: 45131 0   C: 01502 1   C: 00000 1   C: 27423 1   I: 77776 1      05353 1

04,3240   C: 04026 1      01167 0   C: 00002 0   C: 00000 1   I: 77420 1   C: 02711 1      05353 1   C: 04022 0
04,3250      06037 0   I: 77650 1   C: 02711 1   C: 00063 1      34737 0      70077 0      10000 0      03270 1
04,3260      31302 1      74743 1      00006 1      13265 1      44750 0      63273 1      05744 0      06001 0
04,3270      05504 0   C: 00007 0      14631 0   C: 00220 1      54016 1      56002 0      54012 0      04400 1

04,3300      34346 1      00006 1      02015 1      54073 1      40101 0      74735 0      26101 0      34355 0
04,3310      05072 1   C: 02077 0   C: 60101 1      30073 0      50064 0      54154 0      05270 1      54016 1
04,3320      56002 0      54012 0      04400 1      34755 1      56045 0      54073 1      34751 0      00006 1
04,3330      05011 1      34346 1      70073 1      56073 0      00006 1      74742 0      54734 0      74346 0

04,3340      63374 1      03371 1      34742 1      00006 1      70734 0      74346 0      40000 0      03371 1
04,3350      43377 0      60073 0      00006 1      13361 1      34750 1      70103 1      10000 0      05270 1
04,3360      03307 0      44750 0      70103 1      54103 1      03307 0      40103 1      74750 0      26103 1
04,3370      05270 1      60073 0      10000 0      03365 1   C: 77740 1      03365 1      00002 0   C: 00022 1
```

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OCTAL LISTING FOR PARAGRAPH # 043,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3400         44753 0        05353 1     C: 07026 1     C: 30000 1     C: 03712 0     C: 10102 0        34753 1        54332 1
04,3410         05311 1     C: 00033 1        51172 1        13414 1        13417 1        13422 1        13422 1        34752 0
04,3420         55170 1        13445 0        33515 0        54156 1        33516 0        04616 1     C: 20334 1        13712 1
04,3430         13424 1        03506 1        44752 1        61174 1        00006 1        63424 0        41174 0        64362 1

04,3440         00006 1        63424 0        31174 1        55170 1        25173 0        33662 0        61173 0        54156 1
04,3450         33516 0        04616 1     C: 20334 1        13712 1        13450 1        03506 1        41173 1        61170 0
04,3460         00006 1        63463 0        13444 1        33514 1        54156 1        33517 1        04616 1     C: 20334 1
04,3470         13712 1        13520 1        03506 1        31167 0        00006 1        63463 0        41167 1        61170 0

04,3500         64753 1        00006 1        63463 0        33662 0        61167 0        13447 1        40154 0        74746 1
04,3510         10000 0        00002 0        50002 0        77771 0     C: 01167 0     C: 01174 1     C: 05201 1     C: 05202 1
04,3520         00004 0        30103 0        56001 0        34751 0        00006 1        06001 0        54103 1        05353 1
04,3530      C: 04026 1        00004 0        44752 1        61172 1        00006 1        63544 1        00006 1        31175 0

04,3540         53205 0        03567 0        04364 1        03712 0        34355 0        05105 0     C: 03551 0     C: 10103 1
04,3550         05155 0        06037 0     I: 77624 1     C: 27414 0     I: 77776 1        05353 1     C: 04026 1        05504 0
04,3560      C: 00236 0        00004 0        51172 1        13564 1        13723 0        13632 1        13664 1        00006 1
04,3570         23167 0        34755 1        22007 0        52025 1        53217 0        34756 1        54001 1        40000 0

04,3600         52765 1        00004 0        34755 1        22007 0        54156 1        53205 0        52155 1        00006 1
04,3610         31217 1        20155 1        00006 1        13622 0        34755 1        53217 0        20025 1        05353 1
04,3620      C: 04026 1        01167 0        07257 0        52155 1        20025 1        05353 1     C: 04026 1        00004 0
04,3630         51167 0        00001 0        31175 0        54003 0        74357 0        55167 1        67745 0        61170 0

04,3640         00006 1        13647 0        74743 1        10000 0        13760 1        37745 0        61170 0        54154 0
04,3650         50000 1        31176 0        54001 1        30154 1        61167 0        50000 1        23400 1        10154 0
04,3660         13647 0        13711 1     C: 01173 0        13711 1        34753 1        71170 1        10000 0        13671 0
04,3670         13760 1        44752 1        61170 0        54154 0        50000 1        31175 0        22000 1        10154 0

04,3700         54154 0        50000 1        31175 0        54003 0        74357 0        50000 1        23400 1        10154 0
04,3710         13673 1        03165 0        31171 1        05314 1        34755 1        54332 1        03765 0        00006 1
04,3720         34755 1        52765 1        05472 0        00006 1        41175 1        53205 0        03567 0        03760 0
04,3730         00006 1        41175 1        53207 1        00006 1        41175 1        53211 0        05353 1     C: 04026 1

04,3740         34755 1        22007 0        53207 1        21571 1        34755 1        22007 0        53211 0        21643 0
04,3750         34755 1        22007 0        53175 1        21710 1        27706 0        05353 1     C: 04026 1        03711 0
04,3760         04364 1        13711 1        04364 1        03765 0        05472 0        44751 1        00006 1        03011 1
04,3770         00002 0     C: 03771 0     C: 03772 0  CKSM 12532 0           @              @              @              @
```

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OCTAL LISTING FOR PARAGRAPH # 044,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2000      C: 02357 1    C: 20000 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1
05,2010      C: 00000 1    C: 16533 0    C: 30007 0    C: 77333 1    C: 56654 0    C: 00000 1    C: 00000 1    C: 06273 1
05,2020      C: 03275 1    C: 01242 1    C: 24467 1    C: 00020 0    C: 17260 0    C: 00002 0    C: 00000 1    C: 22572 1
05,2030      C: 27214 0    C: 01315 1    C: 26177 1    C: 77731 1    C: 55217 0    C: 32055 0    C: 22576 0    C: 10624 0

05,2040      C: 10605 0    C: 37436 1    C: 01635 0    C: 01065 0    C: 31323 1    C: 20770 0    C: 13725 0    C: 02245 0
05,2050      C: 06475 1    C: 00162 1    C: 33431 1    C: 22566 1    C: 24130 0    C: 02000 0    C: 00000 1    C: 00256 0
05,2060      C: 17752 1    C: 77512 1    C: 67453 1    C: 00131 1    C: 26730 1    C: 77340 0    C: 32127 1    C: 24340 0
05,2070      C: 03451 1    C: 13443 0    C: 02256 1    C: 01344 0    C: 25733 1    C: 03633 1    C: 12266 0    C: 13700 1

05,2100      C: 01340 1    C: 03630 1    C: 32136 1    C: 00024 1    C: 32145 0    C: 24340 0    C: 32154 0    C: 07115 0
05,2110      C: 00007 0    C: 01776 0    C: 12274 0    C: 03635 1    C: 12365 1    C: 01333 0    C: 05336 1    C: 03577 1
05,2120      C: 01331 1    C: 01302 1    C: 03441 0    C: 32157 0    C: 32170 0    C: 00007 0    C: 74261 1    C: 76056 0
05,2130      C: 01723 0    C: 01725 0    C: 01727 1    C: 01731 0    C: 01570 1    C: 76060 0    C: 04320 1    C: 01432 0

05,2140      C: 07021 0    C: 07235 1    C: 04032 1    C: 24074 1    C: 52754 0    C: 76555 0    C: 01224 1    C: 01226 0
05,2150      C: 01230 1    C: 01232 0    C: 01234 0    C: 76557 1    C: 07243 0    C: 10372 0    C: 77667 0    C: 07021 0
05,2160      C: 07235 1    C: 04032 1    C: 03024 1    C: 03113 1    C: 34011 0    C: 34013 1    C: 34030 0    C: 43745 0
05,2170      C: 03560 1    C: 67453 1    C: 32127 1    C: 24340 0    C: 02020 1    C: 02774 1    C: 07115 0    C: 01333 0

05,2200      C: 01344 0    C: 25733 1    C: 00735 0    C: 12022 1    C: 05336 1    C: 32224 1    C: 32136 1    C: 00024 1
05,2210      C: 32145 0    C: 24340 0    C: 32154 0    C: 32226 0    C: 05336 1    C: 04036 0    C: 00112 0    C: 01331 1
05,2220      C: 01302 1    C: 03441 0    C: 32157 0    C: 52754 0    C: 05700 0    C: 77665 1    C: 12737 1    C: 02755 1
05,2230      C: 12760 0    C: 65011 1    C: 32127 1    C: 24340 0    C: 32276 0    C: 14340 0    C: 03451 1    C: 13443 0

05,2240      C: 13433 1    C: 03633 1    C: 12266 0    C: 00007 0    C: 03630 1    C: 32224 1    C: 32136 1    C: 00024 1
05,2250      C: 32145 0    C: 24340 0    C: 32154 0    C: 07115 0    C: 00007 0    C: 01776 0    C: 12274 0    C: 03635 1
05,2260      C: 12365 1    C: 02256 1    C: 04036 0    C: 00112 0    C: 01331 1    C: 01302 1    C: 03441 0    C: 32157 0
05,2270      C: 02302 1    C: 03620 0    C: 03466 0    C: 03577 1    C: 02347 0    C: 77770 1    C: 74320 0    C: 03461 1

05,2300      C: 03752 1    C: 03754 1    C: 74017 1    C: 32341 0    C: 32355 0    C: 01344 0    C: 13253 1    C: 13645 1
05,2310      C: 03642 1    C: 03664 0    C: 12022 1    C: 00007 0    C: 32224 1    C: 32136 1    C: 00024 1    C: 32145 0
05,2320      C: 24340 0    C: 32154 0    C: 07115 0    C: 12636 1    C: 13626 1    C: 13634 1    C: 02262 0    C: 02400 1
05,2330      C: 03615 0    C: 00112 0    C: 01331 1    C: 01302 1    C: 03441 0    C: 32157 0    C: 32170 0    C: 03614 1

05,2340      C: 74324 1    C: 75441 1    C: 03651 0    C: 02337 1    C: 03652 0    C: 03754 1    C: 03654 0    C: 03756 0
05,2350      C: 03457 1    C: 03461 1    C: 03752 1    C: 03754 1    C: 75443 0    C: 24340 0    C: 57423 0    C: 32127 1
05,2360      C: 24340 0    C: 32276 0    C: 14340 0    C: 02774 1    C: 25733 1    C: 26236 1    C: 32224 1    C: 32136 1
05,2370      C: 00024 1    C: 32145 0    C: 24340 0    C: 32154 0    C: 32226 0    C: 12230 0    C: 02020 1    C: 00112 0
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OCTAL LISTING FOR PARAGRAPH # 045,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2400       C: 01331 1    C: 01302 1    C: 03441 0    C: 32157 0    C: 32170 0    C: 00007 0    C: 77770 1    C: 12200 0
05,2410       C: 02214 1    C: 12201 1    C: 02215 0    C: 12206 0    C: 02214 1    C: 12207 1    C: 02215 0    C: 25170 0
05,2420       C: 25204 0    C: 32136 1    C: 00024 1    C: 32145 0    C: 24340 0    C: 32154 0    C: 07115 0    C: 00007 0
05,2430       C: 00007 0    C: 02020 1    C: 25174 1    C: 15210 0    C: 01331 1    C: 01302 1    C: 00007 0    C: 32157 0

05,2440       C: 52754 0    C: 02172 1    C: 02407 0    C: 02232 0    C: 02066 0    C: 02303 0    C: 02357 1       00004 0
05,2450          03107 1       12456 0       34736 1       05105 0    C: 77777 0    C: 77777 0       31036 0       74771 0
05,2460          64735 1       55036 1       34740 0       54333 0       34755 1       55365 1       54375 1       54376 1
05,2470          54377 0       54320 1       44644 1       55313 0       34736 1       00006 1       01011 0       44755 0

05,2500          54055 0       347*1 0       55273 1       34355 0       54366 0       34755 1       55246 1       54371 0
05,2510          55072 1       55262 1       55263 0       55276 1       55360 1       55362 0       54332 1       55324 1
05,2520          55501 0       00006 1       01005 0       00006 1       01006 0       00006 1       01012 0       00006 1
05,2530          01013 1       00006 1       01014 0       41036 1       74771 0       10000 0       02542 0       34771 1

05,2540          00006 1       05012 1       02643 1       44755 0       55011 1       33362 0       55302 0       33067 0
05,2550          55346 0       34751 0       55325 0       33063 1       54111 1       35015 0       54003 0       33060 1
05,2560          55444 0       33061 0       55476 1       32000 0       55400 0       33064 0       55403 0       55406 0
05,2570          33065 1       55405 0       55410 1       34755 1       55407 1       34363 0       55404 1       34744 1

05,2600          55411 0       35026 0       64746 0       55303 1       00006 1       33367 0       52075 1       33370 0
05,2610          54076 1       34737 0       70077 0       63371 1       54077 0       00006 1       33373 0       52101 0
05,2620          00006 1       33375 0       52103 1       34744 1       64740 0       64741 1       70104 0       63376 0
05,2630          54104 0       33377 1       54105 1       34737 0       70106 1       63400 0       54106 1       33401 1

05,2640          54107 0       04635 0    C: 03210 1       00004 0       00006 1       34755 1       52755 1       00006 1
05,2650          34755 1       52761 0       00006 1       34755 1       52753 1       00006 1       34755 1       52757 0
05,2660          00006 1       34755 1       52763 1       00006 1       34755 1       52765 1       00002 0       24320 0
05,2670          22002 0       00006 1       04007 1       53433 0       31036 0       74750 0       00006 1       12703 0

05,2700          64740 0       00006 1       05012 1       03070 0       34350 0       71360 1       00006 1       12711 0
05,2710          13105 1       41360 1       00006 1       12730 0       61377 0       00006 1       12720 1       13105 1
05,2720          31374 0       54003 0       00006 1       31376 1       51377 0       52001 1       34755 1       55360 1
05,2730          03107 1       44736 0       70106 1       54106 1       33364 0       71036 1       64735 1       57036 0

05,2740          33350 1       71302 0       63363 1       55302 0       31324 0       54332 1       34750 1       00006 1
05,2750          05014 1       40101 0       74745 1       10000 0       12761 1       34737 0       00006 1       05011 1
05,2760          1277* 1       34736 1       00006 1       05011 1       12775 1       00004 0       03116 1       12771 0
05,2770          03146 1       03070 0       43066 0       70106 1       54106 1       34756 1       54161 0       60000 1
```

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OCTAL LISTING FOR PARAGRAPH # [illegible],  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3000        00006 1      50000 1      30753 0      00006 1      06001 0      10000 0      13054 1      13054 1
05,3010        13054 1      10161 0      12776 1      54162 0      05315 0      00004 0      44736 0      70075 1
05,3020        54075 1      44740 1      70075 1      54075 1      44741 0      70074 0      54074 0      34756 1
05,3030        54161 0      60000 1      50000 1      10753 1      13036 0      13043 1      54154 0      24154 1

05,3040        24162 1      33062 0      04622 0      10161 0      13030 0      10162 0      12641 1      34735 1
05,3050        71011 1      00006 1      16001 1      12641 1      05567 0   C: 01107 0      12501 0   C: 07777 1
05,3060     C: 32321 0   C: 77445 1   C: 03526 0   C: 21312 1   C: 77001 0   C: 00074 1   C: 20100 1   C: 03434 1
05,3070        34747 1      00006 1      02016 1      00006 1      13102 0      00006 1      00015 0      63361 0

05,3100        00006 1      13103 1      00002 0      03107 1      12474 0      03107 1      12501 0      33351 0
05,3110        54335 0      34746 0      00006 1      02033 0      63365 1      54110 0      34733 1      54026 1
05,3120        67746 0      54027 0      67747 1      54030 0      35015 0      54003 0      44737 1      71273 1
05,3130        55273 1      34733 1      55466 0      00006 1      03013 0      34755 1      55465 0      55472 0

05,3140        44751 1      70111 1      54111 1      00006 1      33347 1      53275 1      33360 1      00006 1
05,3150        03011 1      44743 1      70077 0      54077 0      40077 0      74741 0      00006 1      13161 0
05,3160        34742 1      63354 0      40000 0      70110 0      54110 0      33356 1      00006 1      03012 1
05,3170        44750 0      70101 0      54101 0      44741 0      70101 0      54101 0      33357 0      00006 1

05,3200        03013 0      34740 0      00006 1      05013 0      34746 0      00006 1      03014 1      35007 0
05,3210        54003 0      34734 0      55407 1      55406 0      55405 0      55404 1      55403 0      55402 1
05,3220        55401 1      55400 0      45236 1      55410 1      55412 0      55414 0      55416 1      55420 1
05,3230        55422 0      55424 0      55426 1      55430 0      45237 0      55411 0      55413 1      55415 1

05,3240        55417 0      55421 0      55423 1      55425 1      55427 0      55431 1      44755 0      54167 0
05,3250        54203 1      54217 1      54233 1      54247 1      54263 1      54277 1      54313 1      55313 0
05,3260        54067 1      33353 1      54400 1      63355 1      54454 0      63355 1      54530 0      63355 1
05,3270        54604 1      63355 1      54660 0      34363 0      54154 0      44740 1      50154 1      55023 0

05,3300        10154 0      13274 1      55326 0      55327 1      55330 1      55074 1      54045 1      54776 0
05,3310        55042 1      55013 0      55015 0      55012 1      55020 0      55021 1      55001 0      55002 0
05,3320        55043 0      55312 1      55044 1      55304 0      55305 1      55306 1      55307 0      55314 1
05,3330        54100 1      34760 1      55016 0      44753 0      55100 0      34746 0      71303 1      65026 0

05,3340        55303 1      33352 0      55361 0      44360 1      54777 1      00002 0   C: 02024 0   C: 34066 0
05,3350     C: 00435 0   C: 03515 0   C: 03336 1   C: 00400 0   C: 32001 1   C: 00054 0   C: 27470 1   C: 74160 0
05,3360     C: 30001 0   C: 77755 0   C: 37411 1   C: 37000 0   C: 00450 0   C: 00102 1   C: 00000 1   C: 00000 1
05,3370     C: 00000 1   C: 02000 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00100 0   C: 00000 1   C: 00000 1
```

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OCTAL LISTING FOR PARAGRAPH # 047,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3400    C: 00000 1   C: 40000 0      33405 0      54017 0      50017 1      13406 1      33477 0      60002 0
05,3410       54001 1      40000 0      52761 0      50002 0      33476 1      55011 1      55163 0      10002 1
05,3420       40106 1      74737 1      26106 1      43501 1      70111 1      54111 1      40101 0      74745 1
05,3430       26101 0      44355 1      00006 1      02011 0      64737 0      00006 1      01011 0      34735 1

05,3440       54107 0      40074 0      74752 1      26074 0      66011 1      00006 1      30025 0      53345 0
05,3450       00006 1      33475 1      53253 0      00006 1      34755 1      52753 1      00006 1      34755 1
05,3460       52757 0      00006 1      34755 1      52765 1      36245 1      54001 1      40000 0      52761 0
05,3470       37730 1      54030 0      04635 0   C: 12765 0   C: 03770 1   C: 64067 1   C: 00106 0   C: 00027 1

05,3500    C: 00107 1   C: 00640 0   C: 00545 0   C: 00171 0   C: 00017 1   C: 23305 0      54016 1      00006 1
05,3510       22012 1      13763 1      00006 1      05013 0      00335 1      37747 1      54337 1      54336 0
05,3520       33640 0      54335 0      13536 0      10336 0      03653 1   C: 77753 0      13527 0      10337 1
05,3530       13666 0   C: 74001 0      30334 0      00006 1      63536 1      13543 1      50332 0      32441 1

05,3540       54334 1      40332 1      13756 1      50334 0      30000 1      10000 0      24334 0      13553 0
05,3550       56334 0      40000 0      56334 0      24000 1      54336 0      63525 0      10000 0      13563 0
05,3560    C: 47777 0      13563 0      03605 1      30336 1      63560 1      00006 1      63653 1      67741 1
05,3570       00006 1      63611 1      00006 1      50336 1      44000 1      54001 1      00006 1      50336 1

05,3600       43777 1      54336 0      37747 1      56336 1      13701 0      44745 1      00006 1      03013 0
05,3610       00002 0      50336 1      00000 1      10000 0      30336 1      13665 0      56336 1      54337 1
05,3620       34755 1      56336 1      54003 0      74357 0      00006 1      50000 1      31402 0      50336 1
05,3630       52341 0      24336 1      24336 1      24337 0      50337 0      00000 1      10000 0      13622 0

05,3640    C: 03523 0      54337 1      37747 1      54336 0      56337 0      54003 0      74357 0      00006 1
05,3650       50000 1      31402 0      13701 0      30336 1      54003 0      74357 0      54001 1      33531 0
05,3660       26336 0      00006 1      50001 0      31401 0      13701 0      54337 1      50337 0      00000 1
05,3670       10000 0      24337 0      13676 1      54337 1      37747 1      56337 0      24000 1      54336 0

05,3700       13564 1      00006 1      01034 1      30001 0      00006 1      01035 0      15270 0      34755 1
05,3710       54336 0      03753 0      33721 0      54335 0      30025 0      56001 0      30336 1      13701 0
05,3720    C: 03722 0   C: 03735 0      34752 0      26336 0      74357 0      10000 0      13737 0      30336 1
05,3730       70333 0      77722 0      10000 0      13515 1      13711 1      33720 1      54335 0      30336 1

05,3740       54003 0      74357 0      54002 1      34754 0      54001 1      50002 0      71401 1      56001 0
05,3750       50002 0      71400 0      13701 0      00006 1      22335 1      35011 1      54001 1      03605 1
05,3760       32065 0      56001 0      13701 0      34745 0      00006 1      02013 1      10000 0      00335 1
05,3770       34745 0      13512 0   C: 03772 0   C: 03773 1 CKSM 44531 0         @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 060,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2000      54016 1      00006 1      22012 1      11313 0      12010 0      12007 0      12134 1      34757 0
06,2010      54070 1      55313 0      11036 1      02063 0      02063 0      57036 0      74356 1      55036 1
06,2020      64101 0      00006 1      01010 1      02071 0      55016 0      44755 0      54073 1      56776 1
06,2030      64754 0      54776 0      50776 1      11023 0      10776 0      12030 1      12047 1   C: 00012 1

06,2040      10073 1   C: 37764 0      55016 0      00002 0      54073 1      32037 1      12031 0      64753 1
06,2050      50776 1      55023 0      74356 1      54073 1      34350 0      50776 1      74066 1      60073 0
06,2060      00006 1      01010 1      15737 0      10101 0      34755 1      12130 0      11016 0      02024 0
06,2070      12130 0      42171 0      27313 0      37731 0      54027 0      31303 0      00006 1      06032 0

06,2100      74736 0      00006 1      12116 1      23303 0      00006 1      06001 0      55303 1      74736 0
06,2110      10000 0      12116 1      34355 0      05072 1   C: 03452 1   C: 60101 1      50070 0      12120 1
06,2120      03156 0      13006 0      12172 0      13132 0      03156 0      13006 0      12172 0      13132 0
06,2130      00006 1      01010 1      32041 0      12074 1      34736 1      71313 0      00006 1      12165 0

06,2140      11016 0      02024 0      12152 1      44736 0      27313 0      37731 0      54027 0      34743 0
06,2150      27313 0      05270 1      00006 1      01010 1      37731 0      26027 0      34743 0      27313 0
06,2160      11313 0      05270 1   C: 37737 0      02154 0      05270 1      00006 1      01010 1      34736 1
06,2170      12144 0   C: 22400 0      31302 1      00006 1      06030 1      72761 1      00006 1      12227 0

06,2200      54070 1      23302 1      00006 1      06001 0      55302 0      44753 0      56070 0      00006 1
06,2210      62514 0      12213 1      64753 1      24070 0      60000 1      54000 0      12213 1      56071 1
06,2220      50070 0      34736 1      71302 0      50070 0      02755 1      10071 0      12212 0      41302 0
06,2230      74745 1      10000 0      12374 1      34744 1      71302 0      10000 0      12242 0      34744 1

06,2240      27302 0      12374 1      42777 0      71302 0      55302 0      74736 0      10000 0      12347 1
06,2250      41302 0      74743 1      10000 0      12256 0      05567 0   C: 00213 1      02735 1      33005 1
06,2260      05203 0   C: 02266 1   C: 14106 0      12374 1      33005 1      05224 0      44752 1      71302 0
06,2270      57302 1      74752 1      00006 1      12306 1      34736 1      71302 0      00006 1      12264 1

06,2300      40074 0      74744 0      10000 0      15261 0      04635 0   C: 17637 0      34735 1      00006 1
06,2310      05012 1      04674 0   C: 17266 0      05457 1      44763 0      00006 1      03012 1      34741 1
06,2320      05224 0      42774 0      71302 0      55302 0      44746 1      71303 1      55303 1      40076 1
06,2330      74735 0      00006 1      12336 1      26076 1      30025 0      57075 1      02703 1      44735 0

06,2340      00006 1      03012 1      35003 1      05203 0   C: 03254 1   C: 16103 1      15261 0      34750 1
06,2350      00006 1      02012 0      10000 0      12374 1      34744 1      70074 0      10000 0      12374 1
06,2360      02746 0      04674 0   C: 17266 0      34747 1      00006 1      05012 1      05457 1      34746 0
06,2370      05203 0   C: 02313 1   C: 14106 0      12374 1      31303 0      75026 1      54001 1      35026 0
```

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OCTAL LISTING FOR PARAGRAPH # 051,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2400       00006 1     03033 1     00006 1     06001 0     00006 1     12434 1     54070 1     23303 0
06,2410       00006 1     06001 0     55303 1     34755 1     56070 0     60000 1     12421 0     64753 1
06,2420       24070 0     60000 1     54000 0     12420 1     56071 1     50070 0     34737 0     71303 1
06,2430       50070 0     02763 1     10071 0     12417 0     10034 1     12441 0     12465 0     12441 0

06,2440       12465 0     62512 0     00006 1     62464 0     62513 1     00006 1     62462 0     34750 1
06,2450       00006 1     02012 0     10000 0     12462 1     04674 0  C: 17144 0     36242 0     05203 0
06,2460    C: 03140 1  C: 16103 1     34746 0     12465 0     34755 1     61036 0     74746 1     00006 1
06,2470       15270 0     71036 1     10000 0     12507 0     34746 0     71302 0     10000 0     15270 0

06,2500       41036 1     74746 1     64735 1     57036 0     72162 1     27036 1     15270 0     02766 1
06,2510       15270 0     12500 1  C: 63434 1  C: 75252 0     74733 0     54071 0     11302 0     12525 0
06,2520       12525 0     34750 1     00006 1     05011 1     12225 1     02766 1     12225 1     44750 0
06,2530       00006 1     03011 1     12225 1     34752 0     71302 0     10000 0     12225 1     34736 1

06,2540       71302 0     00006 1     12556 1     34735 1     00006 1     02012 0     00006 1     12551 0
06,2550       12225 1     34752 0     27302 0     05567 0  C: 00207 1     12225 1     41302 0     74745 1
06,2560       27302 0     32564 1     54110 0     12225 1  C: 00102 1     10000 0     12361 0     43002 1
06,2570       00006 1     03014 1     42776 1     00006 1     03012 1     44745 1     70101 0     54101 0

06,2600       44355 1     00006 1     02011 0     64736 1     00006 1     01011 0     02743 0     04674 0
06,2610    C: 17175 1     44755 0     54050 0     54051 1     54052 1     54047 0     43001 1     00006 1
06,2620       03014 1     12225 1     00006 1     12643 0     41303 1     74746 1     27303 1     04674 0
06,2630    C: 17175 1     42777 0     70074 0     56074 1     40000 0     74744 0     10000 0     12225 1

06,2640       05567 0  C: 00214 0     12225 1     34752 0     71302 0     10000 0     12225 1     12556 1
06,2650       10000 0     34742 1     57302 1     73004 1     27302 0     02703 1     41302 0     74753 0
06,2660       10000 0     12432 1     31302 1     73000 0     10000 0     12432 1     05567 0  C: 00212 0
06,2670       12432 1     10000 0     12432 1     05567 0  C: 01105 1     12432 1     10000 0     12432 1

06,2700       05567 0  C: 01106 1     12432 1     34761 0     71302 0     00006 1     74742 0     31302 1
06,2710       00006 1     04001 1     40000 0     75025 1     10000 0     12726 1     34753 1     71303 1
06,2720       10000 0     00002 0     44753 0     00006 1     03011 1     00002 0     00006 1     22066 1
06,2730       05744 0     34753 1     00006 1     05011 1     00066 1     43003 0     00006 1     03012 1

06,2740       34763 1     00006 1     05012 1     41036 1     72773 1     27036 1     41302 0     72775 1
06,2750       27302 0     41303 1     74746 1     27303 1     00002 0     12533 1     12703 0     12703 0
06,2760       12565 1  C: 76400 1     12622 1     12650 1     12671 1     12676 0     41303 1     74753 0
06,2770       10000 0     24002 0     00002 0  C: 40010 1  C: 00054 0  C: 00075 0  C: 00272 0  C: 00300 1
```

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OCTAL LISTING FOR PARAGRAPH # 052, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3000    C: 01720 0   C: 00740 1   C: 77000 1   C: 40040 1   C: 76777 1   C: 21450 0      30110 1      00006 1
06,3010       06033 1      74752 1      00006 1      13037 1      22110 1      00006 1      06001 0      73033 0
06,3020       54110 0      74752 1      10000 0      13034 1      37663 0      26110 0      34753 1      05203 0
06,3030    C: 02062 1   C: 52107 0      13132 0   C: 05776 1      44752 1      00006 1      03012 1      30110 1

06,3040       00006 1      06030 1      74745 1      00006 1      13071 0      34752 0      70110 0      10000 0
06,3050       13132 0      34745 0      22110 1      00006 1      06001 0      54110 0      30110 1      74745 1
06,3060       10000 0      13070 1      40074 0      74745 1      10000 0      13070 1      05567 0   C: 00515 0
06,3070       04564 1      30101 1      74750 0      10000 0      13132 0      40103 1      74747 0      10000 0

06,3100       13105 1      30102 1      74744 0      10000 0      13132 0      33127 0      70110 0      10000 0
06,3110       13132 0      04523 1   C: 00035 1      13115 0      13132 0      34741 1      26110 0      43130 1
06,3120       00006 1      03012 1      34752 0      05203 0   C: 02127 1   C: 52107 0      13132 0   C: 32002 1
06,3130    C: 20002 1   C: 02100 1      30034 0      05033 1      55414 0      30034 0      05032 0      54061 1

06,3140       30032 0      05033 1      55417 0      41417 0      00006 1      70061 1      55416 1      30032 0
06,3150       05032 0      55420 1      00006 1      70061 1      55415 1      05270 1      44755 0      00006 1
06,3160       06032 0      74357 0      54002 1      41276 1      70002 1      54001 1      40002 1      71276 1
06,3170       25001 1      00006 1      15270 0      00006 1      74745 1      56001 0      24001 0      60000 1

06,3200       54000 0      13176 0      50001 0      34743 0      54002 1      71276 1      10000 0      13223 0
06,3210       41262 1      50001 0      73242 1      27262 1      41263 0      50001 0      73252 0      27263 0
06,3220       30002 0      27276 1      13236 1      50001 0      43242 1      71262 1      55262 1      50001 0
06,3230       43252 0      71263 0      55263 0      40002 1      71276 1      55276 1      37715 0      05072 1

06,3240    C: 02454 0   C: 40106 1      15270 0   C: 00040 0   C: 00020 0   C: 00100 0   C: 00200 0   C: 00010 0
06,3250    C: 00001 0   C: 00004 0   C: 00002 0   C: 00010 0   C: 00020 0   C: 00004 0   C: 00200 0   C: 00001 0
06,3260    C: 00002 0   C: 00040 0   C: 00100 0      33531 0      56003 1      54163 1      11477 0      13272 1
06,3270       13272 1      13353 0      34751 0      54132 0      50132 1      31453 1      00006 1      50132 1

06,3300       70324 0      54002 1      30001 0      00006 1      74746 1      50132 1      54325 1      30002 0
06,3310       00006 1      74746 1      50132 1      20325 1      50132 1      41452 1      00006 1      71075 0
06,3320       00006 1      74750 0      50132 1      20325 1      10132 0      67747 1      13273 0      13330 0
06,3330       55477 0      54130 1      03356 1      41460 0      03454 1      03373 0      41461 1      03454 1

06,3340       03410 1      31462 0      03454 1      11477 0      13346 1      13353 0      35031 0      05072 1
06,3350    C: 03507 0   C: 14063 1      00003 1      30163 0      54003 0      14631 0      00006 1      22156 0
06,3360       00006 1      40325 1      52155 1      31463 1      03425 1      00006 1      40327 0      52155 1
06,3370       41466 0      03425 1      00156 0      00006 1      22156 0      00006 1      40327 0      52155 1
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OCTAL LISTING FOR PARAGRAPH # 053, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3400      31464 0      03425 1      00006 1      40331 1      52155 1      41467 1      03425 1      00156 0
06,3410      00006 1      22156 0      00006 1      40327 0      52155 1      31470 0      03425 1      00006 1
06,3420      40331 1      52155 1      31465 1      03425 1      00156 0      56154 1      00006 1      70154 0
06,3430      52123 0      30155 0      00006 1      70154 0      54001 1      34755 1      20123 0      30122 0

06,3440      00006 1      74743 1      50130 0      21472 0      30123 1      00006 1      74743 1      54001 1
06,3450      34755 1      50130 0      21472 0      00002 0      00006 1      22131 1      00006 1      71075 0
06,3460      22155 0      00006 1      74750 0      50130 0      21472 0      30155 0      00006 1      74750 0
06,3470      54001 1      34755 1      50130 0      21472 0      34752 0      60130 0      56130 0      50000 1

06,3500      11471 0      13503 0      00131 1      73553 0      10000 0      55477 0      00131 1      34751 0
06,3510      54130 1      50130 0      31472 1      00006 1      74744 0      50130 0      55472 0      34755 1
06,3520      50130 0      57471 1      00006 1      74744 0      50130 0      21472 0      10130 1      67747 1
06,3530      13510 1   C: 01471 1      33531 0      04616 1   C: 17323 0      04616 1   C: 17716 1      15155 1

06,3540      34751 0      54130 1      50130 0      31472 1      00006 1      74744 0      50130 0      23472 1
06,3550      10130 1      67747 1      13541 0   C: 77776 1      15155 1      11477 0      13561 1      13561 1
06,3560      15155 1      00004 0      10076 1      15155 1      15155 1      13566 0      30104 1      74744 0
06,3570      54141 1      00006 1      13575 1      04674 0   C: 77544 1      30025 0      57075 1      00003 1

06,3600      40000 0      61075 1      64736 1      64736 1      56001 0      56001 0      00006 1      74742 0
06,3610      52125 0      34755 1      55477 0      54130 1      10141 1      03356 1      00006 1      30125 1
06,3620      52155 1      41460 0      03644 1      10141 1      03373 0      00006 1      40125 0      52155 1
06,3630      31461 0      03644 1      10141 1      03410 1      00006 1      40125 0      52155 1      41462 1

06,3640      03644 1      11477 0      13507 1      15155 1      56002 0      54131 0      30002 0      00006 1
06,3650      70154 0      50130 0      21472 0      30002 0      00006 1      70155 1      54001 1      34755 1
06,3660      50130 0      21472 0      13474 1      04616 1   C: 17277 0      11477 0      13671 0      13671 0
06,3670      15155 1      30104 1      74744 0      54141 1      37716 0      57075 1      40000 0      61235 1

06,3700      13602 1      33531 0      56003 1      54163 1      34755 1      55477 0      55471 0      55472 0
06,3710      55473 1      55474 0      55475 1      55476 1      13353 0   C: 20000 0   C: 00000 1   I: 53575 0
06,3720   I: 77656 1   I: 72441 0   C: 01742 1   I: 51136 1   C: 15730 1   I: 43215 0   C: 15716 0   C: 15716 0
06,3730   C: 02253 1   I: 43414 1   C: 02675 1   I: 53575 0   C: 02323 1   I: 77676 0   C: 00023 0   I: 53435 0

06,3740   C: 02331 1   C: 00015 0   I: 53435 0   C: 00023 0   C: 24007 0   C: 00001 0   I: 76521 0   C: 00007 0
06,3750   C: 03434 1   I: 43414 1   C: 02475 0   I: 57545 1   C: 01716 0   C: 14017 1   C: 01714 1   C: 14021 1
06,3760   C: 24007 0   C: 24023 0   C: 00017 1   I: 77616 0   C: 03764 1   C: 03765 0 CKSM 44057 0        @
06,3770        @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 054, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2000       00004 0      11312 1      02004 1      02006 0      05652 0   C: 00105 0      36242 0      71044 1
07,2010       10000 0      12044 1      34752 0      27044 1      10400 1      12031 0      10454 0      12031 0
07,2020       10530 0      12031 0      10604 1      12031 0      10660 0      12031 0      52134 0      05716 1
07,2030    C: 01207 0      64752 0      55312 1      34755 1      51312 0      53777 0      35025 0      05105 0

07,2040    C: 02063 0   C: 16067 1      00003 1      14631 0      52134 0      05716 1   C: 01211 1      34755 1
07,2050       57312 0      75004 1      10000 0      50000 1      54000 0      34753 1      04674 0   C: 17665 1
07,2060       34755 1      55044 1      06001 0      41312 1      74740 1      27312 1      32330 0      04616 1
07,2070    C: 20334 1      12060 1      12074 1      12063 1      37744 1      70735 1      00006 1      74743 1

07,2100       55551 0      00006 1      62063 0      65660 1      00006 1      12107 1      12123 1      32331 1
07,2110       04616 1   C: 20334 1      12060 1      12115 1      12107 1      00006 1      31350 0      50120 1
07,2120       52011 0      34755 1      12137 1      51551 1      31411 1      50120 1      54011 0      51551 1
07,2130       31403 1      50120 1      54010 1      31405 1      00006 1      50120 1      20010 1      50120 1

07,2140       54012 0      06037 0   I: 77624 1   C: 10536 0   I: 70535 0   C: 00013 0   I: 73406 1   I: 71525 0
07,2150    I: 74206 0   C: 00023 0   I: 74325 0   C: 00001 0   C: 00031 0   I: 45445 0   C: 63762 1   I: 65361 0
07,2160    C: 00031 0   I: 53361 0   C: 00023 0   I: 77626 0   C: 53754 1   C: 24007 0   C: 02715 0   I: 77776 1
07,2170       12202 1   I: 53133 0   C: 00004 0   C: 16177 1   I: 52145 0   C: 00031 0   C: 32011 0   I: 52175 0

07,2200    C: 03765 0   C: 32042 0      34755 1      55551 0      55550 1      35004 0      71312 1      55312 1
07,2210       32621 0      04616 1   C: 20345 1      12060 1      12216 1      12063 1      41312 1      74740 1
07,2220       27312 1      75004 1      55551 0      34755 1      55552 0      31312 0      75015 1      54001 1
07,2230       35015 0      00006 1      06001 0      00006 1      12241 0      11550 1      12240 1      12325 0

07,2240       55550 1      34740 0      27552 0      41550 1      00006 1      76242 1      41551 0      60001 0
07,2250       50120 1      54046 1      30120 1      54166 1      06037 0   I: 76614 0   C: 04307 1   C: 32000 0
07,2260    C: 00002 0   C: 24767 1   C: 00015 0   I: 77624 1   C: 47664 0   I: 76606 0   C: 00001 0   C: 24767 1
07,2270    C: 00023 0   I: 77624 1   C: 47664 0   I: 53435 0   I: 77626 0   C: 77746 1   I: 63335 1   C: 03553 1

07,2300    C: 00031 0   I: 70322 0   C: 00001 0   C: 14031 0   C: 00001 0   I: 56225 1   C: 16623 1   I: 53361 0
07,2310    C: 02715 0   C: 00031 0   C: 02715 0   C: 02767 0   I: 77776 1      11550 1      12240 1      34756 1
07,2320       00004 0      05203 0   C: 02047 0   C: 16067 1      05472 0      05567 0   C: 00111 0      12202 1
07,2330    C: 00307 0   C: 01527 0      54016 1      30033 1      54063 0      30034 0      54064 1      30032 0

07,2340       54065 0      00006 1      30025 0      52062 1      56002 0      54012 0      32624 0      00006 1
07,2350       02016 1      10000 0      12354 0      12404 1      34740 0      71312 1      10000 0      05270 1
07,2360       11312 1      12365 1      05567 0   C: 00112 0      05270 1      34747 1      00006 1      02016 1
07,2370       10000 0      12461 1      34750 1      00006 1      02016 1      10000 0      12422 0      34751 0
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OCTAL LISTING FOR PARAGRAPH # 055,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2400      00006 1     02016 1     10000 0     12416 1     34776 0     00006 1     02016 1     00006 1
07,2410      12413 1     04635 0  C: 40115 0     05567 0  C: 00113 1     05270 1     34755 1     54070 1
07,2420      34742 1     12425 1     34753 1     54070 1     34741 1     55551 0     02514 0     12521 1
07,2430      34736 1     71312 1     00006 1     12444 0     41550 1     64751 0     00006 1     62454 0

07,2440      25550 0     47711 0     71312 1     55312 1     31551 1     71312 1     10000 0     12451 1
07,2450      12526 0     05567 0  C: 00114 0     05270 1     05567 0  C: 00107 1     02514 0     12627 1
07,2460      05270 1     02514 0     12507 0     35015 0     71312 1     10000 0     12472 0     05567 0
07,2470   C: 00115 1     05270 1     44355 1     71312 1     64737 0     57312 0     74737 1     10000 0

07,2500      12505 1     41551 0     71312 1     55312 1     12577 1     45015 1     12502 0     11550 1
07,2510      12512 1     12467 1     55550 1     05270 1     40104 0     74744 0     10000 0     24002 0
07,2520      00002 0     34755 1     54070 1     41312 1     75015 1     27312 1     35004 0     71312 1
07,2530      54071 0     00006 1     30062 0     53562 0     31550 0     00006 1     76242 1     56001 0

07,2540      60071 1     26070 1     55552 0     30063 1     50070 0     54000 0     30064 0     50070 0
07,2550      54002 1     30065 1     50070 0     54004 1     02514 0     12604 0     34737 0     61551 1
07,2560      40000 0     71312 1     61551 1     55312 1     75015 1     54001 1     35015 0     00006 1
07,2570      05001 0     10000 0     12577 1     41312 1     74736 0     27312 1     12577 1     35015 0

07,2600      71312 1     00006 1     74746 1     55552 0     35025 0     05072 1  C: 02611 0  C: 16067 1
07,2610      05270 1     02514 0     12627 1     51552 1     32616 1     02211 1  C: 15507 1  C: 15307 1
07,2620   C: 15107 0  C: 15507 1  C: 04000 0  C: 00000 1  C: 00034 0  C: 01507 1  C: 01517 0     32626 1
07,2630      04616 1  C: 20334 1     12060 1     12641 1     34746 0     70154 0     10000 0     12645 0

07,2640      12627 1     44736 0     71312 1     64736 1     55312 1     31236 1     51552 1     54001 1
07,2650      31240 0     51552 1     54003 0     41312 1     74736 0     00006 1     12216 1     31550 0
07,2660      64753 1     40000 0     64756 1     00006 1     62454 0     25550 0     12205 0  I: 77614 1
07,2670   C: 06466 0  I: 74345 0  C: 02355 0  C: 02303 0  I: 74325 0  C: 02361 1  C: 03726 1  I: 53455 0

07,2700   I: 50206 0  C: 02154 0  I: 45246 0  C: 13503 0  I: 71244 0  C: 30347 1  C: 03474 0  I: 51025 1
07,2710   C: 13505 0  C: 60774 0  I: 77650 1  C: 30347 1     00004 0     41036 1     74771 0     10000 0
07,2720      12724 0     05567 0  C: 00206 0     13657 1     03653 1     41303 1     74773 1     27303 1
07,2730      41302 0     75751 0     27302 0     44771 0     00006 1     03012 1     03266 0     34747 1

07,2740      00006 1     05012 1     05457 1     34746 0     05203 0  C: 02757 0  C: 16103 1     41302 0
07,2750      74743 1     10000 0     12755 0     05567 0  C: 00210 1     00003 1     14631 0     03641 1
07,2760      05457 1     44747 0     00006 1     03012 1     34741 1     05224 0     03641 1     45751 0
07,2770      71302 0     55302 0     44773 1     71303 1     55303 1     04674 0  C: 14703 0     13631 1
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OCTAL LISTING FOR PARAGRAPH # 056,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3000       00004 0     03653 1     03144 0     36242 0     05203 0  C: 03010 0  C: 16103 1     12755 0
07,3010       03641 1     34746 0     00006 1     05012 1     34752 0     55474 0     51474 1     30321 1
07,3020       00006 1     51474 1     20032 1     00006 1     74737 1     56001 0     60000 1     54061 1
07,3030       13032 1     26001 1     51474 1     23471 1     11474 0     03015 0     34752 0     05224 0

07,3040       03641 1     54061 1     34752 0     55474 0     51474 1     11471 0     03052 0     03061 0
07,3050       03117 0     03061 0     63745 1     00006 1     63127 0     51474 1     55471 0     43746 0
07,3060       24061 0     64754 0     51474 1     54050 0     11474 0     03043 0     10061 1     13133 1
07,3070       05221 0  C: 00226 1     34752 0     54061 1     50000 1     30032 0     00006 1     50061 0

07,3100       20321 0     10000 0     13110 0     13105 1     13110 0     10061 1     13073 1     13631 1
07,3110       63116 1     00006 1     63105 0     05567 0  C: 00211 0     13637 1  C: 77511 1     63745 1
07,3120       00006 1     63127 0     40000 0     51474 1     55471 0     33746 1     03060 1     34755 1
07,3130       51474 1     57471 1     03060 1     37740 0     00006 1     05014 1     33747 0     13037 1

07,3140       34746 0     00006 1     05012 1     05261 1     34750 1     00006 1     02012 0     10000 0
07,3150       00002 0     44746 1     00006 1     03012 1     44742 0     00006 1     03014 1     44755 0
07,3160       54047 0     34750 1     00006 1     05012 1     41036 1     73207 0     27036 1     41303 1
07,3170       74746 1     27303 1     41302 0     74750 0     27302 0     44747 0     70075 1     54075 1

07,3200       44735 0     70076 1     54076 1     44737 1     70077 0     54077 0     00002 0  C: 40010 1
07,3210       00004 0     03653 1     43744 1     00006 1     03012 1     44746 1     71303 1     55303 1
07,3220       03266 0     34742 1     05203 0  C: 03234 1  C: 16103 1     35000 1     05203 0  C: 03232 1
07,3230    C: 16103 1     12755 0     03641 1     13631 1     03646 0     15261 0     34750 1     00006 1

07,3240       02012 0     10000 0     15261 0     41302 0     74737 1     27302 0     44750 0     71302 0
07,3250       55302 0     04674 0  C: 14703 0     15261 0     03646 0     15261 0     41302 0     74742 0
07,3260       27302 0     41303 1     74737 1     27303 1     44747 0     13247 1     43207 0     71036 1
07,3270       64735 1     55036 1     00002 0     44755 0     54037 1     54040 1     54041 0     03646 0

07,3300       14631 0     00004 0     44753 0     71302 0     55302 0     04674 0  C: 14703 0     12755 0
07,3310       00004 0     41302 0     74753 0     27302 0     74742 0     10000 0     12755 0     05567 0
07,3320    C: 00212 0     00004 0     13305 0     54161 0     03653 1     11314 1     03367 0     54156 1
07,3330       34746 0     00006 1     05014 1     34751 0     05203 0  C: 03405 0  C: 16103 1     30161 1

07,3340       56003 1     56161 1     55314 1     74357 0     54061 1     34752 0     54157 0     60000 1
07,3350       60061 0     54160 1     00006 1     50000 1     31401 0     52155 1     07257 0     52155 1
07,3360       50160 0     53401 1     10157 0     13346 1     30161 1     54003 0     12755 0     00006 1
07,3370       30134 1     52155 1     33404 1     15133 1     11314 1     13372 0     54156 1     00006 1
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OCTAL LISTING FOR PARAGRAPH # 057, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3400       30155 0      52134 0      34753 1      13334 1   C: 17374 1      43626 1      00006 1      03014 1
07,3410       03641 1      31314 0      00006 1      74750 0      50000 1      13416 0      03433 0   C: 00202 1
07,3420       03433 0   C: 00302 0      03431 1   C: 00100 0      34755 1      55314 1      33404 1      05137 1
07,3430       13232 0      44751 1      27314 1      50002 0      30000 1      54064 1      74757 1      64737 0

07,3440       27314 1      54003 0      74357 0      54061 1      44757 1      70064 1      54064 1      00006 1
07,3450       50061 0      31401 0      52071 0      10070 1      13467 0      13457 0      13607 1      10071 0
07,3460       13464 0      13411 1      13604 1      13411 1      63520 0      00006 1      63411 0      00006 1
07,3470       33630 1      20071 0      30064 0      00006 1      05014 1      36074 1      70071 0      56071 1

07,3500       00006 1      74744 0      54062 1      30070 0      00006 1      74743 1      54070 1      30001 0
07,3510       00006 1      74736 0      26062 1      00006 1      30071 1      67747 1      10000 0      13543 1
07,3520    C: 77601 0      13525 1      34736 1      26062 1      34755 1      50061 0      53401 1      30062 0
07,3530       54047 0      00006 1      74742 0      66245 1      05203 0   C: 03405 0   C: 16103 1      34742 1

07,3540       00006 1      05014 1      15261 0      50061 0      53401 1      34736 1      60062 0      54047 0
07,3550       00006 1      74742 0      67745 0      05203 0   C: 03557 0   C: 16103 1      13537 1      03641 1
07,3560       34750 1      00006 1      02012 0      10000 0      13637 1      31314 0      54003 0      74357 0
07,3570       54061 1      50061 0      11400 0      13577 0      34736 1      26047 0      13531 1      50061 0

07,3600       55400 0      34736 1      26047 0      13550 0      63520 0      00006 1      63411 0      00006 1
07,3610       43630 0      20071 0      30064 0      64743 0      00006 1      05014 1      40070 1      54070 1
07,3620       40071 0      76074 0      40000 0      56071 1      40000 0      13500 0   C: 01700 1   C: 00000 1
07,3630    C: 00034 0      00006 1      00011 1      74753 0      10000 0      13637 1      13665 0      34755 1

07,3640       13662 1      34746 0      71302 0      10000 0      13637 1      00002 0      41302 0      74746 1
07,3650       10000 0      24002 0      00002 0      41302 0      74746 1      10000 0      00002 0      44755 0
07,3660       55304 0      12755 0      54071 0      44755 0      13667 1      54071 0      44753 0      54072 0
07,3670       50071 1      11304 0      13676 1      13706 1      00006 1      13707 0      34755 1      50071 1

07,3700       57304 1      05137 1      40072 0      50064 0      26164 0      15261 0      30072 1      50071 1
07,3710       55304 0      15261 0      34753 1      03717 0      34752 0      13717 1      34755 1      00004 0
07,3720       54071 0      50000 1      11304 0      13741 1      13735 1      13731 0      50071 1      55304 0
07,3730       12755 0      10000 0      13741 1      24133 0      13726 0      04645 1      50071 1      55304 0

07,3740       15133 1      52134 0      05716 1   C: 01210 0   C: 00030 1   C: 77500 1   C: 77477 0   C: 00074 1
07,3750       31307 1      00006 1      13755 1      05652 0   C: 01210 0      00006 1      30134 1      53310 0
07,3760       30006 1      74757 1      27310 0      30167 1      77725 1      55311 1      33772 0      54003 0
07,3770       04635 0   C: 44004 0   C: 03276 1   C: 03773 1   C: 03774 0 CKSM 66702 1         @            @
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OCTAL LISTING FOR PARAGRAPH # 060,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2000      I: 77160 0   C: 00002 0   C: 00000 1   I: 77614 1   C: 04343 1   C: 20011 0   I: 77160 0   C: 00012 1
10,2010      C: 00002 0   I: 66143 1   C: 10011 0   C: 02776 0   C: 22317 1   C: 10003 0   I: 54214 1   C: 04343 1
10,2020      C: 20022 0   C: 20607 1   C: 02321 0   I: 43134 0   C: 02777 1   C: 01271 1   I: 77650 1   C: 73606 0
10,2030      I: 77776 1      04616 1   C: 20036 0      06037 0   I: 77616 0   C: 02664 1      32035 0      54142 1

10,2040         56003 1      56142 0      74357 0      65007 0      54141 1      00006 1      30745 1      52155 1
10,2050         07103 1   C: 00746 1      52155 1      20001 1      50141 0      52001 1      00006 1      30741 0
10,2060         50141 0      52003 0      00006 1      40737 0      52155 1      07107 0      52155 1      20001 1
10,2070         50141 0      52005 0      00006 1      40743 0      52155 1      07107 0      52155 1      20001 1

10,2100         52160 1      00006 1      40743 0      52155 1      07103 1   C: 00740 1      00006 1      40155 1
10,2110         52162 0      07103 1   C: 00736 0      52155 1      20001 1      20001 1      52162 0      52155 1
10,2120         07103 1   C: 00744 0      52155 1      20001 1      20001 1      52131 0      00006 1      30745 1
10,2130         52155 1      07103 1   C: 00750 0      52155 1      20001 1      20162 0      00006 1      30737 1

10,2140         52155 1      07107 0      52155 1      20001 1      20131 0      52131 0      52155 1      00006 1
10,2150         30155 0      50141 0      52015 1      00006 1      30160 0      50141 0      52017 0      00006 1
10,2160         30162 1      50141 0      52021 0      30141 0      54116 0      00006 1      30006 1      64751 0
10,2170         52165 1      34744 1      54023 1      17460 0      52155 1      20001 1      50141 0      52007 1

10,2200         52160 1      20001 1      50141 0      52011 0      52162 0      20001 1      50141 0      52013 1
10,2210         30142 0      54003 0      14631 0      00004 0      52071 0      34355 0      05072 1   C: 03534 0
10,2220      C: 60102 1      52071 0      00003 1      52006 0      22073 0      30065 1      74757 1      60000 1
10,2230         54061 1      30065 1      75030 0      00006 1      74740 1      54062 1      30065 1      74101 1

10,2240         56065 1      75024 0      10000 0      15370 1      30062 0      50061 0      54751 0      10066 0
10,2250         12264 1      12252 1      40072 0      22072 1      50071 1      52751 0      10066 0      12260 0
10,2260         12264 1      40025 1      50071 1      55051 0      10065 0      12300 1      12303 1      40025 1
10,2270         50061 0    [illegible] 0  30065 1      62276 0      10000 0      12276 1   C: 17777 0      12303 1

10,2300         00006 1      30025 0      53152 1      40062 1      50061 0      54750 1      30002 0      22073 0
10,2310         00003 1      52006 0      22073 0      30062 0      50061 0      54751 0      30070 0      50061 0
10,2320         55052 0      00006 1      30064 0      50061 0      53435 0      12247 0      05474 0      13421 1
10,2330         54155 1      34735 1      12500 1      34755 1      54155 1      33031 0      12500 1      54155 1

10,2340         33520 0   12[illegible]00 1  54155 1    33505 1      12500 1      54155 1      33506 1      12500 1
10,2350         54155 1      34735 1      12453 0      54155 1      33031 0      12637 0      54155 1      33520 0
10,2360         12637 0      54155 1      33505 1      12637 0      34753 1      02735 1      30100 0      73521 0
10,2370         10000 0      12427 0      30100 0      74743 1      00006 1      12377 1      15155 1      00004 0
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OCTAL LISTING FOR PARAGRAPH # 061,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2400        44756 0     70100 1     64753 1     54100 1     00003 1     41071 1     74747 0     10000 0
10,2410        12413 1     40370 1     54370 1     34753 1     12616 0     30165 0     54156 1     50164 1
10,2420        33531 0     54162 0     50164 1     31070 1     54160 1     54003 0     00002 0     30100 0
10,2430        73254 0     10000 0     13454 0     40100 1     74751 1     00004 0     26100 1     12534 0

10,2440        30370 0     74144 0     13120 0     54155 1     34755 1     12500 1     54155 1     34746 0
10,2450        12500 1     54155 1     34755 1     54160 1     34755 1     12641 1     34755 1     54155 1
10,2460        33504 0     12500 1     54155 1     33504 0     12637 0     54155 1     34736 1     12500 1
10,2470        54155 1     34736 1     12453 0     54155 1     33543 0     12500 1     54155 1     34750 1

10,2500        54160 1     02722 1     00003 1     12546 0     54155 1     33523 0     12637 0     54155 1
10,2510        33523 0     12500 1     34755 1     54164 0     03374 1     12522 1     30100 0     73542 0
10,2520        10000 0     12575 0     30100 0     75642 0     00006 1     12530 1     34755 1     12774 0
10,2530        30100 0     73540 1     00006 1     12536 1     34753 1     12774 0     02734 0     03205 0

10,2540        05137 1     03222 0     30025 0     55165 0     34755 1     12616 0     30167 1     77725 1
10,2550        54163 1     37721 1     05146 1     30160 0     73522 0     10000 0     12512 1     12561 0
10,2560        12364 0     34752 0     54164 0     03374 1     12577 1     41072 1     74750 0     10000 0
10,2570        12577 1     30100 0     73513 1     00006 1     12577 1     05552 0  C: 01502 1     02736 1

10,2600        30163 0     00006 1     04007 1     54366 0     30100 0     73514 0     10000 0     12754 1
10,2610        12612 1     12754 1     03205 0     05137 1     03222 0     34752 0     54164 0     13070 1
10,2620        54155 1     37734 0     12500 1     55045 0     33476 1     54155 1     33475 1     12500 1
10,2630        54155 1     33501 0     12500 1     02715 0     12500 1     54155 1     34750 1     54160 1

10,2640        36245 1     00004 0     54072 0     30167 1     77725 1     54063 0     30160 0     74750 0
10,2650        10000 0     12637 0     30063 1     05072 1  C: 02546 1  C: 20067 1     12665 1     30006 1
10,2660        00006 1     04007 1     54001 1     33537 0     05116 1     02722 1     00006 1     30156 0
10,2670        50064 0     52156 1     00006 1     30160 0     50064 0     52160 1     30064 0     54161 0

10,2700        02727 1     00003 1     14640 0     55045 0     33476 1     54155 1     33475 1     12637 0
10,2710        54155 1     33501 0     12637 0     02715 0     12637 0     55144 0     33502 0     54155 1
10,2720        33503 1     00002 0     00004 0     43512 0     70160 1     60003 1     54160 1     22002 0
10,2730        04645 1     54157 0     60072 1     00001 0     34755 1     54164 0     00004 0     30160 0

10,2740        50164 1     55070 0     73530 0     00006 1     12750 0     30157 1     50164 1     54372 0
10,2750        30155 0     50164 1     54367 1     13231 0     50164 1     33531 0     72760 0     03544 1
10,2760     C: 03004 0     44753 0     60164 1     54154 0     50154 1     33510 0     00004 0     05137 1
10,2770        03222 0     50154 1     33510 0     15133 1     54154 0     03205 0     05137 1     30154 1
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OCTAL LISTING FOR PARAGRAPH # 062,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3000        50064 0      54154 0      33015 0      03223 1      50154 1      33532 0      73534 1      03554 0
10,3010     C: 74004 0      50154 1      34747 1      64751 0      03544 1   C: 02764 0      30100 0      74751 1
10,3020        10000 0      02377 0      12536 1      34755 1      54160 1      50160 0      33524 1      64751 0
10,3030        03554 0   C: 40010 1      50160 0      33510 0      00004 0      05137 1      13335 0      31072 0

10,3040        54003 0      30366 1      04727 1      77725 1      05146 1      46245 0      60374 1      14640 0
10,3050        00003 1      31073 1      54156 1      30100 0      77740 1      10000 0      13061 1      13471 1
10,3060        12377 1      05504 0   C: 00105 0      34736 1      70100 1      10000 0      12544 1      12615 0
10,3070        02417 1      30160 0      74757 1      54001 1      44737 1      50164 1      71070 0      50164 1

10,3100        55070 0      74744 0      54141 1      30156 0      54165 1      55073 0      50164 1      10367 1
10,3110        13117 1      13233 1      40370 1      54370 1      76074 0      63515 0      60141 0      64753 1
10,3120        04155 1      13245 0      04433 1      02415 0      05516 0   C: 00102 1      05516 0   C: 00103 0
10,3130        05516 0   C: 00104 1      30160 0      04255 1      13070 1      34747 1      70160 1      10000 0

10,3140        13163 1      34750 1      70160 1      10000 0      13260 1      40160 1      74746 1      10000 0
10,3150        13155 1      50164 1      30372 1      54157 0      13353 0      50164 1      30367 0      76074 0
10,3160        00006 1      13260 1      15155 1      30160 0      74737 1      10000 0      13141 1      34737 0
10,3170        50164 1      27070 0      22007 0      00006 1      62440 0      74740 1      00006 1      13203 1

10,3200        41067 0      63541 1      13120 0      33500 1      13120 0      44747 0      00006 1      03011 1
10,3210        30100 0      73516 1      10000 0      34753 1      54001 1      34755 1      50001 0      57042 0
10,3220        00004 0      00002 0      34217 1      56064 0      00006 1      63231 1      56064 0      50064 0
10,3230        54164 0      00003 1      00002 0      37720 0      05105 0   C: 04231 0   C: 04060 0      13261 0

10,3240        30100 0      73266 1      00006 1      12575 0      15155 1      11042 1      15155 1      13251 0
10,3250        15155 1      30162 1      73517 0      03544 1   C: 24100 0      50164 1      33507 0      04442 1
10,3260        04427 1      30164 1      54157 0      30162 1      73010 1      03544 1   C: 40040 1      31074 0
10,3270        50164 1      74751 1      10000 0      13360 0      11042 1      13240 0      13300 0      13240 0

10,3300        04207 0      13372 0      13411 1      43526 1      60154 1      00006 1      26000 0      00006 1
10,3310        13461 0      34752 0      54161 0      30100 0      74101 1      10000 0      13321 0      13427 1
10,3320        13413 0      40025 1      61165 1      10000 0      40000 0      67731 0      64753 1      63570 0
10,3330        00006 1      62544 0      13427 1      34753 1      13024 0      10161 0      64753 1      13341 0

10,3340        15155 1      50157 1      60372 1      54157 0      30162 1      73347 0      03554 0   C: 74044 1
10,3350        46245 0      04154 0      13353 0      30163 0      77725 1      05146 1      30157 1      14640 0
10,3360        50164 1      44751 1      71074 1      55074 1      34755 1      04727 1      36245 1      50164 1
10,3370        60372 1      14640 0      34755 1      13312 0      40160 1      74736 0      10000 0      16737 0
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OCTAL LISTING FOR PARAGRAPH # 063, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3400       40157 0     50164 1     60372 1     00006 1     13406 1     00002 0     11012 1     05155 0
10,3410       00002 0     34753 1     13312 0     46242 1     70100 1     00004 0     54100 1     00003 1
10,3420       13335 0     37747 1     54161 0     30100 0     74355 1     10000 0     13061 1     30100 0
10,3430       73524 0     10000 0     13023 1     30100 0     73525 1     10000 0     13333 0     31072 0

10,3440       74771 0     10000 0     13335 0     30371 1     00006 1     13335 0     35025 0     00004 0
10,3450       05072 1  C: 02615 1  C: 20060 0     13335 0     30100 0     73524 0     10000 0     15155 1
10,3460       12754 1     50157 1     30367 0     76074 0     40000 0     60155 0     00006 1     13311 0
10,3470       13050 0     46245 0     04154 0     15155 1     15155 1  C: 00036 1  C: 00231 1  C: 01407 0

10,3500    C: 14400 0  C: 00030 1  C: 01006 0  C: 00014 1  C: 20010 1  C: 40230 1  C: 40036 0  C: 20542 0
10,3510    C: 20377 0  C: 20615 1  C: 03400 0  C: 11210 1  C: 66521 1  C: 01177 1  C: 00700 0  C: 00704 1
10,3520    C: 40030 0  C: 34300 0  C: 40100 1  C: 00110 1  C: 02020 1  C: 01010 1  C: 00026 0  C: 77730 0
10,3530    C: 00050 1  C: 20144 1  C: 42424 0  C: 11254 1  C: 74704 1  C: 67777 1  C: 40420 0  C: 02546 1

10,3540    C: 10200 1  C: 40200 0  C: 20100 1  C: 24030 1     00004 0     75660 0     54001 1     40100 1
10,3550       70001 1     26100 1     00003 1     16737 0     00004 0     75660 0     40000 0     70100 1
10,3560       54100 1     13552 1     00004 0     54001 1     30133 0     55363 1     30134 1     05576 0
10,3570    C: 77467 1     35006 1     12504 0     00006 1     30025 0     16055 0     10154 0     34755 1

10,3600       13603 0     13602 1     44736 0     54155 1     34755 1     56154 1     00006 1     74736 0
10,3610       20155 1     16061 1     07257 0     16061 1     03644 1     34755 1     54155 1     16060 0
10,3620       03644 1     52162 0     52155 1     03644 1     54156 1     52160 1     52155 1     03644 1
10,3630       54155 1     30161 1     54154 0     34753 1     16060 0     03644 1     52160 1     52155 1

10,3640       03644 1     54001 1     30157 1     16055 0     52155 1     20001 1     10000 0     64753 1
10,3650       13652 1     40000 0     54154 0     00002 0     50000 1     34734 0     26154 0     00002 0
10,3660       54142 1     50130 0     10000 0     64753 1     13670 1     64753 1     64753 1     40000 0
10,3670       60142 0     10000 0     64753 1     13675 1     40000 0     54142 1     13702 0     50000 1

10,3700       34734 0     60142 0     50130 0     54000 0     00002 0     50120 1     30046 0     04616 1
10,3710    C: 17323 0     16061 1     00006 1     34733 1     52155 1     10000 0     34755 1     16057 1
10,3720       13721 1     00006 1     44733 0     16055 0     34753 1     13727 1     34755 1     60120 1
10,3730       54156 1     04616 1  C: 01010 1     10154 0     13770 0     13737 0     13770 0     10157 0

10,3740       13770 0     13743 0     13770 0     10161 0     13770 0     13747 1     13770 0     30155 0
10,3750       00006 1     74736 0     20155 1     30160 0     00006 1     74736 0     20160 1     30162 1
10,3760       00006 1     74736 0     20162 0     34761 0     50156 0     54045 1     04635 0  C: 01024 0
10,3770       34755 1     13764 0     04616 1  C: 01010 1     06061 0  C: 03775 1  C: 03776 1 CKSM 56105 0
```

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OCTAL LISTING FOR PARAGRAPH #    ,   WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2000      I: 77614 1    C: 00475 1    I: 44175 1    C: 03444 0    C: 03463 0    C: 03472 0    I: 77646 0    C: 03723 1
11,2010      I: 46135 1    C: 03000 1    C: 22026 0    I: 72575 0    C: 02323 1    C: 26323 1    C: 02331 1    I: 77752 1
11,2020      C: 26331 1    C: 03472 0    I: 77752 1    C: 03472 0    I: 77646 0    C: 03723 1    I: 71331 0    C: 03617 1
11,2030      C: 77776 1    I: 70546 1    C: 17667 0    I: 67154 0    C: 00154 1    C: 02701 0    I: 77775 1    C: 02323 1

11,2040      C: 26655 0    C: 03472 0    C: 16663 0    C: 03452 1    C: 02671 0    I: 77201 1    C: 00001 0    C: 02323 1
11,2050      I: 41456 0    I: 53435 0    C: 02331 1    C: 26674 0    C: 03472 0    I: 50256 0    I: 43015 1    C: 03667 0
11,2060      C: 03665 1    C: 03667 0    I: 43044 0    C: 22105 0    C: 03465 0    I: 41575 0    C: 02663 0    I: 63246 1
11,2070      I: 46206 1    C: 02674 0    I: 51352 1    I: 74256 0    I: 77772 0    C: 02663 0    I: 67351 1    C: 24007 0

11,2100      C: 03617 1    I: 77244 0    C: 22105 0    C: 02663 0    C: 03472 0    I: 63345 0    C: 26007 1    C: 02663 0
11,2110      I: 63256 0    C: 02655 0    I: 41456 0    I: 57435 1    C: 00003 1    I: 77606 1    I: 71350 1    C: 02776 0
11,2120      C: 00023 0    I: 62040 1    C: 22124 0    C: 77767 1    I: 67310 1    C: 00012 1    C: 00047 1    I: 77230 0
11,2130      C: 22132 1    I: 41476 1    I: 77775 1    I: 50235 0    I: 71244 0    C: 22137 1    I: 41476 1    I: 67154 0

11,2140      C: 00000 1    C: 02672 0    I: 45150 1    C: 02776 0    C: 23765 1    I: 77214 0    C: 00675 0    C: 02744 1
11,2150      C: 16337 1    C: 02702 0    I: 45030 0    C: 22230 0    C: 27414 0    I: 43135 1    C: 03000 1    C: 00263 0
11,2160      I: 43030 0    C: 22163 0    C: 00063 1    I: 77775 1    C: 02323 1    C: 02655 0    C: 25535 0    C: 02337 1
11,2170      C: 15543 1    C: 03610 0    C: 01517 0    I: 43015 1    C: 03452 1    C: 01673 1    C: 34041 0    C: 27107 1

11,2200      I: 77775 1    C: 00025 0    C: 02703 1    I: 63154 1    C: 03616 0    C: 00001 0    I: 55134 1    C: 03616 0
11,2210      C: 02701 0    I: 46135 1    C: 00050 1    C: 22225 1    I: 52375 1    C: 03472 0    C: 00017 1    I: 77655 1
11,2220      C: 02663 0    C: 16663 0    C: 03667 0    I: 77650 1    C: 22062 0    I: 77775 1    C: 02663 0    C: 03472 0
11,2230      I: 52375 1    C: 02337 1    C: 02331 1    C: 26366 0    C: 02703 1    C: 03566 1    I: 46135 1    C: 03000 1

11,2240      C: 22255 0    I: 70575 1    C: 03566 1    C: 27566 1    C: 02337 1    I: 77742 0    C: 26337 1    C: 03472 0
11,2250      I: 77742 0    C: 27472 0    C: 02366 0    I: 77742 0    C: 02366 0    I: 70750 1    C: 02776 0    C: 10003 0
11,2260      I: 41206 0    C: 02742 1    I: 56342 1    C: 00041 1    C: 17721 0    I: 77661 0    C: 20607 1    C: 03717 0
11,2270      I: 77201 1    C: 00001 0    C: 03472 0    C: 37444 1    C: 03463 0       56016 0       00006 1       22012 1

11,2300         05321 1    C: 00100 0       15270 0       00006 1       00031 0       40000 0       72373 0       55265 0
11,2310         34752 0       55264 1       34756 1       05173 1    C: 02321 0       15270 0       55264 1       34757 0
11,2320         05224 0       00006 1       00031 0       40000 0       72373 0       57265 1       54001 1       11265 0
11,2330         12317 1       10001 1       12341 1       11264 1       12316 0       34740 0       00006 1       05013 0

11,2340         15261 0       34737 0       00006 1       02031 1       00006 1       12335 1       30001 0       74746 1
11,2350         10000 0       42374 1       27266 0       30001 0       74747 0       10000 0       32374 0       27266 0
11,2360         30001 0       74753 0       10000 0       42375 0       27267 1       30001 0       74752 1       10000 0
11,2370         32375 1       27267 1       12335 1    C: 00063 1    C: 01074 0    C: 00217 0    I: 40354 1    C: 02030 0
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OCTAL LISTING FOR PARAGRAPH # 065,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2400      C: 00001 0    I: 75543 1    C: 51770 0    I: 53515 0    C: 01535 0    I: 60325 0    C: 00045 0    C: 00047 1
11,2410      I: 77715 1    I: 65241 0    C: 01543 1    C: 02074 0    I: 60225 1    C: 01551 1    C: 00051 0    I: 77742 0
11,2420      I: 65271 0    C: 00003 1    I: 41405 0    C: 00005 1    I: 65316 0    C: 00005 1    I: 64716 0    C: 51770 0
11,2430      I: 40442 1    I: 47515 0    C: 01543 1    I: 44205 0    C: 00045 0    I: 41271 0    C: 00003 1    I: 53605 1

11,2440      C: 25774 1    C: 20176 0    I: 43260 1    C: 00050 1    I: 45257 0    C: 20211 1    I: 41205 0    C: 00001 0
11,2450      C: 00005 1    I: 53657 0    C: 20211 1    C: 20201 0    I: 65215 1    C: 01553 0    I: 53605 1    C: 00001 0
11,2460      C: 20202 0    I: 43204 0    C: 57753 1    I: 77626 0    C: 75647 0    I: 74020 0    C: 02112 1    C: 00012 1
11,2470      I: 74014 1    C: 00303 1    C: 24023 0    C: 00002 0    I: 77650 1    C: 24023 0    I: 66350 1    C: 01500 0

11,2500      C: 00051 0    C: 77762 1    I: 54345 1    C: 02076 1    C: 20612 0    I: 61500 0    C: 22507 0    I: 43206 1
11,2510      C: 01551 1    C: 16074 0    I: 77615 0    C: 01517 0    C: 35517 1    C: 22376 0    I: 73150 1    C: 02030 0
11,2520      C: 02030 0    I: 77775 1    C: 24007 0    C: 26062 1    C: 02032 1    I: 53257 1    C: 57605 0    C: 01535 0
11,2530      C: 02040 1    I: 65014 1    C: 01756 1    C: 22540 0    C: 01500 0    C: 12132 1    I: 77724 0    C: 01500 0

11,2540      I: 53575 0    C: 02032 1    C: 16032 1    C: 00045 0    C: 02070 1    I: 77624 1    C: 22650 1    I: 66175 1
11,2550      C: 02040 1    C: 00051 0    C: 16032 1    C: 02072 0    C: 02070 1    I: 71214 0    C: 00342 1    C: 23022 0
11,2560      C: 01517 0    I: 77624 1    C: 33664 0    I: 72174 0    C: 00002 0    C: 00051 0    I: 77614 1    C: 00343 0
11,2570      C: 22573 0    I: 77076 0    C: 00000 1    C: 02040 1    C: 26105 1    C: 00003 1    C: 02122 1    I: 45335 0

11,2600      C: 01012 0    C: 25776 0    I: 43030 0    C: 22606 1    C: 01756 1    C: 22622 1    I: 74375 0    C: 02032 1
11,2610      C: 02070 1    I: 42257 0    C: 57175 0    C: 02040 1    I: 77724 0    C: 01500 0    C: 12140 1    C: 02114 1
11,2620      I: 77724 0    C: 01500 0    I: 62175 0    C: 02105 1    C: 00004 0    I: 43014 0    C: 04260 1    C: 00343 0
11,2630      C: 22635 1    I: 53261 1    C: 20612 0    C: 02122 1    C: 02122 1    I: 77624 1    C: 22650 1    I: 62174 1

11,2640      C: 00004 0    C: 00004 0    I: 77775 1    C: 02122 1    C: 36040 0    C: 22650 1    I: 77650 1    C: 23022 0
11,2650      I: 74575 0    C: 02040 1    I: 40236 1    C: 00001 0    I: 61501 1    C: 00040 0    I: 60325 0    C: 02070 1
11,2660      C: 00041 1    I: 63342 1    C: 02040 1    I: 77656 1    C: 16040 1    C: 00045 0    C: 02072 0    I: 55301 0
11,2670      C: 00042 1    I: 41562 0    I: 77743 1    C: 27710 1    C: 00051 0    I: 57124 1    C: 00050 1    C: 00040 0

11,2700      I: 71264 1    C: 00041 1    C: 00003 1    I: 65057 0    C: 57177 1    C: 00050 1    I: 74406 0    I: 50315 0
11,2710      C: 02032 1    C: 02040 1    I: 44372 1    I: 57206 1    C: 00005 1    I: 77752 1    I: 43206 1    C: 25756 1
11,2720      I: 75406 1    I: 41475 1    C: 00013 0    I: 43352 1    C: 25756 1    I: 43325 1    C: 00013 0    C: 24005 1
11,2730      I: 72475 1    C: 00011 1    I: 56215 1    C: 25750 1    C: 00017 1    I: 74275 1    C: 00007 0    C: 02040 1

11,2740      I: 64515 1    C: 02032 1    I: 41455 0    I: 41345 0    C: 00001 0    C: 00015 0    I: 61501 1    C: 00037 0
11,2750      I: 40665 0    C: 00003 1    C: 51770 0    I: 74276 1    I: 57124 1    C: 00050 1    C: 00051 0    I: 55064 0
11,2760      C: 00036 1    C: 00037 0    I: 77600 1    C: 22764 1    I: 65057 0    C: 57177 1    C: 00050 1    I: 77655 1
11,2770      C: 02062 1    C: 02062 1    I: 43400 1    C: 22774 0    I: 51575 1    C: 01521 0    I: 77654 0    C: 23017 0
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OCTAL LISTING FOR PARAGRAPH # [illegible],  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3000     I: 54345 1   C: 02100 1   C: 20612 0   I: 44206 0   C: 01551 1   C: 16074 0   C: 01517 0   I: 45425 0
11,3010     C: 42260 0   C: 22376 0   I: 77624 1   C: 23441 1   I: 77614 1   C: 04020 1   C: 27257 1   I: 77776 1
11,3020        05652 0   C: 00430 0   I: 71354 0   C: 02030 0   C: 02070 1   I: 44601 0   C: 00001 0   C: 50053 1
11,3030     I: 43044 0   C: 23232 0   C: 00343 0   C: 23241 1   I: 65375 0   C: 02032 1   C: 01517 0   I: 45125 0

11,3040     C: 25746 0   C: 51670 1   C: 00017 1   I: 47375 0   C: 02013 1   C: 24001 0   I: 61255 1   C: 24001 0
11,3050     C: 00025 0   I: 77656 1   C: 00025 0   I: 57345 1   C: 00023 0   C: 25760 1   I: 63525 0   C: 00023 0
11,3060     I: 45275 0   C: 25762 0   C: 25754 0   I: 57206 1   C: 00023 0   I: 76405 1   C: 25766 1   I: 57325 1
11,3070     C: 00001 0   C: 25774 1   I: 41421 0   I: 57275 0   C: 00023 0   C: 25770 0   I: 57325 1   C: 00003 1

11,3100     C: 25772 1   I: 77621 1   I: 77603 1   C: 51764 0   I: 43271 1   C: 02070 1   C: 00005 1   I: 56273 1
11,3110     C: 51760 1   C: 02070 1   I: 74215 1   C: 00003 1   C: 02032 1   C: 14033 1   I: 70403 1   C: 51764 0
11,3120     I: 43271 1   C: 02070 1   I: 50473 1   C: 51760 1   I: 43271 1   C: 02070 1   I: 76561 1   C: 00025 0
11,3130     I: 77645 0   C: 00033 1   C: 14033 1   C: 02070 1   I: 63501 0   C: 00047 1   I: 60316 0   C: 00051 0

11,3140     I: 54606 0   C: 51754 0   I: 40161 0   C: 00033 1   C: 23145 0   I: 56070 0   C: 00046 0   C: 00046 0
11,3150     I: 53670 0   C: 00050 1   C: 20153 1   I: 40055 0   C: 02062 1   C: 22774 0   C: 36062 0   C: 27725 1
11,3160     I: 77716 1   I: 41206 0   C: 27712 0   I: 60525 0   I: 44215 1   C: 00011 1   C: 11043 0   I: 41205 0
11,3170     C: 00017 1   C: 27712 0   I: 56561 0   C: 00017 1   I: 77725 1   I: 43225 0   C: 11043 0   C: 00011 1

11,3200     C: 14011 1   C: 00017 1   I: 41205 0   C: 00023 0   C: 27712 0   I: 43352 1   I: 60325 0   C: 02070 1
11,3210     C: 00050 1   I: 67206 1   C: 01354 1   I: 74271 0   I: 53257 1   C: 57601 1   I: 70257 0   C: 20146 0
11,3220     I: 65325 0   C: 01517 0   C: 27712 0   I: 45154 0   C: 02030 0   C: 55716 1   I: 40055 0   C: 02062 1
11,3230     C: 22774 0   C: 02062 1   I: 72135 0   C: 01501 1   C: 00154 1   I: 73205 1   C: 27714 0   C: 00155 0

11,3240     C: 23247 1   I: 77745 1   C: 02036 0   C: 24023 0   C: 24001 0   I: 77650 1   C: 23052 1   C: 23466 1
11,3250     C: 23472 1   C: 23503 0   I: 77214 0   C: 00342 1   C: 23303 0   C: 01535 0   I: 41241 0   C: 01543 1
11,3260     C: 02076 1   I: 77640 0   C: 23303 0   I: 43014 0   C: 00303 1   C: 23360 0   C: 04340 1   C: 23355 0
11,3270     I: 45145 0   C: 01517 0   C: 33664 0   C: 02105 1   I: 77754 1   C: 02030 0   I: 51445 0   C: 01535 0

11,3300     I: 50025 0   C: 27720 1   C: 23375 1   I: 51575 1   C: 01521 0   I: 77600 1   C: 23331 1   I: 51025 1
11,3310     C: 25764 0   C: 23331 1   I: 53615 0   C: 25764 0   C: 57605 0   I: 45271 1   C: 00013 0   C: 27716 1
11,3320     I: 77244 0   C: 23331 1   C: 01527 0   I: 45246 0   C: 25764 0   I: 77600 1   C: 23331 1   I: 77640 0
11,3330     C: 23333 0   I: 77624 1   C: 23441 1   I: 77775 1   C: 01527 0   C: 25135 1   C: 01521 0   C: 01127 1

11,3340     I: 77614 1   C: 00261 1   I: 66375 0   C: 01127 1   C: 01501 1   C: 00000 1   C: 16032 1   C: 24007 0
11,3350     C: 02100 1   I: 52014 0   C: 00301 0   C: 23705 1   C: 22516 0   I: 52175 0   C: 02105 1   C: 23276 0
11,3360     I: 60545 0   C: 00013 0   I: 50025 0   C: 27720 1   C: 23303 0   I: 71214 0   C: 04340 1   C: 23375 1
11,3370     C: 01517 0   I: 77624 1   C: 33664 0   I: 77676 0   C: 02105 1   I: 77624 1   C: 23401 0   I: 77650 1
```

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OCTAL LISTING FOR PARAGRAPH = 067,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3400     C: 23333 0    I: 45020 1    C: 02112 1    C: 23441 1    I: 53775 1    C: 01535 0    C: 57576 1    I: 53651 0
11,3410     C: 02105 1    C: 57574 0    C: 01503 0    C: 15535 0    C: 01517 0    I: 77624 1    C: 33775 1    I: 57414 1
11,3420     C: 00343 0    C: 23422 1    I: 53715 1    C: 01543 1    C: 57576 1    I: 77651 0    I: 77657 0    C: 57574 0
11,3430     C: 01511 0    C: 01543 1    I: 67154 0    C: 02112 1    C: 00052 0    I: 52014 0    C: 00303 1    C: 26711 1

11,3440     C: 26716 0    I: 77354 0    C: 02030 0    C: 01521 0    I: 53257 1    C: 57605 0    C: 01535 0    C: 01503 0
11,3450     C: 25535 0    C: 01527 0    I: 53257 1    C: 57602 1    C: 01543 1    C: 01511 0    C: 25543 1    C: 24007 0
11,3460     C: 01521 0    C: 15527 0    C: 24007 0    C: 01551 1    C: 01553 0    I: 77616 0    I: 64575 1    C: 02062 1
11,3470     C: 36046 0    C: 23646 1    I: 74575 0    C: 02062 1    I: 53206 0    C: 02046 1    C: 26054 1    I: 53362 0

11,3500     C: 02046 1    C: 36046 0    C: 23646 1    I: 57345 1    C: 02100 1    C: 25774 1    I: 74206 0    C: 02046 1
11,3510     I: 53372 1    C: 01135 1    I: 53361 0    C: 02100 1    C: 01127 1    C: 25127 1    C: 02062 1    I: 53322 1
11,3520     C: 02054 1    I: 76561 1    I: 77655 1    C: 01135 1    C: 01135 1    I: 45014 0    C: 00341 1    C: 23577 0
11,3530     C: 11244 0    I: 77354 0    C: 01117 1    C: 01135 1    I: 77732 1    C: 12467 1    I: 77775 1    C: 01127 1

11,3540     I: 40132 0    C: 23671 0    C: 12401 1    I: 77624 1    C: 11244 0    I: 66354 0    C: 01117 1    C: 00052 0
11,3550     C: 00000 1    I: 67114 1    C: 00006 1    C: 01126 0    I: 45104 0    C: 23642 0    C: 11244 0    I: 67154 0
11,3560     C: 01126 0    C: 01117 1    I: 77624 1    C: 11244 0    I: 76754 0    C: 01117 1    C: 75376 1    I: 77722 0
11,3570     C: 01127 1    I: 76173 0    C: 75310 1    C: 00000 1    I: 77722 0    C: 35135 0    C: 23342 0    I: 77200 0

11,3600     C: 22774 0    C: 01135 1    C: 25527 0    C: 01127 1    C: 01521 0    I: 43014 0    C: 04715 0    C: 27633 1
11,3610     C: 01756 1    C: 27257 1    I: 77776 1       05353 1    C: 04022 0       05504 0    C: 00236 0       06037 0
11,3620     I: 77731 1    C: 00053 1    C: 23627 0    I: 52014 0    C: 01714 1    C: 26661 1    C: 26734 0    I: 66214 0
11,3630     C: 00061 0    C: 01120 0    C: 77741 0    I: 66214 0    C: 01755 1    C: 23562 1    C: 01120 0    C: 77717 0

11,3640     I: 77650 1    C: 23562 1    I: 77745 1    C: 01116 0    C: 34041 0    C: 27141 0    I: 43345 1    C: 02076 1
11,3650     C: 02100 1    I: 66110 1    C: 77763 0    C: 01500 0    C: 02100 1    I: 74561 0    C: 02062 1    I: 74255 0
11,3660     C: 01135 1    C: 02100 1    I: 77655 1    C: 01127 1    C: 02032 1    I: 52014 0    C: 00301 0    C: 23705 1
11,3670     C: 22476 1    I: 43014 0    C: 01676 1    C: 01671 0    I: 77614 1    C: 02676 1    I: 77414 0    C: 01472 1

11,3700        05567 0    C: 00421 0       06037 0    I: 77650 1    C: 27257 1    I: 70754 0    C: 02030 0    C: 51770 0
11,3710     C: 36072 1    C: 23733 1    C: 02062 1    I: 62014 0    C: 00342 1    C: 23232 0    C: 77771 0    I: 70744 1
11,3720     C: 02030 0    C: 51772 1    C: 36072 1    C: 23733 1    I: 50414 0    C: 00303 1    C: 23727 1    I: 77655 1
11,3730     C: 02062 1    C: 36062 0    C: 23232 0    I: 60575 0    C: 02032 1    I: 53513 0    C: 02132 0    I: 46315 1

11,3740     C: 02032 1    I: 52361 1    C: 25764 0    I: 60325 0    C: 00045 0    C: 00052 0    I: 63406 0    I: 77605 1
11,3750     I: 65301 0    C: 00043 0    C: 02072 0    I: 56342 1    I: 77761 1    I: 57154 0    C: 00051 0    C: 00051 0
11,3760     I: 57074 0    C: 00051 0    C: 00042 1    I: 43457 0    C: 57606 0    I: 43131 0    C: 00027 1    C: 00024 1
11,3770     C: 03752 1    C: 25212 1    I: 52131 0    C: 00027 1    C: 00005 1    C: 25212 1    C: 03776 1  CKSM 43373 1
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OCTAL LISTING FOR PARAGRAPH # [illegible] ,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2000     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 20000 0   C: 00000 1   C: 00000 1   C: 00000 1
12,2010     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 77777 0   C: 77771 0   C: 77763 0   C: 37777 1
12,2020     C: 37777 1   C: 37777 1   C: 37777 1   I: 40001 1   C: 00001 0   C: 24026 0   I: 77773 1   C: 10005 0
12,2030     C: 24017 1   C: 01503 0   I: 66256 0   C: 00027 1   C: 00024 1   C: 16647 0   C: 00045 0   C: 24041 1

12,2040     C: 01503 0   I: 76441 1   C: 01511 0   I: 76405 1   C: 00023 0   C: 24043 0   C: 01511 0   I: 57236 1
12,2050     C: 00017 1   I: 52405 1   C: 00041 1   I: 61425 0   C: 11035 1   C: 00045 0   I: 74421 0   C: 11035 1
12,2060     I: 77671 1   C: 00041 1   C: 00011 1   I: 71244 0   C: 24073 0   C: 11053 1   I: 40071 0   C: 00011 1
12,2070     C: 24077 1   I: 52166 1   C: 24077 1   I: 55366 1   C: 11055 1   I: 77600 1   C: 24077 1   C: 00013 0

12,2100     I: 65205 0   C: 00023 0   C: 00011 1   I: 65301 0   C: 00047 1   I: 56257 1   C: 20173 0   I: 50000 1
12,2110     C: 24124 0   C: 24124 0   I: 51525 1   C: 02074 0   I: 50025 0   C: 00001 0   C: 24124 0   I: 77765 0
12,2120     C: 02074 0   C: 16074 0   I: 77650 1   C: 24112 0   I: 71201 1   C: 00001 0   C: 02130 1   C: 00025 0
12,2130     I: 53165 0   C: 02074 0   C: 24302 0   I: 51440 0   C: 24302 0   I: 51025 1   C: 00013 0   C: 24302 0

12,2140     I: 51145 0   C: 02074 0   C: 24152 1   I: 57545 1   C: 00013 0   C: 14015 0   C: 24007 0   C: 00013 0
12,2150     I: 77650 1   C: 24155 0   I: 77745 1   C: 24007 0   C: 00015 0   I: 57345 1   C: 02074 0   C: 11046 0
12,2160     I: 77646 0   C: 16177 1   C: 01553 0   I: 77621 1   C: 00025 0   C: 02643 1   I: 63545 0   C: 00025 0
12,2170     I: 41501 0   C: 00047 1   I: 53605 1   C: 00011 1   C: 21573 0   C: 34031 1   C: 24421 0   I: 44200 0

12,2200     C: 24311 1   C: 02074 0   C: 02645 1   I: 44246 1   C: 02177 1   I: 71244 0   C: 24333 1   C: 00037 0
12,2210     I: 60225 1   C: 01551 1   C: 00047 1   I: 60325 0   C: 02643 1   C: 00050 1   I: 41260 0   C: 00047 1
12,2220     C: 02645 1   I: 56257 1   C: 21202 1   I: 41542 1   I: 71244 0   C: 24246 1   C: 00025 0   C: 00013 0
12,2230     I: 45221 1   C: 00015 0   I: 51000 0   C: 24240 1   C: 24240 1   I: 52145 0   C: 00001 0   C: 24260 0

12,2240     I: 45345 1   C: 00015 0   C: 00025 0   I: 52075 1   C: 11051 0   C: 24260 0   I: 77745 1   C: 00025 0
12,2250     C: 00015 0   I: 45221 1   C: 00013 0   I: 50000 1   C: 24274 0   C: 24274 0   I: 77745 1   C: 00001 0
12,2260     C: 02643 1   I: 43254 0   C: 24333 1   C: 00025 0   C: 14025 0   C: 00037 0   C: 01551 1   I: 46034 1
12,2270     C: 24644 1   C: 24333 1   I: 77650 1   C: 24166 0   I: 45345 1   C: 00013 0   C: 00025 0   I: 52075 1

12,2300     C: 11051 0   C: 24260 0   I: 70545 1   C: 00013 0   I: 77765 0   C: 02074 0   C: 00025 0   I: 77650 1
12,2310     C: 24140 1   I: 50145 1   C: 00025 0   C: 24330 1   C: 00013 0   I: 70545 1   C: 02643 1   C: 02643 1
12,2320     I: 44254 1   C: 02112 1   C: 00025 0   C: 14025 0   C: 01551 1   C: 00037 0   I: 77650 1   C: 24267 1
12,2330     C: 00015 0   I: 77650 1   C: 24315 0   I: 44545 0   C: 00041 1   I: 74225 1   C: 00035 1   C: 02647 0

12,2340     I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023 0   C: 00025 0   I: 53605 1
12,2350     C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 01511 0   I: 53372 1   I: 77712 0
12,2360     C: 01535 0   I: 60246 1   C: 00050 1   C: 14043 0   C: 00031 0   I: 45275 0   C: 00033 1   C: 11033 1
12,2370     I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 56601 0   I: 74271 0   C: 00043 0   C: 02647 0
```

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OCTAL LISTING FOR PARAGRAPH # 071,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2400     I: 65372 1    C: 00035 1    I: 56257 1    C: 56602 0    C: 00043 0    I: 74221 0    C: 11047 1    C: 01511 0
12,2410     I: 42455 0    I: 77626 0    C: 62234 0    C: 00037 0    C: 15551 1    C: 00025 0    C: 01553 0    I: 77650 1
12,2420     C: 02112 1    I: 77776 1       07222 1    C: 00010 0    C: 02525 1    C: 12526 0    C: 67356 0    C: 75666 0
12,2430     C: 15001 1    C: 23771 1    C: 64342 0    C: 43674 0    C: 06563 1    C: 04645 1    C: 75173 0    C: 52672 0

12,2440     C: 00656 1    C: 14331 0    C: 77633 1    C: 40512 0    C: 00023 0    C: 11210 1    C: 77774 0    C: 67506 0
12,2450        06037 0    C: 14033 1    C: 00031 0    I: 77776 1       07222 1    C: 00010 0    C: 01000 0    C: 00000 1
12,2460     C: 72525 0    C: 52506 0    C: 13301 1    C: 15337 1    C: 62776 0    C: 54733 1    C: 11176 1    C: 13267 0
12,2470     C: 73410 0    C: 51674 0    C: 01446 0    C: 33641 1    C: 77451 1    C: 65233 0    C: 00055 1    C: 37266 1

12,2500     C: 77767 1    C: 52336 0       06037 0    I: 53605 1    C: 00001 0    C: 21574 1    C: 00035 1    I: 72405 0
12,2510     C: 00043 0    I: 65234 1    C: 21633 1    I: 53605 1    C: 00033 1    C: 21574 1    I: 72405 0    C: 00045 0
12,2520     I: 65234 1    C: 21633 1    C: 00041 1    I: 76261 0    C: 20607 1    I: 41301 0    C: 00047 1    C: 00025 0
12,2530     I: 76257 0    C: 20576 1    I: 57232 0    C: 00023 0    C: 00037 0    I: 77616 0    I: 71214 0    C: 00614 1

12,2540     C: 24606 1    C: 00037 0    I: 60225 1    C: 02762 0    C: 00047 1    I: 60325 0    C: 00015 0    C: 00050 1
12,2550     I: 41260 0    C: 00047 1    C: 02760 1    I: 56257 1    C: 21202 1    I: 43142 1    C: 04351 1    C: 24562 0
12,2560     I: 75246 0    C: 02760 1    I: 51006 0    C: 24620 0    I: 43145 0    C: 02766 1    C: 04311 0    C: 24571 1
12,2570     C: 00017 1    I: 45221 1    C: 00011 1    I: 51000 0    C: 24600 1    C: 24600 1    I: 77650 1    C: 24632 0

12,2600     I: 45345 1    C: 00011 1    C: 02766 1    I: 52005 0    C: 11051 0    C: 24634 0    I: 41345 0    C: 00011 1
12,2610     C: 00051 0    I: 41325 0    C: 00017 1    C: 00051 0    I: 77625 0    I: 52165 1    C: 02760 1    C: 24562 0
12,2620     I: 43145 0    C: 02766 1    C: 04311 0    C: 24625 0    C: 00011 1    I: 45221 1    C: 00017 1    I: 50000 1
12,2630     C: 24636 1    C: 24636 1    I: 77745 1    C: 00001 0    C: 00015 0    I: 77616 0    I: 45345 1    C: 00017 1

12,2640     C: 02766 1    I: 52005 0    C: 11051 0    C: 24634 0       44753 0       50120 1       60026 0       50120 1
12,2650        54026 1       54154 0       06061 0    I: 44545 0    C: 00041 1    I: 74225 1    C: 00035 1    C: 02722 1
12,2660     I: 65372 1    C: 00025 0    I: 60316 0    C: 00047 1    I: 57275 0    C: 00023 0    C: 00025 0    I: 53605 1
12,2670     C: 00033 1    C: 21572 1    I: 77621 1    C: 00037 0    I: 74352 0    C: 02744 1    I: 53372 1    I: 41512 1

12,2700     I: 77646 0    I: 77701 1    C: 00047 1    C: 16720 0    C: 00031 0    I: 45205 1    C: 00033 1    C: 11033 1
12,2710     I: 76405 1    C: 00021 1    I: 53605 1    C: 00025 0    C: 21176 1    I: 74271 0    C: 02720 0    C: 02722 1
12,2720     I: 65372 1    C: 00035 1    I: 56257 1    C: 21175 1    C: 02720 0    I: 77621 1    C: 11047 1    I: 53361 0
12,2730     C: 02744 1    I: 43412 1    I: 40220 0    C: 02710 0    C: 00001 0    I: 77600 1    C: 24737 1    I: 63375 0

12,2740     C: 02655 0    C: 02744 1    I: 77624 1    C: 11064 0    I: 45000 0    C: 24764 1    C: 24767 1    I: 43145 0
12,2750     C: 00031 0    C: 04310 1    C: 25742 1    I: 45014 0    C: 04273 0    C: 24421 0    I: 45014 0    C: 03706 0
12,2760     C: 02710 0    C: 24653 1    I: 77650 1    C: 02710 0    I: 77614 1    C: 04033 0    C: 25742 1    I: 66374 1
12,2770     C: 00003 1    C: 00052 0    C: 00001 0    I: 77614 1    C: 04276 0    I: 65366 1    C: 02732 0    I: 44342 1
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OCTAL LISTING FOR PARAGRAPH # 072, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3000    C: 11037 0   I: 54325 1   C: 02730 1   C: 21607 0   I: 77671 1   I: 77600 1   C: 25122 1   I: 41225 1
12,3010    C: 02766 1   I: 40132 0   C: 25122 1   I: 63406 0   I: 65351 0   C: 00155 0   C: 02742 1   I: 76202 0
12,3020    I: 75440 0   C: 25205 1   I: 43306 0   I: 61000 0   C: 25120 0   C: 25013 1   I: 40065 0   C: 11033 1
12,3030    C: 25205 1   I: 41440 1   C: 25205 1   I: 77716 1   I: 41301 0   C: 00047 1   C: 02742 1   I: 77457 1

12,3040    C: 21567 0      07222 1   C: 00005 1   C: 20000 0   C: 00000 1   C: 72525 0   C: 52471 1   C: 03146 1
12,3050    C: 15003 0   C: 75556 0   C: 45210 0   C: 01615 1   C: 13553 0   C: 76371 0   C: 63777 0   C: 01232 0
12,3060    C: 27367 0      06037 0   I: 76405 1   I: 43006 0   C: 04316 1   C: 25172 1   I: 60316 0   C: 00047 1
12,3070    I: 53605 1   C: 02742 1   C: 21565 1   C: 14031 0   C: 00041 1   I: 75542 0   I: 41306 1   I: 77632 0

12,3100    C: 00025 0   I: 60316 0   C: 00047 1   I: 41325 0   C: 02740 0   C: 00041 1   I: 75452 0   I: 56405 0
12,3110    C: 02766 1   C: 14043 0   C: 02742 1   I: 43021 0   C: 11035 1   C: 04270 0   C: 00045 0   I: 77616 0
12,3120    I: 77774 0   C: 00003 1   I: 51001 1   C: 00001 0   C: 25127 1   I: 77614 1   C: 04076 1   I: 75545 1
12,3130    C: 02740 0   I: 41325 0   C: 02730 1   C: 02766 1   I: 65352 0   C: 02732 0   I: 43202 0   C: 11043 0

12,3140    I: 41225 1   I: 55301 0   C: 00047 1   C: 02730 1   I: 51457 0   C: 21174 0   I: 63406 0   C: 14043 0
12,3150    C: 11041 1   I: 63406 0   I: 65234 1   C: 21633 1   C: 02742 1   I: 40405 1   C: 00043 0   I: 77771 0
12,3160    I: 75440 0   C: 25205 1   I: 77615 0   I: 60304 0   C: 25151 0   C: 00047 1   I: 77665 1   I: 52057 1
12,3170    C: 21172 0   C: 25031 1   I: 50145 1   C: 02742 1   C: 25205 1   I: 60366 1   C: 00047 1   I: 53665 1

12,3200    C: 11055 1   C: 20176 0   I: 41425 1   I: 77650 1   C: 25066 0   I: 40001 1   C: 00001 0   C: 25210 0
12,3210    I: 43414 1   C: 04070 1   I: 40220 0   C: 02710 0   C: 00001 0   I: 77600 1   C: 25217 1   I: 76614 0
12,3220    C: 02674 0   C: 10005 0   C: 14017 1   C: 02671 0   I: 77675 0   C: 11042 1   C: 02764 0   I: 77214 0
12,3230    C: 00474 0   C: 02655 0   I: 45115 0   C: 02663 0   C: 11130 0   C: 16730 1   C: 02720 0   I: 65301 0

12,3240    C: 00047 1   C: 00041 1   I: 56342 1   I: 65257 1   C: 20173 0   I: 77626 0   C: 75045 1   I: 44342 1
12,3250    C: 11037 0   C: 02734 0   I: 53106 0   C: 25463 1   I: 65301 0   C: 00047 1   C: 00001 0   I: 56342 1
12,3260    I: 75457 0   C: 20176 0   I: 54325 1   C: 02730 1   C: 20607 1   I: 43271 1   C: 02734 0   I: 77626 0
12,3270    C: 77760 0   I: 50000 1   C: 25277 1   C: 25302 1   I: 50025 0   C: 11061 0   C: 25302 1   I: 77745 1

12,3300    C: 11061 0   C: 00017 1   I: 77745 1   C: 02732 0   I: 45261 0   C: 20607 1   I: 77626 0   C: 61041 0
12,3310    C: 02673 1   I: 71240 1   C: 25503 0   C: 02736 1   I: 56352 0   C: 02730 1   I: 77600 1   C: 25503 0
12,3320    C: 00011 1   I: 66214 0   C: 00715 1   C: 25467 0   C: 00051 0   C: 00001 0   I: 77745 1   C: 02766 1
12,3330    I: 77605 1   C: 02730 1   I: 45342 0   C: 02736 1   I: 65301 0   C: 00047 1   C: 02734 0   I: 56257 1

12,3340    C: 20170 0   I: 53040 0   C: 25417 1   C: 25417 1   C: 16740 0   C: 02766 1   I: 43316 1   C: 11045 0
12,3350    I: 41301 0   C: 00047 1   C: 02740 0   I: 44257 1   C: 20571 0   C: 11043 0   C: 16742 1   C: 02740 0
12,3360    I: 45000 0   C: 25422 1   C: 24767 1   I: 77745 1   C: 00037 0   C: 16762 0   C: 00031 0   I: 45014 0
12,3370    C: 04310 1   C: 25417 1   C: 24421 0   I: 44200 0   C: 25437 0   C: 02671 0   C: 02760 1   I: 44246 1
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OCTAL LISTING FOR PARAGRAPH # 073,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3400     C: 02764 0    I: 47044 1    C: 25506 0    C: 24644 1    I: 45030 0    C: 25450 1    C: 24536 1    I: 53145 1
12,3410     C: 00155 0    C: 25450 1    I: 77615 0    C: 02766 1    C: 02766 1    I: 77650 1    C: 25330 0    I: 51145 0
12,3420     C: 00015 0    C: 25442 1    I: 71201 1    C: 00001 0    C: 02766 1    C: 00011 1    I: 70545 1    C: 00015 0
12,3430     C: 00015 0    I: 442[illegible]4 1    C: 25450 1    C: 02766 1    C: 02766 1    I: 77650 1    C: 25330 0    I: 77745 1

12,3440     C: 02762 0    C: 00037 0    I: 71201 1    C: 00001 0    C: 02766 1    C: 00017 1    I: 77650 1    C: 25426 0
12,3450     I: 51545 1    C: 02760 1    I: 41325 0    C: 02671 0    C: 11030 1    I: 45215 0    C: 11057 0    I: 43044 0
12,3460     C: 25506 0    C: 02434 0    C: 25506 0    I: 43001 1    C: 00001 0    C: 02434 0    C: 02710 0    I: 71331 0
12,3470     C: 00051 0    C: 10000 0    C: 00011 1    I: 65342 1    C: 00017 1    I: 43342 0    I: 77626 0    C: 75011 0

12,3500     C: 00015 0    I: 77650 1    C: 25330 0    I: 52145 0    C: 11063 1    C: 25320 1    I: 60345 0    C: 00041 1
12,3510     C: 00047 1    I: 70525 1    C: 02740 0    I: 77671 1    I: 75457 0    C: 20175 0    I: 72405 0    C: 00021 1
12,3520     I: 41206 0    C: 02766 1    I: 74261 1    C: 20206 1    C: 02722 1    I: 77725 1    I: 76561 1    C: 02674 0
12,3530     I: 53235 0    C: 02722 1    I: 77772 0    C: 02744 1    I: 53135 0    C: 02702 0    C: 25541 0    I: 77650 1

12,3540     C: 02710 0    I: 45145 0    C: 02720 0    C: 24701 1    C: 02703 1    I: 77650 1    C: 02710 0    I: 40220 0
12,3550     C: 02710 0    C: 00001 0    I: 77600 1    C: 25554 1    I: 63375 0    C: 02655 0    C: 02744 1    I: 77624 1
12,3560     C: 11064 0    I: 71200 0    C: 24764 1    C: 11043 0    I: 41225 1    C: 02742 1    C: 02740 0    I: 41366 1
12,3570     C: 02766 1    I: 74212 0    C: 02712 1    I: 45325 1    C: 11035 1    C: 02742 1    I: 52361 1    C: 02722 1

12,3600     I: 53512 1    I: 77600 1    C: 25660 0    I: 60325 0    C: 02756 1    C: 00047 1    I: 41325 0    C: 00041 1
12,3610     C: 02740 0    I: 56257 1    C: 20201 0    I: 56225 1    C: 11041 1    C: 00045 0    C: 00031 0    I: 63400 0
12,3620     C: 25664 1    I: 50021 1    C: 11037 0    C: 25664 1    I: 75366 0    C: 02755 1    I: 77614 1    C: 04272 1
12,3630     I: 76561 1    C: 02674 0    I: 63235 0    C: 00001 0    I: 53361 0    C: 00031 0    I: 41572 1    I: 56241 0

12,3640     C: 02722 1    C: 25756 1    I: 60142 1    C: 25644 0    C: 26732 0    C: 02722 1    I: 76435 1    I: 72441 0
12,3650     C: 02674 0    C: 16730 1    C: 02740 0    I: 77624 1    C: 24767 1    I: 77614 1    C: 02634 1    C: 24747 0
12,3660     I: 43001 1    C: 00001 0    C: 02434 0    C: 25742 1    I: 75345 1    C: 24005 1    C: 00031 0    C: 14031 0
12,3670     C: 24007 0    I: 77614 1    C: 04032 1    C: 25630 0    I: 40220 0    C: 02710 0    C: 00001 0    I: 77600 1

12,3700     C: 25701 0    I: 63375 0    C: 02655 0    C: 02744 1    I: 77624 1    C: 11064 0    I: 77600 1    C: 25710 0
12,3710     I: 42405 0    C: 02742 1    I: 75421 1    C: 11035 1    C: 02752 0    I: 65215 1    C: 11031 0    C: 00041 1
12,3720     I: 72405 0    C: 02740 0    I: 77671 1    I: 60325 0    C: 02742 1    C: 00047 1    I: 53725 1    C: 00041 1
12,3730     C: 20174 1    I: 45271 1    I: 50000 1    C: 25737 0    C: 25737 0    I: 77650 1    C: 02710 0    I: 52145 0

12,3740     C: 24020 0    C: 02710 0    I: 77776 1       05652 0    C: 00607 0    C: 04631 1    C: 23146 0    C: 14000 1
12,3750     C: 00000 1    C: 02314 0    C: 31463 1    C: 01400 1    C: 00000 1    C: 10000 0    C: 00000 1    C: 03000 1
12,3760     C: 00000 1    C: 36000 1    C: 00000 1    C: 30000 1    C: 00000 1    C: 22525 0    C: 12525 0    C: 22000 1
12,3770     C: 00000 1    C: 01200 1    C: 00000 1    C: 25252 0    C: 25253 1    C: 00027 1    C: 03776 1  CKSM 73411 1
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OCTAL LISTING FOR PARAGRAPH # 074,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2000      C: 07112 1   C: 06620 0   C: 27446 1   C: 14620 0   C: 16471 1   C: 01352 1   C: 22437 1   C: 16067 1
13,2010      C: 00000 1   C: 00000 1   C: 02302 1   C: 24736 0   C: 77651 0   C: 76237 0   C: 77776 1   C: 53032 0
13,2020      C: 10407 0   C: 05344 1   C: 13710 0   C: 35320 0   C: 12160 0   C: 12124 0   I: 43014 0   C: 01474 1
13,2030      C: 04347 0   C: 26036 0   I: 43014 0   C: 02756 1   C: 26036 0   C: 01476 0   I: 45014 0   C: 01667 1

13,2040      C: 27134 1   I: 71214 0   C: 04307 1   C: 26063 0   C: 01571 0   C: 34041 0   C: 27414 0   I: 45014 0
13,2050      C: 01674 0   C: 26644 0   I: 77614 1   C: 02756 1   C: 26060 0   I: 43014 0   C: 01476 0   C: 01475 0
13,2060      I: 45014 0   C: 01467 0   C: 27134 1   I: 77614 1   C: 01236 1   C: 26632 1   I: 43414 1   C: 01674 0
13,2070      I: 43414 1   C: 04756 1   C: 26073 1   I: 53775 1   C: 01521 0   C: 57605 0   I: 53655 1   C: 01535 0

13,2100      C: 57576 1   C: 25221 1   C: 01527 0   I: 53257 1   C: 57602 1   C: 01543 1   I: 77657 0   C: 57576 1
13,2110      C: 15227 1   C: 01517 0   C: 01235 1   I: 77616 0   I: 53775 1   C: 01521 0   C: 57605 0   I: 53655 1
13,2120      C: 01535 0   C: 57576 1   C: 25720 0   C: 01527 0   I: 53257 1   C: 57602 1   C: 01543 1   I: 77657 0
13,2130      C: 57576 1   C: 01726 0   I: 77616 0   C: 00041 1   I: 57545 1   C: 00043 0   I: 67401 0   C: 00001 0

13,2140      I: 44206 0   C: 24005 1   C: 14005 1   C: 24007 0   C: 24043 0   C: 00041 1   I: 41056 1   C: 52421 1
13,2150      C: 14041 1   C: 00041 1   I: 44142 0   C: 00051 0   C: 14023 0   C: 00045 0   I: 77742 0   C: 34021 0
13,2160      C: 47320 0   I: 43206 1   C: 24005 1   C: 24007 0   C: 00005 1   I: 77634 0   C: 21635 1   C: 25112 1
13,2170      C: 00001 0   I: 77634 0   C: 21635 1   C: 01110 0   I: 77776 1      40110 0      74740 1      10000 0

13,2200         12204 1      53110 1      53112 0      53110 1      06037 0   I: 77650 1   C: 00051 0      05504 0
13,2210      C: 00031 0      06037 0   I: 77775 1   C: 03434 1   C: 02223 0   I: 77776 1      32336 0      04616 1
13,2220      C: 20476 0      12333 1      02224 1      02216 0      32337 1      04616 1   C: 20476 0      12333 1
13,2230         02232 0      02224 1      06037 0   I: 77745 1   C: 03442 0   C: 34041 0   C: 27043 0   I: 53575 0

13,2240      C: 00001 0   I: 77676 0   C: 00031 0   I: 53435 0   C: 00007 0   C: 00023 0   I: 53435 0   C: 00031 0
13,2250      C: 24015 0   C: 02223 0   I: 76505 0   C: 00015 0   I: 77655 1   C: 00007 0   C: 00007 0   I: 77624 1
13,2260      C: 27414 0   I: 77624 1   C: 26340 1   I: 53775 1   C: 00007 0   C: 57176 0   C: 25543 1   C: 00001 0
13,2270      I: 77657 0   C: 57176 0   C: 15535 0   C: 03442 0   C: 01517 0   I: 71214 0   C: 01673 1   C: 01643 1

13,2300      C: 34041 0   C: 27107 1   I: 77624 1   C: 27414 0   I: 77775 1   C: 00017 1   C: 01503 0   C: 15535 0
13,2310      C: 00015 0   C: 25517 0   C: 00025 0   I: 77624 1   C: 23455 1   I: 77776 1      05353 1   C: 04024 0
13,2320         05504 0   C: 00236 0      06037 0   I: 77624 1   C: 26661 1   I: 77531 0   C: 00053 1   C: 26332 1
13,2330         04616 1   C: 27445 1   I: 77776 1      34755 1      55462 1      16001 1   C: 01524 0   C: 01441 1

13,2340      I: 43174 1   C: 00002 0   C: 00063 1   I: 77014 1   C: 04303 0   C: 00052 0   C: 00000 1   I: 43414 1
13,2350      C: 00263 0   I: 40220 0   C: 03674 1   C: 00001 0   C: 24007 0   C: 02032 1   I: 51406 1   C: 16070 1
13,2360      C: 24007 0   I: 71414 0   C: 01743 0   C: 26364 1   I: 77624 1   C: 51670 1   I: 77656 1   C: 36032 0
13,2370      C: 26550 0   I: 77624 1   C: 26550 0   I: 63545 0   C: 02032 1   I: 63525 0   C: 02034 1   I: 75415 0
```

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OCTAL LISTING FOR PARAGRAPH # 075,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2400     I: 76405 1   C: 00011 1   C: 14021 1   C: 02036 0   C: 34023 1   C: 26510 1   C: 15121 1   C: 02032 1
13,2410     C: 14021 1   C: 02034 1   C: 34023 1   C: 26510 1   C: 15123 0   C: 02070 1   I: 77625 0   C: 03673 0
13,2420     C: 35125 1   C: 03674 1   I: 40220 0   C: 03674 1   C: 00001 0   C: 34007 1   C: 26550 0   I: 73545 1
13,2430     C: 01121 1   I: 65275 1   C: 00011 1   C: 01121 1   I: 65346 0   C: 01123 0   I: 57356 0   I: 71525 0

13,2440     C: 01121 1   I: 71525 0   C: 01123 0   I: 55475 1   I: 41456 0   C: 36032 0   C: 25560 0   I: 43145 0
13,2450     C: 24007 0   C: 01743 0   C: 26454 0   I: 77746 1   I: 77624 1   C: 55716 1   C: 16032 1   C: 03673 0
13,2460     I: 74215 1   C: 01125 0   C: 02032 1   I: 77772 0   C: 36032 0   C: 03674 1   I: 63545 0   C: 02036 0
13,2470     I: 44352 0   C: 24005 1   I: 44275 1   C: 26507 1   C: 24005 1   I: 75465 1   C: 26503 0   I: 77622 1

13,2500     C: 03673 0   I: 77616 0   C: 00446 1   C: 00305 1   C: 17711 0   C: 05254 1   C: 00155 0   C: 25250 1
13,2510     I: 77600 1   C: 26512 0   I: 63545 0   C: 00023 0   I: 63525 0   C: 00021 1   I: 77615 0   I: 75454 0
13,2520     C: 26536 0   I: 40065 0   C: 00023 0   C: 26543 1   I: 67542 0   C: 00025 0   I: 50125 1   C: 00021 1
13,2530     C: 26532 1   I: 43545 1   I: 57545 1   I: 43244 1   C: 26540 1   C: 24005 1   C: 00025 0   I: 77616 0

13,2540     I: 52025 1   C: 24005 1   C: 26536 0   I: 75345 1   C: 11037 0   C: 00023 0   C: 00025 0   I: 77616 0
13,2550     I: 43145 0   C: 26505 0   C: 01743 0   C: 26556 0   I: 77735 0   C: 24005 1   C: 00011 1   I: 77616 0
13,2560     I: 71220 1   C: 00051 0   C: 10003 0   I: 71214 0   C: 01703 1   C: 26575 1   C: 10001 1   I: 45014 0
13,2570     C: 00742 0   C: 26573 1   C: 26466 1   C: 37673 1   C: 00051 0   I: 77214 0   C: 00702 1   C: 26573 1

13,2600     C: 02023 1   I: 64446 0   I: 77650 1   C: 26573 1      05353 1   C: 00052 0      35017 1      05105 0
13,2610     C: 02613 1   C: 26063 0      05261 1      06037 0   I: 47014 1   C: 04712 1   C: 26653 0   C: 21573 0
13,2620     C: 00041 1   I: 77624 1   C: 27414 0   I: 45014 0   C: 01076 1   C: 26644 0   I: 77650 1   C: 26026 1
13,2630     C: 00003 1   C: 25140 0   I: 77414 0   C: 01672 0      05353 1   C: 20032 1      00006 1      32631 1

13,2640        05277 0   C: 02604 1   C: 26063 0      05155 0   I: 43014 0   C: 01472 1   C: 01673 1   I: 43014 0
13,2650     C: 01676 1   C: 01675 1   I: 77616 0   I: 77776 1      05353 1   C: 00002 0      05516 0   C: 00221 0
13,2660        05155 0   I: 47020 0   C: 00051 0   C: 26674 0   I: 45014 0   C: 04063 0   C: 26114 1   I: 43014 0
13,2670     C: 00303 1   C: 00051 0   C: 04223 0   C: 00051 0      03036 1      55500 1      51500 0      31502 1

13,2700        51500 0      55554 0      11500 1      12675 0      06061 0   I: 43034 1   C: 26723 0   C: 04303 0
13,2710     C: 26716 0   I: 66214 0   C: 00263 0   C: 02031 1   C: 00000 1   I: 77616 0   I: 66214 0   C: 00063 1
13,2720     C: 02031 1   C: 00002 0   I: 77616 0      03036 1      55500 1      51500 0      31554 1      51500 0
13,2730        55502 0      11500 1      12724 0      06061 0   I: 47020 0   C: 00051 0   C: 26747 1   I: 45014 0

13,2740     C: 04064 1   C: 26070 1   I: 43014 0   C: 00303 1   C: 00051 0   C: 04224 1   C: 00051 0      03036 1
13,2750        55500 1      51500 0      31502 1      51500 0      55626 0      11500 1      12750 0      06061 0
13,2760     I: 47014 1   C: 04307 1   C: 27001 0   C: 26770 0   I: 52014 0   C: 04304 1   C: 26716 0   C: 26711 1
13,2770        03036 1      55500 1      51500 0      31626 1      51500 0      55502 0      11500 1      12771 0
```

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OCTAL LISTING FOR PARAGRAPH # 076, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3000        06061 0    I: 77201 1    C: 00001 0    C: 02023 1    I: 41525 0    C: 00041 1    C: 15517 0    C: 27712 0
13,3010     I: 77624 1    C: 55716 1    C: 25535 0    C: 24001 0    C: 14001 0    C: 01517 0    C: 14007 0    C: 27712 0
13,3020     I: 45014 0    C: 00063 1    C: 55716 1    I: 74235 0    C: 01535 0    C: 26001 1    C: 25543 1    C: 24007 0
13,3030     C: 01521 0    I: 67174 1    C: 00002 0    C: 02030 0    C: 35527 1    C: 27157 1       33042 1       54006 0

13,3040        33452 1       00002 0    C: 26063 0    I: 45020 1    C: 00046 0    C: 27414 0    I: 43130 1    C: 02102 0
13,3050     C: 01474 1    I: 43014 0    C: 01467 0    C: 01676 1    I: 77614 1    C: 01633 0    C: 27136 0    I: 45020 1
13,3060     C: 00046 0    C: 27414 0    I: 43130 1    C: 02102 0    C: 01634 1    C: 27051 0    I: 45020 1    C: 00046 0
13,3070     C: 27414 0    I: 43130 1    C: 02102 0    C: 01474 1    I: 43014 0    C: 01676 1    C: 01433 1    C: 27136 0

13,3100     I: 45020 1    C: 00046 0    C: 27414 0    I: 43130 1    C: 02102 0    C: 01634 1    C: 27074 1    I: 66214 0
13,3110     C: 01467 0    C: 02031 1    C: 00000 1    I: 66214 0    C: 00343 0    C: 27120 1    C: 02031 1    C: 00002 0
13,3120     I: 77220 1    C: 02102 0    C: 24007 0    C: 01521 0    C: 35527 1    C: 23441 1    I: 43014 0    C: 01676 1
13,3130     C: 04062 1    I: 77614 1    C: 04020 1    C: 27150 0    I: 77620 0    C: 02102 0    I: 43014 0    C: 04060 0

13,3140     C: 04062 1    I: 77731 1    C: 00053 1    C: 27150 0    I: 52014 0    C: 01714 1    C: 26705 1    C: 26760 1
13,3150     I: 77745 1    C: 00041 1    C: 01116 0    I: 52014 0    C: 01753 1    C: 27257 1    C: 27243 1    I: 77414 0
13,3160     C: 01752 0    C: 27200 0       05353 1    C: 04022 0       05504 0    C: 00236 0       06037 0    I: 77731 1
13,3170     C: 00053 1    C: 27176 1    I: 52014 0    C: 01714 1    C: 26661 1    C: 26734 0    I: 77624 1    C: 11244 0

13,3200     I: 45001 1    C: 00001 0    C: 23441 1    I: 53775 1    C: 01503 0    C: 57576 1    I: 53715 1    C: 01511 0
13,3210     C: 57576 1    I: 63325 0    C: 01517 0    C: 01503 0    I: 64715 0    C: 01511 0    C: 51770 0    I: 76006 0
13,3220     C: 77765 0    I: 76014 0    C: 00303 1    C: 27225 1    C: 77775 1    I: 40001 1    C: 00001 0    C: 27230 0
13,3230     I: 43014 0    C: 04676 1    C: 01667 1    I: 77614 1    C: 01672 0    I: 77535 1    C: 02103 1       30154 1

13,3240        50120 1       54052 1       03425 1    I: 45345 1    C: 01116 0    C: 01517 0    C: 36074 1    C: 23441 1
13,3250     I: 77624 1    C: 22376 0    I: 43345 1    C: 01551 1    C: 01517 0    C: 35517 1    C: 27200 0    I: 43014 0
13,3260     C: 04752 0    C: 27264 1    C: 01632 1    C: 27225 1    I: 73001 1    C: 00013 0    C: 02030 0    I: 51575 1
13,3270     C: 01535 0    I: 43006 0    C: 00262 1    I: 50023 0    C: 53755 0    C: 27300 1    I: 77614 1    C: 00062 0

13,3300     I: 41345 0    C: 00013 0    C: 00043 0    I: 55762 1    C: 51770 0    I: 41366 1    C: 25752 0    I: 40442 1
13,3310     I: 54345 1    C: 00155 0    C: 20220 0    I: 40006 0    C: 27341 1    I: 50021 1    C: 27413 1    C: 27341 1
13,3320     I: 45345 1    C: 01116 0    C: 01517 0    I: 54234 0    C: 21612 1    C: 20211 1    C: 02076 1    I: 51400 1
13,3330     C: 27345 0    I: 50025 0    C: 00015 0    C: 27351 0    I: 75345 1    C: 00015 0    C: 02076 1    C: 36076 0

13,3340     C: 27351 0    I: 65345 0    C: 27413 1    I: 77650 1    C: 27320 0    I: 77634 0    C: 21712 0    C: 36076 0
13,3350     C: 27334 0    I: 51545 1    C: 02076 1    I: 50025 0    C: 27411 0    C: 27157 1    I: 46135 1    C: 01012 0
13,3360     C: 27363 1    I: 77650 1    C: 23252 0    I: 77614 1    C: 01707 0    C: 23252 0    I: 45345 1    C: 02076 1
13,3370     C: 00015 0    I: 43040 1    C: 27157 1    C: 04242 1    C: 23252 0    I: 45345 1    C: 01116 0    C: 01517 0
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OCTAL LISTING FOR PARAGRAPH # 077,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3400     I: 77640 0    C: 27225 1    I: 40525 1    C: 02076 1    I: 44322 1    I: 52040 1    C: 27225 1    C: 23252 0
13,3410     C: 00000 1    C: 01400 1    C: 14152 1    C: 00000 1    I: 77776 1       30106 0       73466 1       00006 1
13,3420        13460 1       33465 0       05133 0    I: 77776 1       13445 0       40106 1       74745 1       10000 0
13,3430        03445 1       50120 1       30052 0       55055 1       05353 1    C: 04022 0       31055 0       50120 1

13,3440        54052 1       34745 0       70106 1       00006 1       13463 1       33465 0       00004 0       05137 1
13,3450        10064 1       13445 0    C: 00051 0       43466 1       70106 1       54106 1       00003 1       13463 1
13,3460        34736 1       00004 0       26106 1       06037 0    I: 77616 0    C: 27415 1    C: 20100 1    I: 43020 1
13,3470     C: 02772 1    C: 02716 0    C: 27536 1    I: 77614 1    C: 01711 1    C: 27536 1    I: 45145 0    C: 01235 1

13,3500     C: 27414 0    I: 45014 0    C: 01474 1    C: 26644 0    C: 34041 0    C: 27134 1    I: 45174 1    C: 00002 0
13,3510     C: 27414 0    I: 77014 1    C: 04304 1    C: 27515 0    C: 00000 1    I: 53775 1    C: 01221 1    C: 57176 0
13,3520     C: 01503 0    C: 15535 0    C: 01235 1    C: 25517 0    C: 01227 1    I: 45057 1    C: 57176 0    C: 23455 1
13,3530     I: 66234 1    C: 26747 1    C: 03463 0    C: 00000 1    I: 77650 1    C: 47226 1    I: 45145 0    C: 01235 1

13,3540     C: 27414 0    I: 43014 0    C: 01476 0    C: 04476 0    I: 43014 0    C: 01475 0    C: 01674 0    C: 34041 0
13,3550     C: 27134 1    I: 77650 1    C: 27476 1    I: 43020 1    C: 03744 0    C: 04634 1    C: 27572 1    I: 43020 1
13,3560     C: 03744 0    C: 04474 1    I: 43234 0    C: 21573 0    C: 27674 1    I: 51021 0    C: 00041 1    C: 27576 0
13,3570     I: 77624 1    C: 27662 0    I: 43234 0    C: 21573 0    C: 27674 1    C: 00041 1    I: 77624 1    C: 27414 0

13,3600     I: 45014 0    C: 01676 1    C: 26066 0    I: 43014 0    C: 01673 1    C: 04475 0    I: 77624 1    C: 27134 1
13,3610     I: 77214 0    C: 04675 1    C: 00001 0    C: 27545 0    C: 00007 0    C: 17553 1    C: 00015 0    C: 03561 0
13,3620     I: 66134 1    C: 02777 1    C: 02776 0    I: 77776 1       00004 0       00006 1       40025 1       20155 1
13,3630        07257 0       31744 1       04640 1    I: 47014 1    C: 04754 0    C: 27652 0    C: 21573 0    I: 44215 1

13,3640     C: 27674 1    C: 01116 0    I: 45044 0    C: 27257 1    C: 27662 0    I: 43234 0    C: 21573 0    C: 27674 1
13,3650     C: 35116 1    C: 27257 1    I: 45345 1    C: 01116 0    C: 01517 0    I: 45246 0    C: 27672 1    I: 52040 1
13,3660     C: 27157 1    C: 27645 0    I: 77414 0    C: 04674 0       25744 1       05567 0    C: 01703 1       06037 0
13,3670     I: 77616 0    C: 00000 1    C: 00003 1    C: 00000 1    C: 03720 1    C: 77764 1    C: 77775 1    C: 77766 0

13,3700     C: 77771 0    C: 77775 1    C: 77775 1    C: 00000 1    C: 77763 0    C: 77766 0    C: 77773 1    C: 77770 1
13,3710     C: 77771 0    C: 24000 1    C: 00000 1    C: 74631 0    C: 63145 1    C: 00243 1    C: 32703 1    C: 03654 0
13,3720     C: 21000 1    C: 03654 0    C: 21000 1    C: 04627 0    C: 25200 1    I: 71214 0    C: 00343 0    C: 23232 0
13,3730     C: 00017 1    I: 77716 1    I: 63525 0    C: 00021 1    I: 77625 0    I: 74205 0    C: 27712 0    C: 00017 1

13,3740     I: 65332 0    C: 00017 1    I: 43342 0    C: 00003 1    C: 14003 1    C: 00021 1    I: 44342 1    C: 00005 1
13,3750     C: 00005 1    I: 74335 1    C: 01353 0    I: 43525 1    C: 00023 0       44747 0       70077 0       54077 0
13,3760        44745 1       70106 1       54106 1       44753 0       70076 1       54076 1       00002 0    C: 03767 1
13,3770     C: 03770 1 CKSM 21126 1          @             @             @             @             @             @
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OCTAL LISTING FOR PARAGRAPH # 1[illegible],  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2000      C: 26723 0    C: 00450 0    C: 00065 1    C: 01265 1    C: 00302 0    C: 24533 1    C: 00052 0    C: 04047 0
14,2010      C: 15262 0    C: 21773 1    C: 74130 0    C: 42420 1    C: 70033 0    C: 41533 1    C: 15014 0    C: 04650 0
14,2020      C: 67067 1    C: 60150 0    C: 02551 1    C: 15723 0    C: 07210 0    C: 01664 1    C: 67276 0    C: 62232 0
14,2030      C: 13262 0    C: 00563 1    C: 05076 0    C: 35561 0    C: 70716 0    C: 40260 1    C: 62466 1    C: 64656 0

14,2040      C: 10452 1    C: 04246 0    C: 63235 0    C: 44200 0    C: 73710 0    C: 66230 0    C: 07204 0    C: 33712 0
14,2050      C: 61747 1    C: 72343 0    C: 02343 1    C: 21362 0    C: 03237 1    C: 13301 1    C: 62030 0    C: 65332 0
14,2060      C: 70715 0    C: 71267 1    C: 01745 0    C: 06477 0    C: 63531 0    C: 75365 0    C: 12010 0    C: 03005 1
14,2070      C: 76146 0    C: 77014 1    C: 60371 1    C: 75073 1    C: 03370 0    C: 12003 1    C: 76125 0    C: 40037 1

14,2100      C: 72436 0    C: 77062 0    C: 61041 0    C: 54164 0    C: 72277 0    C: 51044 0    C: 62641 0    C: 45471 1
14,2110      C: 70711 1    C: 70546 1    C: 67364 1    C: 47073 0    C: 64425 0    C: 77777 0    C: 07157 0    C: 16322 0
14,2120      C: 63327 1    C: 64446 0    C: 67515 1    C: 55266 0    C: 05230 0    C: 25476 0    C: 64754 0    C: 72604 0
14,2130      C: 71235 0    C: 72553 1    C: 66427 0    C: 42171 0    C: 66546 0    C: 70765 1    C: 73260 1    C: 71643 0

14,2140      C: 14121 0    C: 30153 0    C: 61247 1    C: 73310 1    C: 72313 0    C: 41247 0    C: 74744 0    C: 44566 1
14,2150      C: 70606 0    C: 54564 1    C: 77153 0    C: 61536 0    C: 61601 1    C: 47046 0    C: 60604 0    C: 76224 1
14,2160      C: 77031 0    C: 73354 1    C: 73161 0    C: 63065 1    C: 60431 1    C: 51702 0    C: 00656 1    C: 33013 0
14,2170      C: 04044 0    C: 10627 0    C: 62164 0    C: 45040 1    C: 07325 1    C: 37443 0    C: 03267 1    C: 06626 0

14,2200      C: 63471 0    C: 50471 0    C: 11660 1    C: 04151 0    C: 75501 1    C: 46664 1    C: 70430 1    C: 46540 1
14,2210      C: 07507 1    C: 20100 1    C: 13727 1    C: 05455 0    C: 72160 0    C: 64202 0    C: 11144 0    C: 05203 0
14,2220      C: 64200 1    C: 65331 0    C: 71322 1    C: 41512 1    C: 16402 0    C: 16205 1    C: 01365 0    C: 04034 1
14,2230      C: 75054 1    C: 56052 0    C: 17030 1    C: 17635 1    C: 73321 0    C: 57603 0    C: 77010 0    C: 47623 0

14,2240      C: 11515 0    C: 01640 1    C: 63215 1    C: 52176 0    C: 02143 0    C: 26755 1    C: 12715 1    C: 31470 0
14,2250      C: 13401 0    C: 31222 1    C: 03157 1    C: 27504 0    C: 17402 1    C: 12312 1    C: 75552 1    C: 63657 0
14,2260      C: 05471 0    C: 06122 0    C: 16220 0    C: 16362 1    C: 04417 1    C: 32762 0    C: 06443 1    C: 12622 1
14,2270      C: 07766 1    C: 10237 0    C: 14154 1    C: 36154 1    C: 13200 1    C: 31653 0    C: 13244 1    C: 21036 1

14,2300      C: 01067 1    C: 23106 1    C: 10560 0    C: 27227 0    C: 10402 0    C: 00275 1    C: 65477 0    C: 77044 1
14,2310      C: 00153 0    C: 11212 0    C: 00077 1    C: 36275 1    C: 17777 0    C: 01417 1    C: 07674 0    C: 21771 0
14,2320      C: 03416 1    C: 07626 1    C: 62413 0    C: 57536 0    C: 07510 1    C: 06414 0    C: 01673 1    C: 06065 1
14,2330      C: 15735 1    C: 31531 1    C: 16745 0    C: 17555 1    C: 02615 1    C: 13716 0    C: 73010 1    C: 40311 0

14,2340      C: 15776 0    C: 34660 0    C: 00325 0    C: 26625 1    C: 07572 0    C: 05105 0    C: 15472 1    I: 45575 1
14,2350      C: 74515 0    I: 77775 1    C: 03537 0    C: 37254 0    C: 60721 0    I: 77534 0    C: 21573 0    I: 43225 0
14,2360      C: 01235 1    C: 03454 1    I: 77476 1       07257 0       35016 0       54003 0       00004 0       10155 1
14,2370         12373 0       12373 0       34755 1       64753 1       55644 1       05173 1    C: 02410 0       05353 1
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OCTAL LISTING FOR PARAGRAPH # 101,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2400      C: 47014 1   C: 76133 1   C: 02410 0   C: 30067 0      06037 0   I: 52014 0   C: 03470 1   C: 60451 1
14,2410         04674 0   C: 75551 1      35027 1      05105 0   C: 02424 1   C: 30067 0      05353 1   C: 07024 0
14,2420      C: 17000 1   C: 02424 1   C: 30067 0      15261 0      05504 0   C: 00214 0      32445 0      04616 1
14,2430      C: 20476 0      12434 1      12436 0      12426 1      04635 0   C: 61007 1      00004 0      04674 0

14,2440      C: 40153 1      04674 0   C: 40140 0      04635 0   C: 60777 0   C: 04077 0   I: 77620 0   C: 02746 0
14,2450      C: 35243 1   C: 26351 1   I: 70545 1   C: 01123 0   C: 16711 1   C: 01125 0   C: 16713 0   C: 01121 1
14,2460      C: 16707 0   I: 77776 1      32505 0      04616 1   C: 20476 0      16001 1      12470 1      12462 1
14,2470         06037 0   I: 72545 0   C: 02711 1   C: 15123 0   C: 02713 0   C: 15125 0   C: 02707 0   C: 15121 1

14,2500      C: 01243 0   I: 77624 1   C: 26422 1   I: 77650 1   C: 02746 0   C: 01531 1   I: 77620 0   C: 02745 0
14,2510      C: 37562 1   C: 33664 0   I: 77745 1   C: 03562 0   C: 34041 0   C: 27057 0   I: 61131 0   C: 00052 0
14,2520      C: 00000 1   C: 30543 0   I: 74375 0   C: 02723 0   C: 30001 0   I: 52372 0   C: 00001 0   I: 77656 1
14,2530      C: 26723 0   C: 00001 0   I: 57456 1   C: 16707 0   C: 30005 1   I: 77624 1   C: 30575 0   C: 14017 1

14,2540      C: 30604 0   C: 34023 1   C: 30570 0   I: 74375 0   C: 02723 0   C: 30007 0   I: 53445 1   C: 02715 0
14,2550      C: 26715 0   C: 02723 0   I: 53361 0   C: 30001 0   C: 00001 0   I: 57456 1   C: 26707 0   C: 00001 0
14,2560      I: 57456 1   C: 16723 0   C: 30003 1   I: 77624 1   C: 30575 0   C: 14023 0   C: 30604 0   C: 00017 1
14,2570      I: 77745 1   C: 30606 1   C: 00021 1   I: 77650 1   C: 02745 0   I: 70471 1   C: 00045 0   I: 43336 0

14,2600      C: 30610 0   I: 70546 1   I: 77616 0   C: 07760 1   C: 14473 1   C: 04000 0   C: 00000 1   C: 00343 0
14,2610      C: 21616 0      04645 1      55745 1      06037 0   I: 77624 1   C: 47537 0   I: 77624 1   C: 20030 0
14,2620      I: 77601 0   C: 00001 0   I: 71214 0   C: 01465 1   C: 24007 0   C: 26756 1   C: 02665 0   I: 63361 0
14,2630      C: 24005 1   C: 02701 0   I: 74370 0   C: 00344 1   C: 24005 1   I: 77655 1   I: 53505 1   C: 01734 0

14,2640      C: 02731 0   I: 66331 0   C: 00051 0   C: 00006 1   C: 00052 0   C: 00006 1   I: 52100 1   C: 30651 0
14,2650      C: 30766 0   I: 50373 0   C: 30347 1   C: 02731 0   I: 50025 0   C: 30765 0   C: 30646 0   I: 77754 1
14,2660      C: 00046 0   I: 52104 0   C: 30664 0   C: 30646 0   I: 50373 0   C: 47430 0   C: 02731 0   I: 50025 0
14,2670      C: 30765 0   C: 30661 0   I: 47773 1   C: 30347 1   C: 47430 0   I: 51025 1   C: 30763 0   C: 30661 0

14,2700      I: 45173 0   C: 30347 1   C: 30740 1   I: 77614 1   C: 01710 0   C: 30646 0   I: 45173 0   C: 47430 0
14,2710      C: 30740 1   I: 77614 1   C: 01710 0   C: 30661 0   I: 77614 1   C: 01605 0   C: 30733 0   I: 65120 1
14,2720      C: 02755 1   C: 02756 1   I: 47773 1   C: 30347 1   C: 47430 0   I: 43006 0   C: 01545 1   C: 30717 0
14,2730      I: 45345 1   I: 77644 1   C: 30661 0   I: 67130 1   C: 02755 1   C: 02756 1   I: 77650 1   C: 30661 0

14,2740      I: 51321 0   C: 02707 0   C: 00017 1   I: 77654 0   C: 30757 1   I: 75240 0   C: 30757 1   C: 00160 0
14,2750      I: 75240 0   C: 30757 1   C: 00162 1   I: 43040 1   C: 30757 1   C: 01630 0   C: 00052 0   I: 77614 1
14,2760      C: 01430 1   C: 00052 0   C: 05110 1   C: 35052 0   C: 05110 1   C: 35052 0   I: 77414 0   C: 01745 0
14,2770      C: 30772 0      03013 0   I: 73150 1   C: 02755 1   C: 02756 1   I: 47775 1   C: 02731 0   C: 30347 1
```

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OCTAL LISTING FOR PARAGRAPH # 102,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3000     I: 47715 1     C: 02731 0     C: 47430 0     I: 77625 0     I: 66044 1     C: 31011 0     C: 02756 1     I: 77734 1
14,3010     C: 02755 1     I: 77776 1        25745 0        31745 0        04622 0     I: 77620 0     C: 02746 0     I: 77776 1
14,3020        05353 1     C: 04024 0        34761 0        04616 1     C: 20623 1        06001 0        03030 1        03053 1
14,3030        06037 0     I: 43234 0     C: 21573 0     C: 31163 1     I: 77624 1     C: 30506 1     I: 77776 1        04616 1

14,3040     C: 30611 1        03043 0        03053 1        05567 0     C: 00405 0        35006 1        04616 1     C: 20476 0
14,3050        06001 0        03053 1        03022 1        34755 1        55757 1        06037 0     I: 77776 1        05353 1
14,3060     C: 04024 0        06037 0     I: 77624 1     C: 31670 1     I: 77776 1        04616 1     C: 16000 0        04616 1
14,3070     C: 17712 0        05711 0        11757 1        13075 1        03145 1        06037 0     I: 77775 1     C: 02715 0

14,3100     C: 02767 0     I: 77776 1        05353 1     C: 04024 0        06037 0     I: 45145 0     C: 03562 0     C: 32472 1
14,3110     I: 53521 1     C: 01734 0     C: 26715 0     C: 03554 0     I: 53521 1     C: 01734 0     C: 26707 0     C: 02761 0
14,3120     C: 24007 0     C: 02767 0     C: 34015 1     C: 31256 1     I: 45014 0     C: 00354 0     C: 31134 0     C: 47441 0
14,3130     I: 77624 1     C: 31224 1     I: 77614 1     C: 01273 0     I: 77776 1        35751 1        04616 1     C: 20623 1

14,3140        06001 0        03022 1        06037 0     I: 77650 1     C: 02746 0        06037 0     I: 77775 1     C: 02715 0
14,3150     C: 02761 0     I: 45145 0     C: 03562 0     C: 32472 1     C: 03554 0     I: 77731 1     C: 02760 1     C: 00001 0
14,3160     I: 77650 1     C: 31056 0     C: 00002 0     C: 06240 1     I: 45020 1     C: 02746 0     C: 47247 0     I: 43014 0
14,3170     C: 01260 1     C: 01662 1     I: 77776 1        33223 1        04616 1     C: 20451 0        33255 0        04616 1

14,3200     C: 17323 0        04616 1     C: 17716 1        05711 0        05353 1     C: 04024 0        06037 0     I: 75160 1
14,3210     C: 03606 1     C: 01733 1     I: 77624 1     C: 31377 0     I: 43014 0     C: 01273 0     C: 01462 0     I: 77624 1
14,3220     C: 31602 1     I: 77650 1     C: 31134 0     C: 04024 0     I: 77620 0     C: 02745 0     I: 77624 1     C: 47247 0
14,3230     I: 77776 1        33254 1        04616 1     C: 20476 0        06001 0        03237 1        03251 1        05353 1

14,3240     C: 00214 0        33255 0        04616 1     C: 17323 0        04616 1     C: 17716 1        05711 0        05353 1
14,3250     C: 04024 0        06037 0     I: 77650 1     C: 02745 0     C: 01535 0     C: 02737 0     I: 43020 1     C: 02745 0
14,3260     C: 00074 1     I: 77760 0     C: 02706 1     I: 47773 1     C: 00001 0     C: 00007 0     I: 65552 0     C: 00025 0
14,3270     I: 43014 0     C: 00354 0     C: 31302 1     C: 00174 0     I: 71360 1     C: 00006 1     C: 00025 0     C: 00023 0

14,3300     I: 77650 1     C: 31263 1     I: 45345 1     C: 00025 0     C: 00023 0     I: 47046 0     C: 21612 1     C: 01046 1
14,3310     I: 77414 0     C: 00074 1        33326 0        04616 1     C: 20476 0        16001 1        03323 0        06037 0
14,3320     I: 52014 0     C: 00274 0     C: 02745 0        06037 0     I: 77650 1     C: 02745 0     C: 01405 1     I: 77624 1
14,3330     C: 31617 0     I: 66234 1     C: 31413 0     C: 00051 0     C: 00001 0     I: 40370 1     C: 00003 1     C: 00005 1

14,3340     I: 70543 1     C: 00325 0     I: 70523 1     C: 00005 1     I: 51425 0     I: 45206 1     C: 31412 1     I: 71240 1
14,3350     C: 31366 0     I: 51025 1     C: 31413 0     C: 31366 0     I: 77776 1        05353 1     C: 04024 0        06037 0
14,3360     I: 77624 1     C: 31565 0     I: 77624 1     C: 31602 1     I: 77650 1     C: 31370 1     I: 77700 0     C: 31340 1
14,3370     I: 75160 1     C: 02642 0     C: 01733 1     I: 77624 1     C: 31377 0     I: 77650 1     C: 32161 0     I: 77773 1
```

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OCTAL LISTING FOR PARAGRAPH # 103, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3400     C: 00001 0     C: 10001 1     I: 77773 1     C: 00007 0     C: 10007 1     I: 77773 1     C: 00015 0     C: 10015 1
14,3410     I: 77616 0     C: 00056 1     C: 37722 1        00004 0        30032 0        50120 1        54001 1        30033 1
14,3420        50120 1        54002 1        30034 0        50120 1        54003 0        00003 1        06061 0        04616 1
14,3430     C: 33652 0        34761 0        04616 1     C: 20623 1        06001 0        13461 0        05353 1     C: 04024 0

14,3440        34755 1        54321 0        54322 0        54323 1        35010 0        04616 1     C: 20446 0        33564 0
14,3450        04616 1     C: 20446 0        06037 0     I: 77624 1     C: 31565 0     I: 77776 1        05353 1     C: 04024 0
14,3460        13431 0        05353 1     C: 00014 1        06037 0     I: 77624 1     C: 31602 1     I: 40331 1     C: 02760 1
14,3470     C: 00000 1     C: 00001 0     I: 77776 1        05353 1     C: 04024 0        04616 1     C: 16000 0        04616 1

14,3500     C: 17712 0        05711 0        11757 1        13511 0        06037 0     I: 77775 1     C: 02715 0     C: 02761 0
14,3510     I: 77776 1        05353 1     C: 04024 0        11757 1        13530 0        05353 1     C: 04024 0        06037 0
14,3520     I: 45145 0     C: 03562 0     C: 32472 1     C: 03554 0     I: 77776 1        34753 1        55757 1        13473 0
14,3530        05353 1     C: 04024 0        06037 0     I: 45145 0     C: 03562 0     C: 32472 1     C: 24015 0     C: 03554 0

14,3540     C: 24007 0     C: 02761 0     C: 26707 0     C: 02767 0     C: 36715 1     C: 31256 1     I: 77414 0     C: 00314 1
14,3550     C: 31552 1        03431 1     I: 77624 1     C: 47441 0     I: 75160 1     C: 02664 1     C: 01733 1     I: 77624 1
14,3560     C: 31377 0     I: 77414 0     C: 01462 0        06001 0     C: 12200 0     I: 77776 1        04616 1     C: 17000 1
14,3570        04616 1     C: 17716 1        05711 0        04616 1     C: 17210 1        04616 1     C: 17716 1        05711 0

14,3600        06037 0     I: 77616 0     I: 77776 1        30025 0        55075 0        44755 0        54037 1        54040 1
14,3610        54041 0        06037 0     I: 77775 1     C: 24007 0     C: 01472 1     I: 43414 1     C: 01060 0     I: 45020 1
14,3620     C: 02746 0     C: 47537 0     I: 77624 1     C: 20030 0     I: 66370 0     C: 00022 1     C: 00051 0     C: 00006 1
14,3630     I: 61373 1     C: 02707 0     C: 01734 0     I: 77656 1     C: 06707 1     I: 77700 0     C: 31630 0     I: 75160 1

14,3640     C: 03606 1     C: 02642 0     I: 77624 1     C: 31377 0     I: 77624 1     C: 47353 1     I: 77650 1     C: 02746 0
14,3650     I: 77620 0     C: 02746 0     C: 34041 0     C: 27100 0     I: 53575 0     C: 00001 0     C: 27607 0     C: 00007 0
14,3660     I: 53435 0     C: 00001 0     C: 27615 0     C: 03607 0     I: 53435 0     C: 03615 0     C: 37623 1     C: 02746 0
14,3670     I: 77420 1     C: 03665 1        51757 0        31755 1        00006 1        73771 1        64744 1        54735 1

14,3700        33772 0        04616 1     C: 20476 0        06001 0        13706 1        13700 1        05516 0     C: 00124 0
14,3710        30735 0        77744 0        00006 1        74743 1        54001 1        00006 1        63734 1        65660 1
14,3720        00006 1        13734 0        35016 0        54003 0        50001 0        31403 1        54001 1        35014 1
14,3730        54003 0        34737 0        56001 0        13744 1        33773 1        04616 1     C: 20475 0        06001 0

14,3740        13742 1        13734 0        00006 1        31350 0        50120 1        52011 0        06037 0     I: 77624 1
14,3750     C: 10536 0     I: 45034 1     C: 21573 0     C: 32472 1     I: 53521 1     C: 01734 0     C: 03773 1     I: 77776 1
14,3760        04616 1     C: 54123 0        37744 1        70735 1        00006 1        13700 1        06037 0     I: 77650 1
14,3770     C: 03665 1     C: 05253 0     C: 00306 1     C: 01527 0     C: 03774 0     C: 03775 1   CKSM 56616 0           @
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OCTAL LISTING FOR PARAGRAPH # 104, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
15,2000      I: 77773 1   C: 00001 0   C: 00767 1   I: 47133 0   C: 00002 0   C: 21576 0   C: 00031 0   I: 77654 0
15,2010      C: 16171 1   I: 71406 0   I: 73525 1   I: 65361 0   C: 00023 0   I: 52361 1   C: 00015 0   I: 47256 0
15,2020      C: 03765 0   I: 41456 0   I: 47133 0   C: 00004 0   C: 21576 0   C: 00033 1   I: 43225 0   C: 00031 0
15,2030      C: 32047 0   I: 77605 1   C: 32466 1   C: 00033 1   I: 74356 1   I: 65372 1   C: 00033 1   I: 74346 0

15,2040      C: 03765 0   I: 53372 1   I: 45056 0   C: 47664 0   C: 34031 1   C: 16276 0   C: 37777 1   C: 37775 0
15,2050         04616 1   C: 11254 1      34750 1      70076 1      10000 0      02060 0      34752 0      02061 1
15,2060         34753 1      55145 1      34753 1      04616 1   C: 20713 0      06001 0      12073 0      02062 1
15,2070         05353 1   C: 00014 1      05155 0      31145 0      76245 0      50000 1      02077 0      12105 0

15,2100         12153 0      12110 1      06037 0   I: 77650 1   C: 32164 0      00006 1      31401 0      12112 0
15,2110         00006 1      34755 1      53046 0      32170 0      04616 1   C: 20476 0      06001 0      02121 1
15,2120         02113 0      53046 0      00006 1      62125 0      12127 0      00006 1      30025 0      53775 1
15,2130         31145 0      74752 1      10000 0      02137 0      06037 0   I: 77650 1   C: 32220 0      06037 0

15,2140      I: 45145 0   C: 02775 0   C: 31650 0   I: 77624 1   C: 31617 0   I: 77776 1      35010 0      04616 1
15,2150      C: 20476 0      06001 0      12171 0      06037 0   I: 77650 1   C: 32143 0      06037 0   I: 77624 1
15,2160      C: 31327 0   I: 43014 0   C: 01462 0   C: 01273 0   I: 77624 1   C: 31015 1   I: 77776 1      06001 0
15,2170      C: 01442 1      32217 1      04616 1   C: 20623 1      16001 1      12156 0      06037 0   I: 64375 1

15,2200      C: 03607 0   C: 01734 0   I: 77656 1   C: 26665 0   C: 03615 0   I: 53521 1   C: 01734 0   C: 26673 1
15,2210      C: 03623 0   I: 53521 1   C: 01734 0   C: 36701 1   C: 31164 0   I: 77650 1   C: 32166 1   C: 00013 0
15,2220      I: 43014 0   C: 01463 1   C: 00662 0   I: 77201 1   C: 00001 0   C: 02023 1   I: 41525 0   C: 02775 0
15,2230      C: 36401 1   C: 55716 1   I: 77742 0   C: 16032 1   C: 02775 0   I: 77624 1   C: 30446 1   I: 53575 0

15,2240      C: 02032 1   C: 37607 1   C: 11013 0   I: 77650 1   C: 32143 0      40077 0      74737 1      10000 0
15,2250         12455 0      32463 1      04616 1   C: 20476 0      06001 0      12257 1      12245 1      47744 0
15,2260         70735 1      00006 1      76242 1      56001 0      51757 0      55755 0      50120 1      54046 1
15,2270         00006 1      12455 0      40000 0      62561 1      00006 1      62455 1      06037 0   I: 64373 1

15,2300      C: 30347 1   C: 01734 0   I: 45056 0   C: 47646 0   C: 02731 0   I: 77776 1      34753 1      55242 0
15,2310         35016 0      54003 0      51242 1      31403 1      54001 1      35014 1      54003 0      34737 0
15,2320         56001 0      55745 1      50120 1      52011 0      06037 0   I: 77624 1   C: 10536 0   I: 50375 0
15,2330      C: 02731 0   C: 03765 0   I: 65552 0   C: 00031 0   I: 51025 1   C: 32466 1   C: 32420 0   I: 45345 1

15,2340      C: 00031 0   C: 32470 0   I: 71240 1   C: 32413 0   C: 00031 0   I: 42405 0   C: 25764 0   C: 24031 0
15,2350      C: 03765 0   I: 53435 0   C: 24005 1   I: 47206 0   C: 03765 0   I: 77676 0   I: 63256 0   C: 03765 0
15,2360      I: 53435 0   C: 02731 0   I: 50206 0   C: 00001 0   I: 65552 0   C: 24033 1   I: 77641 1   I: 71244 0
15,2370      C: 32375 1   C: 32047 0   I: 77625 0   C: 00033 1   C: 00033 1   I: 70535 0   C: 02746 0   I: 41415 1
```

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OCTAL LISTING FOR PARAGRAPH # 105,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2400     C: 00033 1   I: 77634 0   C: 21614 1   C: 15237 0   C: 00031 0   I: 77615 0   I: 77634 0   C: 21614 1
15,2410     C: 01241 1   I: 77776 1      12437 1   I: 77776 1      34755 1      55236 0      55240 1      12437 1
15,2420     I: 77776 1      25242 1      71242 0      64757 0      00006 1      62427 1      12310 0      05567 0
15,2430     C: 00404 1      35006 1      04616 1   C: 20476 0      16001 1      12455 0      12245 1      32464 0

15,2440        04616 1   C: 20476 0      16001 1      12445 1      12245 1      34757 0      71242 0      00006 1
15,2450        74745 1      47744 0      70735 1      60001 0      54735 1      04616 1   C: 16000 0      04616 1
15,2460     C: 17712 0      05711 0      13054 1   C: 00306 1   C: 01517 0   C: 02525 1   C: 12525 0   C: 00026 0
15,2470     C: 30131 1   C: 12525 0   C: 27562 0   C: 24007 0   C: 02707 0   I: 77420 1   C: 02736 1      47744 0

15,2500        70735 1      00006 1      76242 1      56001 0      51757 0      55755 0      10000 0      12523 0
15,2510        32562 1      04616 1   C: 20476 0      02510 1      02516 1      02510 1      06037 0   I: 53575 0
15,2520     C: 02707 0   I: 77650 1   C: 02736 1      40000 0      62561 1      00006 1      62537 1      51757 0
15,2530        31755 1      50120 1      54046 1      06037 0   I: 52173 0   C: 30347 1   C: 02736 1      06037 0

15,2540     I: 45145 0   C: 03562 0   C: 30506 1   I: 77340 0   C: 02757 0   C: 02707 0   C: 24001 0   C: 02715 0
15,2550     C: 26707 0   C: 00001 0   C: 02715 0   I: 70143 0   C: 02756 1   C: 00154 1   I: 52173 0   C: 02343 1
15,2560     C: 02736 1   C: 00343 0   C: 01530 0      32772 1      54321 0      40000 0      54322 0      32773 0
15,2570        54323 1      06037 0   I: 45014 0   C: 01662 1   C: 32670 1   I: 66370 0   C: 00022 1   C: 00051 0

15,2600     C: 00006 1   I: 77744 0   C: 00050 1   I: 45173 0   C: 54000 0   C: 47673 0   C: 06707 1   I: 77775 1
15,2610     C: 02731 0   I: 73744 1   C: 00047 1   C: 75040 1   I: 71152 1   C: 00047 1   I: 63047 1   C: 54000 0
15,2620     C: 00002 0   C: 06665 1   I: 45100 1   C: 32603 0   C: 47353 1   I: 74575 0   C: 02715 0   C: 36723 1
15,2630     C: 32670 1   I: 74575 0   C: 02715 0   I: 53455 0   C: 02723 0   C: 02761 0   I: 77641 1   C: 02231 0

15,2640     I: 65552 0   C: 01046 1   I: 77776 1      05516 0   C: 00014 1      32771 1      04616 1   C: 20476 0
15,2650        05001 0      12654 0      05504 0   C: 00014 1      05353 1   C: 04024 0      06037 0   I: 77775 1
15,2660     C: 02761 0   C: 02231 0   I: 77776 1      34751 0      70074 0      10000 0      12563 1      13553 0
15,2670     I: 77220 1   C: 02745 0   C: 24007 0   C: 02707 0   I: 77776 1      05353 1   C: 04024 0      04616 1

15,2700     C: 17000 1      04616 1   C: 17716 1      05711 0      04616 1   C: 17210 1      04616 1   C: 17716 1
15,2710        05711 0      32770 0      55736 0      37716 0      55075 0      04616 1   C: 15701 0      05353 1
15,2720     C: 04024 0      04616 1   C: 77544 1      06037 0   I: 77776 1      35000 1      05173 1   C: 02731 0
15,2730        05155 0      04674 0   C: 77544 1      35023 0      05105 0   C: 02740 0   C: 32065 0      05261 1

15,2740        04616 1   C: 15263 1      25736 1      06037 0   I: 53375 0   C: 00325 0   C: 02707 0   C: 02707 0
15,2750     I: 50135 0   C: 02737 0   C: 32724 1   I: 53575 0   C: 02707 0   C: 36731 1   C: 47537 0   I: 77624 1
15,2760     C: 47671 1   C: 02715 0   I: 77776 1      05353 1   C: 04024 0      06037 0   I: 77650 1   C: 02745 0
15,2770     C: 77753 0   C: 01404 0   C: 07357 1   C: 06211 0   I: 71220 1   C: 02745 0   C: 00322 1   I: 65325 0
```

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OCTAL LISTING FOR PARAGRAPH # 104, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3000     C: 00324 1    C: 00323 0    I: 77666 1    C: 24767 1    C: 24005 1    I: 77624 1    C: 47664 0    C: 26707 0
15,3010     C: 24003 1    I: 77624 1    C: 47673 0    C: 36715 1    C: 47537 0    I: 77624 1    C: 20030 0    I: 77775 1
15,3020     C: 02665 0    C: 24007 0    C: 02673 1    C: 34015 1    C: 47441 0    I: 77624 1    C: 47247 0    I: 77776 1
15,3030        04616 1    C: 17210 1       04616 1    C: 17716 1       05711 0       33044 1       04616 1    C: 17323 0

15,3040        04616 1    C: 17716 1       05711 0       12765 0    C: 02737 0       34755 1       13050 0       34753 1
15,3050        55757 1       05353 1    C: 04024 0       12245 1       31757 0       00006 1       13067 1       05353 1
15,3060     C: 04024 0       06037 0    I: 45145 0    C: 03562 0    C: 32472 1    C: 36731 1    C: 33101 1       06037 0
15,3070     I: 77775 1    C: 02715 0    C: 02761 0    I: 45145 0    C: 03562 0    C: 32472 1    C: 02723 0    I: 77776 1

15,3100        13047 0    I: 77131 1    C: 00052 0    C: 00006 1    C: 00014 1    I: 64373 1    C: 75040 1    C: 03607 0
15,3110     I: 77656 1    C: 12723 1    I: 77773 1    C: 75002 1    C: 10023 1    I: 43104 0    C: 33105 0    C: 04315 1
15,3120     C: 33126 1    I: 77624 1    C: 31256 1    I: 77614 1    C: 00354 0    C: 33206 0    I: 77624 1    C: 47441 0
15,3130     I: 77624 1    C: 47247 0    I: 77776 1       34752 0       70104 0       10000 0       13145 0       33313 0

15,3140        04616 1    C: 20476 0       06001 0       13145 0       13207 0       06037 0    I: 40175 0    C: 02740 0
15,3150     C: 33151 1    C: 02750 1    I: 40141 1    C: 30610 0    C: 33254 1    I: 52131 0    C: 02746 0    C: 33161 1
15,3160     C: 33027 1    I: 77776 1       05353 1    C: 04024 0       06037 0    I: 75160 1    C: 03606 1    C: 01733 1
15,3170     I: 45014 0    C: 01462 0    C: 31377 0    I: 77776 1       11145 1       13177 1       13207 0       34752 0

15,3200        70104 0       10000 0       13561 1       06037 0    I: 77624 1    C: 33506 1    I: 77776 1       35751 1
15,3210        04616 1    C: 20623 1       16001 1       13561 1       44752 1       61145 0       00006 1       13221 1
15,3220        16001 1       05353 1    C: 04024 0       06037 0    I: 45175 0    C: 02231 0    C: 47661 0    I: 43105 1
15,3230     C: 01734 0    C: 01463 1    I: 51515 1    C: 02023 1    I: 45561 1    C: 75745 0    I: 47014 1    C: 00662 0

15,3240     C: 21573 0    I: 77624 1    C: 30446 1    C: 01221 1    I: 65352 0    C: 01243 0    I: 77606 1    C: 35235 0
15,3250     C: 51670 1    C: 02023 1    I: 77776 1       16001 1    I: 75160 1    C: 02664 1    C: 02642 0    I: 77624 1
15,3260     C: 31377 0    I: 77624 1    C: 47537 0    I: 77624 1    C: 20030 0    I: 77624 1    C: 47353 1    I: 77414 0
15,3270     C: 04355 0    C: 33303 1       35010 0       04616 1    C: 20476 0       06001 0       13300 0       13272 1

15,3300        05353 1    C: 04024 0       06037 0    I: 77624 1    C: 31565 0    I: 77624 1    C: 31602 1    I: 77624 1
15,3310     C: 32774 1    I: 77650 1    C: 33161 1    C: 01535 0       04616 1    C: 33652 0       36245 1       55145 1
15,3320        34753 1       04616 1    C: 20713 0       06001 0       13331 1       13320 1       05353 1    C: 00014 1
15,3330        05155 0       31145 0       76245 0       50000 1       13335 0       13350 0       13411 1       13320 1

15,3340        06037 0    I: 75160 1    C: 01733 1    C: 03606 1    I: 77624 1    C: 31377 0    I: 77650 1    C: 33410 1
15,3350        06037 0    I: 77745 1    C: 03442 0    C: 01046 1    I: 77776 1       32170 0       04616 1    C: 20476 0
15,3360        16001 1       13363 0       13355 0       06037 0    I: 65234 1    C: 21573 0    C: 01046 1    I: 65254 1
15,3370     C: 33400 0    I: 51025 1    C: 01046 1    C: 33400 0    I: 45545 1    C: 74335 1    C: 36775 1    C: 33402 1
```

```
OCTAL LISTING FOR PARAGRAPH # 167,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3400     I: 45545 1   C: 75002 1   C: 34041 0   C: 27057 0   I: 53575 0   C: 00001 0   C: 37607 1   C: 11013 0
15,3410     I: 77776 1      34755 1      55145 1      55146 1      34737 0      70077 0      10000 0      34745 0
15,3420        27146 1      34753 1      70102 0      10000 0      34750 1      27146 1      34750 1      55144 0
15,3430        33651 0      04616 1   C: 20476 0      16001 1      13436 1      13430 1      34737 0      70077 0

15,3440        10000 0      13541 0      34753 1      70102 0      10000 0      13545 1      34752 0      71145 1
15,3450        10000 0      13545 1      05567 0   C: 00701 1      35006 1      04616 1   C: 20476 0      16001 1
15,3460        13430 1      13430 1   I: 40220 0   C: 02746 0   C: 00001 0   I: 77634 0   C: 21573 0   C: 27562 0
15,3470     C: 02723 0   I: 41525 0   C: 03562 0   I: 77624 1   C: 55716 1   C: 26723 0   C: 02731 0   I: 65201 1

15,3500     C: 00001 0   C: 03562 0   I: 45006 0   C: 55716 1   C: 36731 1   C: 02746 0   I: 45020 1   C: 02746 0
15,3510     C: 47537 0   I: 40234 0   C: 21573 0   C: 00001 0   C: 37562 1   C: 20030 0   I: 61375 1   C: 02673 1
15,3520     C: 01734 0   I: 65256 0   C: 03562 0   I: 45006 0   C: 51670 1   C: 26237 0   C: 02701 0   I: 53505 1
15,3530     C: 01734 0   I: 41525 0   C: 03562 0   I: 77624 1   C: 51670 1   C: 02245 0   I: 77614 1   C: 03036 1

15,3540     C: 02746 0      06037 0   I: 77624 1   C: 33506 1   I: 77776 1      05504 0   C: 00205 0      34753 1
15,3550        71145 1      10000 0      12563 1      05353 1   C: 04024 0      34753 1      70102 0      10000 0
15,3560        13575 1      05353 1   C: 04024 0      05516 0   C: 00205 0      36245 1      71145 1      50000 1
15,3570        13571 0      13575 1      13616 1      13634 1      13635 0      06037 0   I: 77775 1   C: 02237 0

15,3600     C: 26723 0   C: 02245 0   C: 36731 1   C: 47537 0   I: 77624 1   C: 20030 0   I: 77775 1   C: 02673 1
15,3610     C: 26741 0   C: 02701 0   C: 36767 1   C: 33462 1   I: 77650 1   C: 33101 1      06037 0   I: 53575 0
15,3620     C: 02023 1   C: 26723 0   C: 02245 0   C: 36731 1   C: 47537 0   I: 77624 1   C: 20030 0   I: 45175 0
15,3630     C: 02231 0   C: 47661 0   I: 77650 1   C: 33610 0      13045 1      06037 0   I: 53575 0   C: 02023 1

15,3640     C: 02723 0   C: 26731 0   C: 02231 0   I: 77624 1   C: 47661 0   C: 36761 1   C: 33462 1   I: 77776 1
15,3650        13047 0   C: 01206 1      41302 0      74743 1      10000 0      13661 1      05567 0   C: 00210 1
15,3660        06001 0      05504 0   C: 00007 0      04631 1   I: 54201 0   C: 00001 0   C: 20617 0   I: 56371 1
15,3670     C: 01707 0   C: 12024 1   C: 00031 0   I: 77170 1   C: 00000 1   C: 00000 1   I: 77614 1   C: 00274 0

15,3700     I: 77745 1   C: 12004 0   C: 00027 1   I: 40745 0   C: 00031 0   C: 12050 1   I: 42661 0   C: 20211 1
15,3710     C: 12044 0   I: 40756 1   C: 12044 1   I: 62015 1   C: 00027 1   C: 77771 0   C: 00027 1   I: 77614 1
15,3720     C: 00054 0   C: 33703 0   I: 40745 0   C: 00031 0   C: 65747 0   I: 42661 0   C: 20206 1   C: 65741 0
15,3730     I: 77625 0   C: 00027 1   C: 10021 0   I: 63135 0   C: 00050 1   C: 77775 1   I: 53015 0   C: 12026 0

15,3740     C: 33770 1   I: 77644 1   C: 33700 0   I: 45345 1   C: 00021 1   C: 00025 0   I: 65356 1   C: 00021 1
15,3750     I: 65356 1   C: 00021 1   I: 55546 0   I: 53521 1   C: 12002 0   C: 02723 0   I: 65345 0   C: 12004 0
15,3760     C: 00023 0   I: 65356 1   C: 00023 0   I: 55546 0   I: 53521 1   C: 12002 0   C: 02715 0   I: 77616 0
15,3770     I: 77745 1   C: 12004 0   C: 00027 1   I: 77650 1   C: 33722 0   I: 77616 0   C: 03776 1 CKSM 47112 0
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OCTAL LISTING FOR PARAGRAPH # 110, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2000      00006 1      00031 0      40000 0      74355 1      00006 1      12157 1      41303 1      74746 1
16,2010      10000 0      12206 0      41273 1      74751 1      27273 1      12163 0      34742 1      00006 1
16,2020      02030 0      10000 0      12157 1      00002 0      22016 0      00006 1      22012 1      31273 0
16,2030      74737 1      10000 0      12041 1      34737 0      27273 1      37715 0      05072 1   C: 02447 1

16,2040   C: 40106 1      02000 0      30111 0      74751 1      00006 1      12157 1      04674 0   C: 40153 1
16,2050      34755 1      55524 1      55525 0      55526 0      55421 0      55422 0      55423 1      55430 0
16,2060      55431 1      55432 1      55537 0      55540 0      55541 1      55542 1      55424 0      55425 1
16,2070      55501 0      55503 1      55545 0      55546 0      55510 0      55512 1      55502 0      55631 0

16,2100      55633 1      55632 0      55634 0      55460 0      55461 1      55767 1      55770 1      55771 0
16,2110      42202 1      71273 1      55273 1      00006 1      30033 1      53441 0      30034 0      55442 0
16,2120      41273 1      74740 1      27273 1      34751 0      55535 1      55536 1      34733 1      54031 1
16,2130      55466 0      55470 1      34755 1      55467 1      55471 0      55465 0      55472 0      55473 1

16,2140      55474 0      44273 1      55757 1      34752 0      55433 0      55434 1      55435 0      00006 1
16,2150      32205 1      53275 1      37727 1      54030 0      15270 0   C: 02024 0   C: 34106 1      04674 0
16,2160   C: 36626 0      04674 0   C: 35446 1      00006 1      32156 1      53275 1      34755 1      55472 0
16,2170      55473 1      55474 0      00006 1      01005 0      00006 1      01006 0      42203 0      00006 1

16,2200      03012 1      12152 1   C: 03021 1   C: 07400 1   C: 02213 0   C: 34106 1      00006 1      32212 1
16,2210      52006 0   C: 02226 0   C: 40106 1      37727 1      26030 0      22016 0      00006 1      22012 1
16,2220      11757 1      05634 0   C: 02000 0      02000 0      30032 0      55750 0      30033 1      55751 1
16,2230      30034 0      55752 1      31635 0      00006 1      21640 0      02256 1      55635 1      31636 0

16,2240      00006 1      21641 1      02256 1      55636 1      31637 1      00006 1      21642 1      02256 1
16,2250      55637 0      00006 1      27445 1      00006 1      27457 1      12647 1      10000 0      64753 1
16,2260      00002 0      40000 0      00002 0      00006 1      71741 0      21427 0      00006 1      31427 1
16,2270      53744 0      11426 1      12274 0      12304 0      62315 1      00006 1      62304 1      11426 1

16,2300      34733 1      00002 0      44733 0      00002 0      53427 0      00006 1      11750 0      00002 0
16,2310      54007 1      00002 0      50000 1      44734 1      00002 0   C: 77147 0      31737 0      00006 1
16,2320      71530 1      55745 1      31750 1      54001 1      00006 1      21440 1      23440 0      55737 1
16,2330      33620 0      55750 0      41745 1      00006 1      74736 0      27430 0      31746 0      61545 1

16,2340      00006 1      77736 0      27431 1      31747 1      61546 1      00006 1      77736 0      27432 1
16,2350      31751 0      54001 1      00006 1      21441 0      23441 1      55740 1      00006 1      71414 0
16,2360      61737 0      53427 0      02266 1      00006 1      61421 1      27430 0      02310 1      55430 0
16,2370      00006 1      31744 1      21447 0      41454 1      00006 1      73620 1      21447 0      31752 0
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OCTAL LISTING FOR PARAGRAPH # 111,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2400       54001 1       00006 1       21442 0       55741 0       23442 1       31415 0       00006 1       71740 1
16,2410       53427 0       31417 1       02263 1       00006 1       61422 1       27431 1       02310 1       55431 1
16,2420       00006 1       31744 1       21451 1       41455 0       00006 1       73620 1       21451 1       31416 0
16,2430       00006 1       71740 1       53427 0       31420 0       02263 1       00006 1       61423 0       27432 1

16,2440       02310 1       55432 1       00006 1       31744 1       21453 0       41456 0       00006 1       73620 1
16,2450       21453 0       30111 0       74737 1       00006 1       12462 1       00006 1       31405 1       53751 1
16,2460       31403 1       12466 0       00006 1       31410 0       53751 1       31406 1       55752 1       11430 0
16,2470       12472 0       12507 0       61752 0       00006 1       62507 1       22007 0       23430 1       34755 1

16,2500       00006 1       11433 0       27421 0       02310 1       55421 0       31750 1       55433 0       25433 1
16,2510       31745 0       27421 0       02310 1       55421 0       11431 1       12517 1       12544 1       61752 0
16,2520       00006 1       62544 0       22007 0       23431 0       34755 1       00006 1       11434 1       55737 1
16,2530       27422 0       02310 1       55422 0       31750 1       57434 0       61751 0       57737 0       00006 1

16,2540       74756 0       00006 1       11737 1       27537 0       25434 0       31746 0       61545 1       27422 0
16,2550       02310 1       55422 0       11432 1       12555 1       12602 0       61752 0       00006 1       62502 1
16,2560       22007 0       23432 0       34755 1       00006 1       11435 0       55740 1       27423 1       02310 1
16,2570       55423 1       31750 1       57435 1       61751 0       57740 0       00006 1       74756 0       00006 1

16,2600       11740 1       27541 1       25435 1       31747 1       61546 1       27423 1       02310 1       55423 1
16,2610       40111 1       74766 0       10000 0       12624 1       55424 0       55425 1       55545 0       55546 0
16,2620       55537 0       55541 1       12667 0    C: 00074 1       31510 1       00006 1       74766 0       21540 0
16,2630       31537 1       55424 0       00006 1       73616 1       55545 0       31512 0       00006 1       74766 0

16,2640       21542 1       31541 0       55425 1       00006 1       73616 1       55546 0       12667 0       34747 1
16,2650       71273 1       10000 0       03736 0       52011 0       53754 1       32666 0       56017 1       22012 1
16,2660       53756 0       32665 0       52016 1       53760 0       15275 0    C: 02667 1       13641 0       11632 0
16,2670       12710 1       12714 0       11634 0       12712 0       12724 0       00006 1       27767 1       00006 1

16,2700       27770 1       00006 1       27771 0       34740 0       71273 1       00006 1       12734 1       02740 0
16,2710       55632 0       12672 1       55634 0       12675 0       55501 0       55510 0       45007 1       00006 1
16,2720       03012 1       34735 1       55632 0       12672 1       55503 1       55512 1       45020 1       00006 1
16,2730       03012 1       34735 1       55634 0       12675 0       41273 1       74740 1       27273 1       13624 0

16,2740       00006 1       00031 0       40000 0       73613 1       00006 1       13014 0       00006 1       74745 1
16,2750       50000 1       33572 1       55744 0       36242 0       03551 0       46242 1       61743 0       00006 1
16,2760       13013 1       44756 0       61744 1       00006 1       63002 0       41743 1       64751 0       00006 1
16,2770       63013 0       05567 0    C: 02001 1       34753 1       23273 0       00006 1       06001 0       55273 1
```

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OCTAL LISTING FOR PARAGRAPH # 112,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3000      34755 1      13014 0      34753 1      23273 0      00006 1      06001 0      55273 1      74753 0
16,3010      64751 0      27744 0      12753 0      31741 1      55472 0      34737 0      00006 1      02031 1
16,3020      00006 1      13027 0      30111 0      74743 1      10000 0      13463 1      13071 0      34735 1
16,3030      70111 1      00006 1      13071 0      34755 1      55464 1      30032 0      55635 1      11460 0

16,3040      13054 1      34751 0      00006 1      02031 1      00006 1      13064 1      34750 1      00006 1
16,3050      02031 1      00006 1      13062 1      13442 1      00006 1      00031 0      40000 0      75751 0
16,3060      55460 0      13442 1      44363 1      13065 0      34363 0      55524 1      34753 1      55460 0
16,3070      13350 0      00006 1      00031 0      55443 1      74735 0      00006 1      13223 0      34740 0

16,3100      70111 1      00006 1      13463 1      34743 0      71273 1      00006 1      13120 0      34737 0
16,3110      00006 1      02031 1      00006 1      13220 0      45014 0      71273 1      55273 1      13220 0
16,3120      31273 0      74742 0      00006 1      13125 0      13220 0      31273 0      74741 0      00006 1
16,3130      13136 1      13220 0   C: 00001 0   C: 00050 1   C: 74777 0   C: 00056 1      44740 1      00004 0

16,3140      70111 1      54111 1      34737 0      00006 1      02031 1      00006 1      13152 0      30032 0
16,3150      55635 1      03154 1      04674 0   C: 40153 1      00003 1      13463 1      55464 1      34740 0
16,3160      26111 1      34755 1      55446 1      55447 0      55450 0      55451 1      55452 1      55453 0
16,3170      55454 1      55455 0      55456 0      54042 0      54044 0      33134 1      71273 1      55273 1

16,3200      41273 1      74743 1      27273 1      03205 0      13442 1      22044 1      30042 1      53463 0
16,3210      34755 1      54043 1      54042 0      54044 0      33617 1      00006 1      05013 0      00002 0
16,3220      34755 1      54043 1      13227 1      34740 0      70111 1      00006 1      13156 1      30032 0
16,3230      55635 1      10043 1      13235 1      13235 1      13235 1      60000 1      60000 1      63135 0

16,3240      00006 1      70043 1      30001 0      00006 1      71444 0      57454 0      40000 0      61454 0
16,3250      55737 1      03205 0      41454 1      61421 1      55427 0      11737 1      13261 0      13267 0
16,3260      13261 0      61476 0      00006 1      63267 1      33133 0      55445 1      03300 1      31273 0
16,3270      74742 0      00006 1      13274 1      03300 1      31446 0      55752 1      55464 1      03467 1

16,3300      30032 0      55635 1      34755 1      55446 1      55447 0      55464 1      11427 0      03312 1
16,3310      03312 1      03312 1      55737 1      61476 0      00006 1      63325 0      31445 0      00006 1
16,3320      63325 0      41273 1      74742 0      27273 1      13330 0      44742 0      71273 1      55273 1
16,3330      41427 0      00006 1      71551 0      20001 1      02310 1      00006 1      77716 1      55524 1

16,3340      31737 0      61475 0      00006 1      63346 0      36242 0      13355 0      31524 0      27524 1
16,3350      34747 1      70111 1      10000 0      34753 1      64751 0      55743 1      34753 1      54001 1
16,3360      11524 1      13366 0      13442 1      13365 0      13442 1      22007 0      64753 1      55737 1
16,3370      23744 1      03531 0      46242 1      61743 0      00006 1      13377 0      44752 1      64751 0
```

```
OCTAL LISTING FOR PARAGRAPH # 113,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3400        55521 1      31741 1      05754 1      41737 1      63612 1      00006 1      63624 1      63572 1
16,3410        00006 1      63416 1      27737 1      51744 1      33621 1      55524 1      31737 0      22007 0
16,3420        00004 0      53471 0      04674 0   C: 37114 1      44740 1      71273 1      55273 1      03431 1
16,3430        13624 0      30111 0      54001 1      34747 1      00006 1      06001 0      54111 1      00003 1

16,3440        00002 0      03431 1      05753 0      34755 1      55524 1      13624 0      30033 1      00006 1
16,3450        21636 1      00006 1      71414 0      57752 0      30032 0      00006 1      21635 1      61277 1
16,3460        27752 1      57464 0      00002 0      03446 1      41643 0      61421 1      55427 0      44753 0
16,3470        55505 1      30111 0      74737 1      00006 1      13505 0      00004 0      04674 0   C: 43727 1

16,3500        31524 0      00006 1      13441 1      00003 1      13350 0      34755 1      55500 1      00004 0
16,3510        04674 0   C: 37252 0      00003 1      41741 0      63530 1      00006 1      63350 1      11524 1
16,3520        13522 0      13442 1      63527 1      00006 1      63350 1      36242 0      13355 0   C: 77377 1
16,3530     C: 75117 1      36242 0      55742 0      51743 0      33563 1      51744 1      73554 1      55741 0

16,3540        71263 0      10000 0      13544 0      00002 0      11742 0      13551 1      05567 0   C: 02003 0
16,3550        13442 1      55743 1      13532 1      12773 1   C: 00252 1   C: 00125 1   C: 00140 1   C: 00006 1
16,3560     C: 00220 1   C: 00011 1   C: 00151 1   C: 00146 1   C: 00226 1   C: 00231 1   C: 00151 1   C: 00132 1
16,3570     C: 00245 1   C: 00377 1   C: 77445 1   C: 00004 0   C: 00002 0   C: 07776 0   C: 00005 1   C: 00011 1

16,3600     C: 00012 1   C: 07776 0   C: 00003 1   C: 00010 0   C: 00007 0   C: 07776 0   C: 07776 0   C: 07776 0
16,3610     C: 07776 0   C: 07776 0   C: 00360 1   C: 07400 1   C: 00266 0   C: 74631 0   C: 06315 0   C: 00600 1
16,3620     C: 00632 0   C: 77751 1   C: 00026 0   C: 02734 0      41645 0      61423 0      02310 1      55437 1
16,3630        41644 1      61422 1      02310 1      55436 0      00006 1      33640 0      52006 0   C: 02072 0

16,3640     C: 36106 0      34752 0      55744 0      60000 1      54002 1      51744 1      11524 1      13651 1
16,3650        13670 1      63731 1      00006 1      63707 1      51744 1      11524 1      33731 1      13661 1
16,3660        43731 0      51744 1      27524 1      51744 1      11524 1      43615 1      13670 1      33615 0
16,3670        00006 1      51744 1      71521 1      30001 0      51744 1      55737 1      00006 1      74742 0

16,3700        00006 1      63732 1      50002 0      27513 0      11744 0      13642 0      13716 0      34755 1
16,3710        51744 1      57524 0      00006 1      74760 0      30001 0      13670 1      31740 0      61741 1
16,3720        00006 1      71532 0      55747 0      41741 0      61740 0      00006 1      71531 0      55746 1
16,3730        12316 0   C: 77537 0      40000 0      24002 0      13702 0   C: 07400 1      41501 0      00006 1

16,3740        71507 0      23510 1      41503 1      00006 1      71511 1      23512 0      11501 0      34742 1
16,3750        13752 0      34743 0      54066 0      11503 1      34740 0      13757 0      34741 1      26066 0
16,3760        43735 1      00006 1      02012 0      60066 1      00006 1      01012 0      44747 0      71273 1
16,3770        55273 1      00002 0   C: 03772 0   C: 03773 1 CKSM 10415 0         @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 114,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2000        35026 0        05072 1     C: 03241 0     C: 74067 0        05353 1     C: 00006 1        15261 0        00006 1
17,2010        32026 1        53253 0        04674 0     C: 62370 1        12022 1        34737 0        54055 0        34750 1
17,2020        00006 1        05014 1        05353 1     C: 00003 1        15261 0     C: 02462 0     C: 62067 1        10031 1
17,2030        00002 0        05705 0        02032 1        34733 1        00006 1        03013 0        34733 1        22007 0

17,2040        53471 0        53467 1        23465 1        54031 1        67725 0        54000 0        12052 0        34733 1
17,2050        54031 1        12063 1        34735 1        00006 1        05013 0        31466 1        67725 0        54000 0
17,2060        12063 1        34733 1        55466 0        50001 0        15753 1        22016 0        00006 1        22012 1
17,2070        02027 0        15270 0        34737 0        00006 1        02031 1        10000 0        12103 0        40111 1

17,2100        74740 1        00006 1        12104 1        02626 1        11631 0        12507 0        12574 1        34755 1
17,2110        55631 0        53437 1        03146 1        53427 0        34745 0        00006 1        02031 1        00006 1
17,2120        12146 1        34744 1        00006 1        02031 1        00006 1        12147 0        34746 0        70111 1
17,2130        10000 0        12146 1        55473 1        55474 0        40111 1        74744 0        00006 1        12144 0

17,2140        30106 0        74737 1        10000 0        34752 0        55500 1        12200 0        34753 1        64751 0
17,2150        55744 0        67745 0        55500 1        30111 0        74741 0        10000 0        12321 1        30111 0
17,2160        74742 0        10030 0        34753 1        64752 0        55743 1        03173 1        11741 0        12172 0
17,2170        05567 0     C: 02002 1        35774 0        71741 0        55473 1        45774 1        71741 0        55474 0

17,2200        34737 0        00006 1        02031 1        10000 0        12661 0        34735 1        70111 1        00006 1
17,2210        12323 0        00004 0        04674 0     C: 40153 1        34755 1        55450 0        55452 1        00003 1
17,2220        00006 1        00031 0        55737 1        11461 1        12246 1        31737 0        74753 0        00006 1
17,2230        12252 1        31737 0        74752 1        00006 1        12256 0        31737 0        74747 0        00006 1

17,2240        12262 1        31737 0        74746 1        00006 1        12264 1        13063 0        41737 1        72320 0
17,2250        55461 1        13063 0        33107 1        55525 0        43107 0        12266 0        43107 0        55525 0
17,2260        33107 1        12266 0        33107 1        12265 0        43107 0        55525 0        55526 0        32317 0
17,2270        55477 0        34753 1        55461 1        55505 1        30111 0        74737 1        00006 1        12307 0

17,2300        51505 0        11525 0        32316 1        12305 1        42316 0        51505 0        55525 0        30111 0
17,2310        74742 0        10000 0        34753 1        64752 0        55743 1        12727 0     C: 00140 1     C: 02273 0
17,2320     C: 00063 1        34751 0        12164 1        55633 1        44753 0        55631 0        34735 1        71443 1
17,2330        00006 1        12350 1        34740 0        70111 1        00006 1        12661 0        44743 1        71273 1

17,2340        55273 1        12345 0     C: 00050 1     C: 00001 0     C: 00056 1        34755 1        55462 1        55463 0
17,2350        11462 1        12354 0        12354 0        12354 0        60000 1        60000 1        62344 0        00006 1
17,2360        71462 1        30001 0        00006 1        71444 0        57455 1        40000 0        61455 1        55741 0
17,2370        11463 0        12374 1        12374 1        12374 1        60000 1        60000 1        62344 0        00006 1
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OCTAL LISTING FOR PARAGRAPH # 115,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2400      71463 0      30001 0      00006 1      71444 0      57456 1      40000 0      61456 1      55742 0
17,2410      41455 0      61422 1      55436 0      41456 0      61423 0      55437 1      53437 1      03146 1
17,2420      53427 0      11741 0      02425 0      02425 0      02425 0      61476 0      00006 1      62431 0
17,2430      12447 0      11742 0      02435 1      02435 1      02435 1      61476 0      00006 1      62441 1

17,2440      12447 0      31273 0      74741 0      00006 1      12446 1      12451 1      12661 0      32342 0
17,2450      55457 1      00004 0      04674 0   C: 40153 1      00003 1      34755 1      55450 0      55451 1
17,2460      55452 1      55453 0      11426 1      12466 0      12466 0      12466 0      61476 0      00006 1
17,2470      62504 1      11427 0      12475 1      12475 1      12475 1      61476 0      00006 1      62501 1

17,2500      12515 0      34755 1      55427 0      12515 0      11427 0      02510 1      02510 1      02510 1
17,2510      61476 0      00006 1      62524 0      34755 1      55426 1      31457 0      00006 1      62524 0
17,2520      41273 1      74741 0      27273 1      02527 0      44741 0      71273 1      55273 1      32573 1
17,2530      55477 0      34753 1      55505 1      34751 0      55743 1      51505 0      51535 0      12540 0

17,2540      34751 0      51505 0      55535 1      13005 0      51505 0      11426 1      34755 1      12551 0
17,2550      34753 1      51505 0      63722 0      50000 1      41571 1      00006 1      51505 0      71426 1
17,2560      54002 1      20001 1      60002 0      54000 0      12566 1      30002 0      51505 0      55525 0
17,2570      12727 0      34755 1      12566 1   C: 02532 1      34736 1      70111 1      10000 0      12107 1

17,2600      11502 0      12603 1      12107 1      00006 1      00005 1      10000 0      12612 1      00006 1
17,2610      32625 1      52006 0      11633 1      12615 0      12107 1      00004 0      04674 0   C: 43330 0
17,2620      00003 1      34755 1      55633 1      12107 1   C: 03077 1   C: 42106 0      30033 1      00006 1
17,2630      21636 1      55737 1      00006 1      71415 1      55752 1      30034 0      00006 1      21637 0

17,2640      55740 1      00006 1      71417 0      61300 0      61752 0      57450 1      31737 0      00006 1
17,2650      71416 1      55752 1      31740 0      00006 1      71420 1      61301 1      61752 0      57452 0
17,2660      00002 0      31452 0      22000 1      31450 1      03146 1      53752 1      33113 1      55477 0
17,2670      34753 1      55505 1      51505 0      51535 0      12675 0      34751 0      51505 0      55535 1

17,2700      13005 0      51505 0      31751 0      55752 1      51505 0      31426 0      55427 0      30111 0
17,2710      74737 1      10000 0      12715 1      03252 1      12727 0      40111 1      74736 0      10000 0
17,2720      55631 0      00004 0      04674 0   C: 43727 1      00003 1      34751 0      55743 1      30101 1
17,2730      74737 1      00006 1      12743 1      40106 1      74737 1      00006 1      12743 1      30111 0

17,2740      74744 0      00006 1      13063 0      34752 0      54001 1      51505 0      11525 0      12754 1
17,2750      12777 0      12753 0      12777 0      22007 0      64753 1      55737 1      31505 0      60001 0
17,2760      55744 0      31737 0      63110 1      00006 1      63010 0      03173 1      51505 0      33103 0
17,2770      54001 1      31741 1      00004 0      50001 0      05754 1      00003 1      13051 1      51505 0
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OCTAL LISTING FOR PARAGRAPH # 116, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3000      33105 0     00004 0     50000 1     05753 0     00003 1     11505 1     01477 1     13236 1
17,3010      41737 1     63107 1     00006 1     63032 0     27737 1     51505 0     11525 0     33107 1
17,3020      13022 0     43107 0     51505 0     55525 0     11500 1     13031 1     00006 1     00004 0
17,3030      74753 0     55743 1     03173 1     51505 0     33105 0     00004 0     55471 0     31741 1

17,3040      51471 1     05754 1     31737 0     55470 1     03114 0     00003 1     34755 1     51505 0
17,3050      55535 1     46245 0     61743 0     00006 1     63057 0     34752 0     13060 0     34753 1
17,3060      51505 0     55522 1     13005 0     34755 1     55525 0     55526 0     34751 0     00004 0
17,3070      57535 0     00006 1     13074 0     05757 1     34751 0     57536 0     00003 1     00006 1

17,3100      13236 1     00004 0     05770 1     00003 1     13236 1  C: 00004 0  C: 00015 0  C: 00026 0
17,3110   C: 77417 0  C: 00600 1  C: 00266 0  C: 02671 0     41470 1     60031 0     00006 1     63131 1
17,3120      23465 1     53467 1     53471 0     54031 1     23465 1     34735 1     00006 1     05013 0
17,3130      00002 0     61466 1     00006 1     63142 0     23467 0     53471 0     00006 1     60031 0

17,3140      53467 1     00002 0     40000 0     64754 0     55470 1     00002 0     23740 0     00006 1
17,3150      71627 1     57740 0     00006 1     71630 1     54001 1     61740 0     55737 1     13163 1
17,3160      50000 1     44734 1     55737 1     41740 1     60001 0     54007 1     13171 1     50000 1
17,3170      44734 1     23737 0     00002 0     51744 1     33225 1     51743 0     73231 0     55741 0

17,3200      71262 1     10000 0     13204 0     00002 0     36245 1     55743 1     51744 1     33225 1
17,3210      51743 0     73231 0     55741 0     71262 1     00006 1     13203 1     11743 1     13205 1
17,3220      51505 0     55525 0     05567 0  C: 02004 1     12777 0  C: 00110 1  C: 00022 1  C: 00204 1
17,3230   C: 00041 1  C: 00125 1  C: 00252 1  C: 00146 1  C: 00231 1  C: 00377 1     33240 1     07754 0

17,3240   C: 03241 0     53754 1     52011 0     53756 0     56017 1     22002 0     34735 1     53760 0
17,3250      52016 1     15272 1     00006 1     23745 0     51505 0     33722 0     55746 1     31427 1
17,3260      00006 1     63266 0     31746 0     55744 0     33724 0     13276 0     41752 1     55752 1
17,3270      41427 0     55427 0     34753 1     27746 1     55744 0     43724 1     55740 1     31752 0

17,3300      00006 1     74747 0     10000 0     13664 1     13306 0     13630 0     34737 0     00006 1
17,3310      70001 1     55752 1     31427 1     00006 1     74750 0     00006 1     13320 1     13672 0
17,3320      23427 1     31427 1     00006 1     70000 0     00006 1     74737 1     55737 1     11752 1
17,3330      63725 1     13333 0     63725 1     00006 1     51746 0     61601 1     00006 1     63344 1

17,3340      34752 0     27744 0     34751 0     13347 0     11500 1     13347 0     13340 1     55743 1
17,3350      41737 1     00006 1     51744 1     71567 0     51746 0     61601 1     00006 1     61752 0
17,3360      55741 0     00006 1     63542 1     51746 0     31573 1     00006 1     71737 1     61752 0
17,3370      51746 0     61603 0     00006 1     63426 1     51505 0     41525 0     00006 1     71740 1
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OCTAL LISTING FOR PARAGRAPH # 117,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3400     00006 1     63422 0     11555 1     13414 1     41741 0     51746 0     61605 0     00006 1
17,3410     63422 0     03526 0     31741 1     13562 1     51746 0     41601 0     60000 1     61741 1
17,3420     00006 1     63424 0     34755 1     13466 1     03526 0     13547 0     54001 1     11740 1
17,3430     13434 0     05705 0     44752 1     27744 0     30001 0     00006 1     51744 1     71576 0

17,3440     20001 1     20001 1     53750 0     51744 1     31570 1     00006 1     71427 0     55742 0
17,3450     00006 1     73734 0     61747 1     67746 0     00006 1     63503 1     31742 1     00006 1
17,3460     73735 1     61747 1     63726 1     00006 1     63513 0     34741 1     00006 1     71740 1
17,3470     51505 0     55525 0     00006 1     51505 0     71547 1     30001 0     00006 1     63502 0

17,3500     34751 0     55743 1     01745 0     43733 1     61742 1     53750 0     00006 1     11747 0
17,3510     00006 1     74736 0     13623 1     00006 1     33737 1     21750 0     31742 1     63727 0
17,3520     53750 0     00006 1     11747 0     00006 1     74736 0     13466 1     41740 1     55740 1
17,3530     31427 1     00006 1     51744 1     71567 0     55742 0     63740 1     00006 1     63541 1

17,3540     13445 1     00002 0     03526 0     31741 1     61555 0     00006 1     63562 0     41556 1
17,3550     61742 1     00006 1     63555 1     31742 1     13466 1     11427 0     34746 0     13466 1
17,3560     05705 0     13466 1     00006 1     51746 0     61605 0     00006 1     51744 1     71575 0
17,3570     20001 1     20001 1     53750 0     31742 1     63740 1     00006 1     70000 0     00006 1

17,3600     61747 1     00006 1     63465 0     31747 1     67746 0     00006 1     63616 0     33730 0
17,3610     53750 0     00006 1     11747 0     61742 1     63731 1     13466 1     43732 0     53750 0
17,3620     00006 1     11747 0     61742 1     63742 0     00006 1     63422 0     63741 0     13466 1
17,3630     43743 0     27427 0     00006 1     63654 0     03712 0     31427 1     00006 1     51744 1

17,3640     71571 1     67741 1     00006 1     63645 0     13465 1     00006 1     13465 1     64740 0
17,3650     20001 1     20001 1     20001 1     13623 1     03714 0     11740 1     34753 1     13661 1
17,3660     37747 1     27744 0     41427 0     13636 0     03712 0     33743 1     61427 1     54000 0
17,3670     13636 0     13465 1     03712 0     51746 0     41601 0     61752 0     00006 1     74741 0

17,3700     57427 1     00006 1     70000 0     00006 1     51746 0     71571 1     61427 1     00006 1
17,3710     63422 0     13465 1     41740 1     55740 1     34751 0     55743 1     34735 1     55741 0
17,3720     00002 0  C: 77757 1  C: 00000 1  C: 00020 0  C: 14400 0  C: 75673 1  C: 77750 0  C: 00632 0
17,3730  C: 01463 1  C: 00232 1  C: 77462 1  C: 77631 0  C: 77145 1  C: 75462 0  C: 00007 0  C: 25605 0

17,3740  C: 76631 1  C: 00122 0  C: 77655 1  C: 04476 0  C: 03744 0  C: 03745 1  CKSM 64555 0       @
17,3750        @           @           @           @           @           @           @           @
17,3760        @           @           @           @           @           @           @           @
17,3770        @           @           @           @           @           @           @           @
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```
OCTAL LISTING FOR PARAGRAPH # 120,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2000     C: 01150 1   C: 01046 1   C: 07361 1   C: 00666 1      32114 1      70111 1      55343 0      40106 1
20,2010        74737 1      10000 0      34736 1      27343 0      31343 1      74355 1      00006 1      12034 0
20,2020        31343 1      72113 1      55343 0      32112 1      04616 1   C: 20353 0      15472 1      12037 0
20,2030        12014 1      36242 0      05464 1      15155 1      34737 0      27343 0      12021 1      00004 0

20,2040        44737 1      70106 1      54001 1      41343 0      74736 0      10000 0      34737 0      60001 0
20,2050        54106 1      41343 0      74355 1      10000 0      44737 1      62114 1      71343 0      54001 1
20,2060        42114 0      70111 1      60001 0      54111 1      74737 1      10000 0      31332 1      61331 1
20,2070        55244 0      30111 0      74741 0      00006 1      12101 1      44735 0      70075 1      54075 1

20,2100        12104 1      40075 1      74735 0      26075 1      30111 0      76245 0      60000 1      55325 0
20,2110        04635 0   C: 02206 1   C: 00256 0   C: 33113 1   C: 13113 0      74745 1      10000 0      44752 1
20,2120        64753 1      27746 1      15270 0      30111 0      74750 0      00006 1      12140 1      32151 0
20,2130        55346 0      00006 1      22070 0      37715 0      05072 1   C: 02454 0   C: 40106 1      00070 0

20,2140        32150 1      12130 0      00006 1      22070 0      02153 1      32152 0      55346 0      12133 0
20,2150     C: 00155 0   C: 03434 1   C: 00554 0      35015 0      56003 1      54001 1      30032 0      55635 1
20,2160        30033 1      55636 1      30034 0      55637 0      12170 1      35015 0      56003 1      54001 1
20,2170        34755 1      55643 0      55644 1      55645 0      55640 0      55641 1      55642 1      55277 0

20,2200        55300 1      55301 0      22003 1      00002 0      00006 1      22071 1      02165 1      22003 1
20,2210        55537 0      55540 0      55541 1      55542 1      55424 0      55425 1      55545 0      55546 0
20,2220        22003 1      40111 1      74744 0      26111 1      02124 1      00071 1      31273 0      54001 1
20,2230        34750 1      00006 1      06001 0      55273 1      74750 0      10000 0      12322 1      30074 1

20,2240        74750 0      10000 0      12252 1      41450 0      55762 1      41452 1      55763 0      41464 1
20,2250        57761 0      12442 0      00006 1      22061 0      30322 1      00006 1      20033 0      55761 1
20,2260        00006 1      71415 1      57762 0      30323 0      00006 1      20034 1      55763 0      00006 1
20,2270        71417 0      61762 0      02435 1      55762 1      31761 0      00006 1      71416 1      57763 1

20,2300        00006 1      71420 1      61763 1      02435 1      55763 0      31761 0      00006 1      71414 0
20,2310        57761 0      30321 1      00006 1      20032 1      61761 0      02435 1      55761 1      00006 1
20,2320        22061 0      12442 0      31273 0      76242 1      00006 1      12362 0      74751 1      00006 1
20,2330        12353 1      44746 1      00006 1      03012 1      44755 0      55761 1      55762 1      55763 0

20,2340        55764 1      55765 0      55766 0      54050 0      54051 1      54052 1      46242 1      71273 1
20,2350        64752 0      55273 1      12442 0      34746 0      00006 1      05012 1      46242 1      71273 1
20,2360        55273 1      12442 0      34746 0      00006 1      02012 0      10000 0      12373 0      41273 1
20,2370        74751 1      27273 1      12442 0      34752 0      54063 0      42434 1      00006 1      50063 1
```

OCTAL LISTING FOR PARAGRAPH # 121, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
20,2400      71761 1      54001 1      10000 0      32432 0      12406 0      42432 1      60001 0      54061 1
20,2410      12414 0      50000 1      32432 0      54001 1      50063 1      41764 1      60001 0      50063 1
20,2420      26050 0      50063 1      23764 0      10063 0      12374 1      37740 0      00006 1      05014 1
20,2430      12442 0   C: 77177 0   C: 37200 1   C: 00600 1   C: 03146 1      54007 1      00002 0      50000 1

20,2440      44734 1      00002 0      00006 1      32446 0      52006 0   C: 02016 1   C: 34106 1      34755 1
20,2450      55537 0      55541 1      55424 0      55425 1      04616 1   C: 40461 0      05155 0      35015 0
20,2460      54003 0      04645 1      54117 1      30111 0      74737 1      54157 0      10000 0      41332 0
20,2470      61244 1      55331 0      00004 0      30106 0      74737 1      00006 1      12522 1      44733 0

20,2500      55475 1      35751 1      54154 0      41331 0      61400 1      00006 1      62513 1      41331 0
20,2510      62001 1      00006 1      62540 1      27331 0      22007 0      10157 0      31332 1      61331 1
20,2520      53245 1      12540 0      44742 0      55475 1      36242 0      54154 0      41331 0      62002 1
20,2530      00006 1      62513 1      41331 0      62003 0      61400 1      00006 1      62540 1      12513 0

20,2540      00003 1      10157 0      13105 1      34752 0      54155 1      44752 1      26154 0      31331 1
20,2550      50154 1      63060 1      54156 1      00006 1      50154 1      33042 1      00006 1      10156 1
20,2560      50154 1      63057 0      50155 0      55530 1      10155 1      12544 1      12570 0      12667 0
20,2570      41532 0      61531 1      00006 1      62617 0      00006 1      11531 0      54155 1      63104 1

20,2600      00006 1      62604 1      43104 0      54155 1      30155 0      00006 1      73100 1      63102 1
20,2610      55630 1      44733 0      60155 0      00006 1      71630 1      55627 1      12642 1      00006 1
20,2620      11532 0      54155 1      40155 1      63104 1      00006 1      62630 0      33104 1      54155 1
20,2630      30155 0      00006 1      73100 1      63103 0      55627 1      40155 1      64735 1      00006 1

20,2640      71627 1      55630 1      41627 1      00006 1      71531 0      55533 1      31630 0      00006 1
20,2650      71532 0      61533 0      00006 1      74736 0      55533 1      55534 0      10154 0      34755 1
20,2660      55502 0      13230 1      44752 1      54154 0      44753 0      54155 1      12547 1      31246 0
20,2670      00006 1      71244 0      02776 0   C: 03101 1      00006 1      71527 1      00004 0      54154 0

20,2700      00006 1      71532 0      02776 0   C: 02000 0      55511 1      30154 1      00006 1      71531 0
20,2710      02776 0   C: 02000 0      55507 0      00006 1      73077 0      55504 0      31511 0      00006 1
20,2720      73077 0      55506 1      00006 1      00012 1      54155 1      34752 0      12730 0      34755 1
20,2730      54154 0      30155 0      50154 1      73073 1      00006 1      12751 1      30155 0      50154 1

20,2740      73074 0      00006 1      12746 1      50154 1      41507 0      12752 1      50154 1      31507 1
20,2750      12752 1      34755 1      50154 1      55510 0      10154 0      12727 0      40111 1      74736 0
20,2760      00006 1      13706 1      41274 0      63765 0      00006 1      12767 1      13706 1      11633 1
20,2770      12773 1      04674 0   C: 43330 0      10157 0      13671 0      13231 0      54161 0      54160 1
```

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OCTAL LISTING FOR PARAGRAPH # 122,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3000         50002 0      30000 1      24002 0      50000 1      30000 1      00006 1      13035 0      54162 0
20,3010         10000 0      64753 1      13014 0      64753 1      56161 1      00006 1      63020 0      40000 0
20,3020         60161 1      00006 1      63027 1      30160 0      00006 1      10162 0      00002 0      10160 1
20,3030         10162 0      13035 0      10162 0      34735 1      00002 0      34733 1      00002 0   C: 01240 0

20,3040      C: 22513 0   C: 00141 0   C: 07416 0   C: 00030 1   C: 21261 1   C: 00021 1   C: 03766 0   C: 00153 0
20,3050      C: 07111 1   C: 00072 1   C: 24103 0   C: 00135 0   C: 11511 1   C: 04754 0   C: 77142 0   C: 00061 0
20,3060      C: 00217 0   C: 00464 1   C: 75642 0   C: 00536 1   C: 75705 1   C: 00001 0   C: 77616 0   C: 05154 1
20,3070      C: 00052 0   C: 00231 1   C: 77174 0   C: 01400 1   C: 01000 0   C: 06000 1   C: 04000 0   C: 23146 0

20,3100      C: 13241 1   C: 00337 0   C: 26501 1   C: 51276 0   C: 62362 1      34753 1      54160 1      34753 1
20,3110         54161 0      50160 0      33212 0      00006 1      71331 0      00006 1      71332 0      50160 0
20,3120         63213 1      54154 0      13126 0      54161 0      00006 1      26160 1      50160 0      33215 1
20,3130         00006 1      50161 1      71331 0      50160 0      63217 0      00006 1      50161 1      71331 0

20,3140         26154 0      10161 0      13123 0      10160 1      13153 1   C: 00000 1   C: 20354 1      30154 1
20,3150         54155 1      34757 0      13106 1      33212 0      22007 0      02776 0   C: 01244 1      55530 1
20,3160         34733 1      55551 0      55571 1      55572 1      55611 1      55612 1      00006 1      33146 1
20,3170         00006 1      10155 1      00004 0      55531 0      55532 0      33103 0      55627 1      33102 1

20,3200         55630 1      31244 1      00006 1      70154 0      00006 1      71246 1      02776 0   C: 00155 0
20,3210         55511 1      12712 0   C: 00167 1   C: 06176 1   C: 77650 1   C: 72260 0   C: 76637 1   C: 02167 0
20,3220      C: 00645 0   C: 06335 1   C: 04256 1   C: 30163 0   C: 64072 0   C: 53632 0   C: 15133 1   C: 71777 0
20,3230         55633 1      31346 1      00006 1      74737 1      54001 1      60000 1      54115 0      41346 0

20,3240         60001 0      54114 1      00004 0      31541 0      54001 1      31537 1      04674 0   C: 37146 0
20,3250         53544 1      00003 1      30111 0      74744 0      10000 0      34753 1      54116 0      61502 1
20,3260         10000 0      33763 0      54151 0      00006 1      13270 0      10116 0      33762 1      54152 0
20,3270         31530 0      64743 0      54157 0      31530 0      03700 0      00004 0      55551 0      55552 0

20,3300         44743 1      00006 1      71551 0      00006 1      10157 0      55557 0      55560 1      34733 1
20,3310         55553 1      55554 0      00003 1      22007 0      10116 0      53544 1      34755 1      54154 0
20,3320         54163 1      50154 1      11543 0      64753 1      13327 0      64753 1      24163 0      54162 0
20,3330         40163 1      54164 0      31346 1      54143 0      54144 1      30162 1      63764 1      00006 1

20,3340         63432 1      10151 0      13372 0      31346 1      50164 1      26144 1      50163 0      54145 0
20,3350         33227 0      60162 1      00006 1      63356 1      40115 0      13365 0      40162 0      60000 1
20,3360         60000 1      64736 1      60000 1      00006 1      71346 0      50163 0      54143 0      30114 0
20,3370         50164 1      54146 0      30162 1      00006 1      74740 1      60162 1      03700 0      50164 1
```

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OCTAL LISTING FOR PARAGRAPH # 123,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3400       54130 1      34733 1      50163 0      54127 1      30162 1      61533 0      61533 0      64743 0
20,3410       54000 0      13456 1      30162 1      00006 1      74736 0      61533 0      54157 0      64744 1
20,3420       56157 1      03700 0      00006 1      74736 0      54160 1      33431 1      54161 0      44744 0
20,3430       13733 1      13463 1      54001 1      34733 1      54127 1      54130 1      10151 0      13456 1

20,3440       34744 1      60001 0      00006 1      63453 0      30115 1      50164 1      54146 0      60000 1
20,3450       50163 0      54145 0      13456 1      31346 1      54146 0      54145 0      30162 1      61533 0
20,3460       61533 0      54157 0      03724 0      50164 1      54134 0      30160 0      50164 1      54126 0
20,3470       30162 1      61533 0      64743 0      54000 0      13476 0      34733 1      63764 1      54157 0

20,3500       03724 0      50164 1      54132 0      30160 0      50164 1      54124 1      40162 0      61533 0
20,3510       61533 0      03712 0      50163 0      54133 1      54001 1      30160 0      50163 0      54125 0
20,3520       40162 0      61533 0      54157 0      63764 1      00006 1      63743 1      03720 1      50163 0
20,3530       54131 0      30160 0      50163 0      54123 0      50154 1      33770 1      71262 1      00006 1

20,3540       13545 1      30124 0      54126 0      30132 1      54134 0      50154 1      33766 0      71262 1
20,3550       00006 1      13556 0      30123 1      54125 0      30131 1      54133 1      40146 0      60143 1
20,3560       60151 1      54147 1      40145 0      60144 0      60151 1      54150 1      00004 0      10154 0
20,3570       13612 0      30122 0      55547 1      34320 1      05545 0   C: 00123 1   C: 01567 1      00003 1

20,3600       52144 1      52136 1      52146 0      52140 0      52150 1      52142 1      34753 1      54154 0
20,3610       34755 1      13320 1      30122 0      55550 1      34320 1      05545 0   C: 00123 1   C: 01607 1
20,3620       52152 0      53556 1      31346 1      55561 0      55562 0      61555 0      55564 0      55563 1
20,3630       34755 1      55565 1      55566 1      11555 1      13652 1      52136 1      53602 0      52140 0

20,3640       53604 0      52142 1      53606 1      52144 1      53622 1      52146 0      53624 1      52150 1
20,3650       53626 0      13672 0      31346 1      55601 0      55602 0      55621 1      55622 1      61555 0
20,3660       55603 1      55604 0      55623 0      55624 1      34755 1      55605 1      55606 1      55625 0
20,3670       55626 0      00004 0      40111 1      74751 1      26111 1      00003 1      30117 0      04640 1

20,3700       54165 1      34743 0      22007 0      00006 1      10165 1      00002 0      34755 1      55502 0
20,3710       55633 1      12773 1      22007 0      22122 0      54157 0      63764 1      00006 1      63740 1
20,3720       30157 1      00006 1      50164 1      70130 1      64743 0      56157 1      00006 1      22161 1
20,3730       03700 0      54160 1      44743 1      00006 1      70160 1      00006 1      10157 0      00161 1

20,3740       43764 0      54157 0      13721 1      10163 1      34752 0      67747 1      54122 1      60154 1
20,3750       50000 1      33767 1      71262 1      00006 1      13760 1      43764 0      54157 0      13526 1
20,3760       30001 0      13527 0   C: 00110 1   C: 00443 1   C: 77377 1   C: 02213 0   C: 00110 1   C: 00022 1
20,3770    C: 00204 1   C: 00041 1   C: 03772 0   C: 03773 1 CKSM 41116 1         @            @            @
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OCTAL LISTING FOR PARAGRAPH # 124,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2000     C: 24402 1   C: 01551 1   C: 21357 0   C: 22316 0   C: 01507 1   C: 00547 1      40103 1      74747 0
21,2010        10000 0      15261 0      11056 1      12015 0      12130 0      55714 0      36010 0      05173 1
21,2020     C: 02006 0      41303 1      74753 0      00006 1      12042 1      70107 0      00006 1      12033 1
21,2030        34747 1      54001 1      04606 0      34752 0      70107 0      00006 1      12042 1      34751 0

21,2040        54001 1      04606 0      30105 0      74743 1      00006 1      12154 1      41011 1      62107 0
21,2050        00006 1      12154 1      00006 1      00030 1      40000 0      54001 1      74750 0      10000 0
21,2060        12076 0      41011 1      62106 1      00006 1      12154 1      30001 0      74753 0      10000 0
21,2070        12073 0      12154 1      02110 0      44755 0      12077 1      02110 0      34752 0      54002 1

21,2100        00004 0      00006 1      32105 1      52006 0   C: 03402 1   C: 12067 0   C: 00106 0   C: 00107 1
21,2110        40775 0      61011 0      00006 1      12124 0      40105 1      74743 1      10000 0      12124 0
21,2120        30103 0      74747 0      10000 0      00002 0      04364 1      04457 0      04635 0   C: 21050 1
21,2130        40107 0      74735 0      00006 1      12150 0      34746 0      70107 0      00006 1      12150 0

21,2140        40107 0      74742 0      00006 1      12150 0      37720 0      05072 1   C: 03716 1   C: 70067 1
21,2150        00006 1      34755 1      52755 1      12021 1      23714 1      40025 1      53056 1      40103 1
21,2160        74741 0      10000 0      13053 0      31303 0      74745 1      10000 0      12240 1      02324 0
21,2170        41303 1      74745 1      27303 1      34752 0      00006 1      05014 1      31743 0      00006 1

21,2200        71706 0      56070 0      31744 1      00006 1      71707 1      26070 1      31745 0      00006 1
21,2210        71710 1      26070 1      32000 0      00006 1      70070 1      20001 1      20001 1      56070 0
21,2220        31716 0      00006 1      71715 1      60070 0      55711 0      41711 0      00006 1      62231 0
21,2230        12233 0      31711 1      64735 1      54060 0      34751 0      00006 1      05014 1      15261 0

21,2240        02324 0      44745 1      71303 1      55303 1      44752 1      00006 1      03014 1      11741 0
21,2250        12254 1      12254 1      12272 0      55741 0      44753 0      53742 0      53713 1      34742 1
21,2260        56002 0      22007 0      31715 0      00006 1      10002 1      00006 1      72002 0      12273 1
21,2270        53713 1      12313 0      32001 1      00006 1      71711 0      20001 1      61713 0      55713 1

21,2300        34755 1      27712 0      34733 1      64753 1      61713 0      55713 1      34755 1      64733 1
21,2310        61712 1      55712 0      13050 0      11713 1      12320 0      12320 0      34755 1      55713 1
21,2320        11712 0      34735 1      61713 0      12233 0      00006 1      23714 1      34746 0      00006 1
21,2330        02030 0      10000 0      13053 0      40075 1      74736 0      00006 1      12374 1      40075 1

21,2340        74736 0      26075 1      44745 1      71303 1      55303 1      40074 0      74752 1      00006 1
21,2350        15261 0      34744 1      00006 1      05012 1      34755 1      55702 1      55703 0      55676 0
21,2360        55677 1      34750 1      05173 1   C: 02365 0      15261 0      34752 0      00006 1      05012 1
21,2370        41303 1      74744 0      27303 1      15261 0      41235 0      60025 0      64736 1      64736 1
```

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OCTAL LISTING FOR PARAGRAPH # 125,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2400      57715 0    34777 1    54065 0    00006 1    31237 0    20001 1    20001 1    00006 1
21,2410      71715 1    00006 1    10065 0    57706 1    00006 1    31527 0    20001 1    20001 1
21,2420      27706 0    30037 0    61160 1    00006 1    72004 0    27706 0    00006 1    31241 1
21,2430      20001 1    20001 1    00006 1    71715 1    00006 1    10065 0    57707 0    00006 1

21,2440      31531 1    20001 1    20001 1    27707 1    30040 0    61161 0    00006 1    72004 0
21,2450      27707 1    00006 1    31243 0    20001 1    20001 1    00006 1    71715 1    00006 1
21,2460      10065 0    57710 0    00006 1    31533 0    20001 1    20001 1    27710 1    30041 1
21,2470      61162 0    00006 1    72004 0    27710 1    34751 0    05224 0    40074 0    74752 1

21,2500      10000 0    12503 1    01714 1    31733 1    61706 1    54061 1    31735 1    61707 0
21,2510      54062 1    31737 0    61710 0    54063 0    30061 0    00006 1    71717 0    56070 0
21,2520      30062 0    00006 1    71721 0    26070 1    30063 1    00006 1    71723 1    26070 1
21,2530      30070 0    60000 1    57704 0    30061 0    00006 1    71725 1    56070 0    30062 0

21,2540      00006 1    71727 0    26070 1    30063 1    00006 1    71731 1    26070 1    30070 0
21,2550      60000 1    57705 1    35015 0    54003 0    31417 1    54063 0    31420 0    54064 1
21,2560      35016 0    54003 0    30064 0    00006 1    71704 1    56070 0    30063 1    00006 1
21,2570      71705 0    26070 1    32003 0    00006 1    70070 1    20001 1    57700 1    30064 0

21,2600      00006 1    71705 0    56070 0    30063 1    00006 1    71704 1    40000 0    26070 1
21,2610      32003 0    00006 1    70070 1    20001 1    57701 0    42005 1    54066 0    34753 1
21,2620      54065 0    50065 1    11700 0    12627 1    12730 0    12635 1    12730 0    50065 1
21,2630      41700 0    62005 0    00006 1    62643 1    12730 0    50065 1    31700 1    62005 0

21,2640      00006 1    62643 1    12730 0    50065 1    11676 0    12651 0    12662 0    12656 1
21,2650      12662 0    50065 1    31700 1    00006 1    62701 0    12662 0    50065 1    41700 0
21,2660      00006 1    62716 0    50065 1    11702 1    12674 1    12667 0    12712 0    50065 1
21,2670      31700 1    00006 1    62720 0    12703 0    50065 1    31700 1    00006 1    62701 0

21,2700      12703 0    42005 1    13024 0    50065 1    41676 0    62005 0    50065 1    56072 1
21,2710      34753 1    13027 0    50065 1    31700 1    00006 1    62720 0    32005 0    13024 0
21,2720      50065 1    31676 1    62005 0    40000 0    50065 1    56072 1    44753 0    13027 0
21,2730      50065 1    11702 1    12761 1    12735 0    12766 0    50065 1    41676 0    00006 1

21,2740      62742 1    12775 1    50065 1    41700 0    00006 1    63020 0    60066 1    50065 1
21,2750      61676 1    00006 1    63020 0    50065 1    61700 1    00006 1    50065 1    61676 1
21,2760      13024 0    50065 1    41700 0    00006 1    63020 0    12772 0    50065 1    31700 1
21,2770      00006 1    63020 0    50065 1    41676 0    13024 0    50065 1    31700 1    00006 1
```

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OCTAL LISTING FOR PARAGRAPH # 126,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3000        63020 0      32005 0      50065 1      61676 1      40000 0      50065 1      61700 1      00006 1
21,3010        63020 0      00006 1      50065 1      61700 1      50065 1      61676 1      40000 0      13024 0
21,3020        50065 1      41676 0      50065 1      61700 1      50065 1      56072 1      34755 1      50065 1
21,3030        55702 1      50065 1      30072 1      64754 0      50065 1      54053 0      50065 1      30072 1

21,3040        50065 1      27676 0      10065 0      12620 0      35020 0      00006 1      05014 1      01714 1
21,3050        34755 1      54001 1      12270 1      40074 0      74752 1      00006 1      13067 1      34744 1
21,3060        71303 1      10000 0      34752 0      64744 1      40000 0      00006 1      03012 1      43076 1
21,3070        71303 1      55303 1      44736 0      70075 1      54075 1      15261 0   C: 00300 1      37747 1

21,3100        55631 0      34751 0      55535 1      55536 1      34752 0      55633 1      55632 0      55634 0
21,3110        30021 1      60000 1      55505 1      34752 0      13116 0      34755 1      55750 0      51750 1
21,3120        31537 1      00006 1      74752 1      00006 1      13130 1      50000 1      44734 1      56001 0
21,3130        11750 0      50000 1      31436 1      53744 0      51750 1      31504 1      55741 0      00006 1

21,3140        13576 1      51750 1      31450 1      00006 1      71741 0      23737 0      00006 1      74747 0
21,3150        53740 1      00006 1      74747 0      27740 1      41744 0      00006 1      74736 0      00006 1
21,3160        71744 0      61741 1      00006 1      63200 0      00006 1      40001 1      61741 1      00006 1
21,3170        11741 0      57746 0      30001 0      22007 0      00006 1      11741 0      57747 1      13203 1

21,3200        34733 1      54001 1      53747 0      31743 0      00006 1      74743 1      53743 1      00006 1
21,3210        31743 0      53752 1      31744 1      00006 1      63220 1      00006 1      31747 1      13222 1
21,3220        00006 1      41747 0      21752 1      11751 1      13230 1      13227 1      13232 0      11752 1
21,3230        34753 1      13233 1      44753 0      55745 1      11745 1      13247 1      13240 0      13244 1

21,3240        55742 0      55743 1      13247 1   C: 65252 1      00006 1      41743 1      53743 1      00006 1
21,3250        31747 1      21743 1      31746 0      00006 1      73243 0      53747 0      30001 0      00006 1
21,3260        73243 0      27747 0      54001 1      13265 1      27746 1      00006 1      31743 0      21747 0
21,3270        31746 0      00006 1      71744 0      21740 1      31747 1      00006 1      71744 0      27740 1

21,3300        54001 1      13303 0      27737 1      31742 1      00006 1      71741 0      53752 1      31743 0
21,3310        00006 1      71741 0      27752 1      54001 1      13316 1      27751 1      11745 1      13524 0
21,3320        13566 0      13323 1      13566 0      00006 1      41743 1      53743 1      13524 0   C: 23146 0
21,3330        34753 1      55502 0      34752 0      22002 0      22071 1      13337 1      34755 1      54066 0

21,3340        50066 1      31507 1      00006 1      63413 1      54063 0      50066 1      41537 0      00006 1
21,3350        13413 0      54002 1      00006 1      73327 0      60002 0      54001 1      13363 0      40000 0
21,3360        50066 1      57501 1      13417 1      00006 1      63371 1      40000 0      54062 1      44753 0
21,3370        13373 1      54062 1      34753 1      50066 1      55501 0      30063 1      00006 1      74740 1
```

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OCTAL LISTING FOR PARAGRAPH # 127,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3400        60062 0      00006 1      63417 0      40062 1      00006 1      73440 0      00006 1      10063 0
21,3410        00006 1      13413 0      13425 0      34755 1      50066 1      55501 0      13427 1      36010 0
21,3420        50066 1      55632 0      34755 1      55502 0      13427 1      50066 1      55632 0      10066 0
21,3430        13336 0      52073 1      52063 0      04674 0   C: 35736 0      52063 0      52073 1      00071 1

21,3440     C: 00240 1      11751 1      13460 1      13445 0      13451 0      31752 0      00006 1      63451 1
21,3450        13454 0      34755 1      55741 0      00002 0      57751 0      57752 0      34757 0      13461 0
21,3460        34755 1      55741 0      35751 1      55744 0      13473 0      31751 0      13507 1      37746 0
21,3470        27744 0      00006 1      63465 0      41751 1      51744 1      64735 1      00006 1      63467 1

21,3500        51744 1      34735 1      57747 1      00006 1      31752 0      00006 1      11747 0      00006 1
21,3510        23752 0      00006 1      74736 0      55747 0      74737 1      10000 0      33634 0      63632 0
21,3520        03636 1      03636 1      03636 1      01752 0      03441 0      57742 1      00006 1      71742 0
21,3530        53743 1      00006 1      70001 1      27743 1      54001 1      13537 1      27742 0      31744 1

21,3540        00006 1      74736 0      27741 0      00006 1      13563 0      51741 1      34735 1      57742 1
21,3550        00006 1      71742 0      21740 1      57742 1      00006 1      71743 1      27740 1      54001 1
21,3560        13562 1      27737 1      13566 0      00006 1      31743 0      21740 1      11737 1      13573 1
21,3570        13572 0      13575 1      11740 1      34753 1      13576 1      44753 0      54001 1      51750 1

21,3600        57501 1      00006 1      70001 1      10001 1      13621 0      13616 1      13610 1      13616 1
21,3610        51750 1      55510 0      51750 1      43633 0      00006 1      03012 1      41273 1      74747 0
21,3620        27273 1      11750 0      13115 0      31505 0      54021 0      00006 1      33631 0      52006 0
21,3630     C: 03236 0   C: 36106 0   C: 26501 1   C: 01400 1   C: 11276 1   C: 06000 1      55746 1      54021 0

21,3640        31747 1      22007 0      00006 1      11746 1      60021 1      00002 0   C: 00632 0      34736 1
21,3650        51505 0      55525 0      11745 1      13673 1      13676 1      51505 0      41525 0      10000 0
21,3660        00002 0      13663 0      13663 0      51505 0      33705 0      51505 0      55770 1      34755 1
21,3670        51505 0      55525 0      00002 0      51505 0      31525 1      13657 1      51505 0      11770 1

21,3700        13702 0      00002 0      13667 1      00002 0   C: 00004 0   C: 00012 1   C: 00012 1      44753 0
21,3710        55745 1      31427 1      13716 0      34753 1      55745 1      41427 0      22000 1      40111 1
21,3720        74744 0      10000 0      34767 0      60001 0      00006 1      63735 0      13652 1      51505 0
21,3730        11525 0      13713 0      13734 0      13707 0      55745 1      31427 1      00006 1      74766 0

21,3740        10000 0      13760 1      13744 1      13647 0      31427 1      61752 0      00006 1      71411 0
21,3750        00006 1      13766 1      00006 1      63762 1      31427 1      63646 0      00006 1      63766 0
21,3760        44736 0      13650 0      43646 1      61427 1      00006 1      63647 1      34755 1      13650 0
21,3770     C: 03770 1   C: 03771 0 CKSM 67517 0        @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 130,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2000      C: 27533 1    C: 07571 0    C: 25004 1    C: 06702 1       06037 0    I: 77634 0    C: 44403 0    C: 03277 0
22,2010      I: 51535 0    C: 00324 1    I: 51025 1    C: 04403 1    C: 44724 0    I: 72364 0    C: 03246 1    C: 03277 0
22,2020      I: 77624 1    C: 44410 1    I: 72364 0    C: 02230 1    C: 00322 1    I: 77624 1    C: 44410 1    I: 45160 1
22,2030      C: 03246 1    C: 44326 0    I: 45575 1    C: 50457 1    I: 77626 0    C: 50465 0    I: 77626 0    C: 74473 1

22,2040      I: 75160 1    C: 03303 1    C: 02230 1    I: 77624 1    C: 44312 1    I: 45575 1    C: 51532 1    I: 77626 0
22,2050      C: 51540 1    I: 77626 0    C: 75546 1    I: 45601 1    C: 00023 0    C: 44335 1    I: 45575 1    C: 50457 1
22,2060      I: 77626 0    C: 50465 0    I: 77626 0    C: 74473 1    I: 45345 1    C: 03306 1    C: 02233 1    I: 45325 1
22,2070      C: 02235 1    C: 03310 0    I: 45325 1    C: 03316 0    C: 02243 0    I: 77666 1    C: 03326 0    I: 43345 1

22,2100      C: 02231 0    C: 02251 0    I: 43225 0    C: 06512 1    C: 02241 1    C: 03334 0    I: 77726 1    C: 03336 1
22,2110      I: 51025 1    C: 04363 0    C: 44117 0    I: 77751 1    C: 00322 1    C: 37236 1    C: 44742 0    I: 45345 1
22,2120      C: 03336 1    C: 04365 0    I: 77244 0    C: 44131 1    C: 03326 0    I: 77656 1    C: 03271 0    I: 77650 1
22,2130      C: 44744 0    I: 53375 0    C: 02231 0    C: 03304 0    I: 77762 1    C: 27304 0    C: 02237 0    I: 74455 0

22,2140      C: 03312 1    C: 27312 1    C: 02245 0    I: 74455 0    C: 03320 0    C: 03320 0    I: 70545 1    C: 03334 0
22,2150      I: 45325 1    C: 06520 0    C: 03334 0    I: 65204 1    C: 21712 0    C: 03324 1    I: 56225 1    C: 00001 0
22,2160      C: 00003 1    I: 65366 1    C: 03314 1    I: 56225 1    C: 00001 0    C: 00003 1    I: 65366 1    C: 03304 0
22,2170      I: 56225 1    C: 00001 0    C: 00003 1    I: 55566 1    I: 77656 1    C: 03271 0    I: 45345 1    C: 03271 0

22,2200      C: 03273 1    I: 71240 1    C: 44211 0    C: 03271 0    I: 50025 0    C: 03275 1    C: 44266 0    I: 77650 1
22,2210      C: 44242 0    I: 45345 1    C: 03273 1    C: 03275 1    I: 77640 0    C: 44266 0    I: 51145 0    C: 03330 1
22,2220      C: 44224 0    I: 57575 1    C: 03271 0    C: 03271 0    I: 51145 0    C: 03306 1    C: 44232 1    I: 57545 1
22,2230      C: 03271 0    C: 03271 0    I: 51145 0    C: 03316 0    C: 44744 0    I: 57545 1    C: 03275 1    C: 03275 1

22,2240      I: 77650 1    C: 44744 0    I: 51145 0    C: 03326 0    C: 44250 0    I: 57575 1    C: 03271 0    C: 03271 0
22,2250      I: 51145 0    C: 03306 1    C: 44256 0    I: 57545 1    C: 03273 1    C: 03273 1    I: 51145 0    C: 03310 0
22,2260      C: 44744 0    I: 57545 1    C: 03275 1    C: 03275 1    I: 77650 1    C: 44744 0    I: 51145 0    C: 03332 0
22,2270      C: 44274 0    I: 57575 1    C: 03271 0    C: 03271 0    I: 51145 0    C: 03310 0    C: 44302 0    I: 57545 1

22,2300      C: 03271 0    C: 03271 0    I: 51145 0    C: 03316 0    C: 44744 0    I: 57545 1    C: 03273 1    C: 03273 1
22,2310      I: 77650 1    C: 44744 0    I: 76601 1    C: 00001 0    C: 00001 0    I: 62703 1    C: 77776 1    C: 00007 0
22,2320      I: 62703 1    C: 77776 1    C: 00015 0    I: 41503 1    C: 77776 1    I: 77616 0    I: 76601 1    C: 00001 0
22,2330      C: 00001 0    I: 62713 0    C: 00007 0    C: 00015 0    I: 77606 1    I: 77776 1       50120 1       52013 1

22,2340         50120 1       52017 0       50120 1       52013 1       50120 1       52015 1       50120 1       52005 0
22,2350         50120 1       52015 1       50120 1       52003 0       50120 1       52007 1       50120 1       52003 0
22,2360         06037 0    I: 77616 0    C: 00013 0    C: 13563 0    C: 17070 0    C: 34343 1    C: 15666 0    C: 20443 0
22,2370      C: 33555 1    C: 01106 1    C: 67777 1    C: 77777 0    C: 04000 0    C: 00000 1    C: 00216 1    C: 36323 0
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OCTAL LISTING FOR PARAGRAPH # 131,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2400     C: 17773 1    C: 00057 0    C: 14344 1       30034 0       54156 1       00006 1       30033 1       16476 0
22,2410     I: 66370 0    C: 00003 1    C: 00051 0    C: 00001 0    C: 00010 0    I: 77601 0    C: 00001 0    I: 47133 0
22,2420     C: 00013 0    C: 21576 0    C: 00013 0    I: 65356 1    C: 00013 0    I: 41546 0    I: 71300 1    C: 44417 0
22,2430     C: 00007 0    I: 72405 0    C: 00013 0    C: 10001 1    I: 41345 0    C: 00005 1    C: 00001 0    I: 41325 0

22,2440     C: 00007 0    C: 00011 1    I: 72405 0    C: 00003 1    I: 72421 0    C: 00015 0    C: 10003 0    I: 41345 0
22,2450     C: 00003 1    C: 00005 1    I: 41325 0    C: 00007 0    C: 00011 1    I: 72405 0    C: 00001 0    I: 72415 1
22,2460     C: 00017 1    C: 10005 0    I: 77745 1    C: 00011 1    C: 10007 1    I: 77745 1    C: 00013 0    I: 72405 0
22,2470     C: 00003 1    C: 10011 0    I: 41345 0    C: 00013 0    C: 00001 0    I: 72476 1    C: 10013 1    I: 41345 0

22,2500     C: 00005 1    C: 00013 0    I: 72476 1    C: 10015 1    I: 77745 1    I: 72405 0    C: 00011 1    I: 41325 0
22,2510     C: 00007 0    C: 00001 0    I: 72415 1    I: 77626 0    C: 67760 1    I: 77745 1    I: 72405 0    C: 00011 1
22,2520     I: 41325 0    C: 00007 0    C: 00003 1    I: 72425 1    I: 77626 0    C: 67756 1    I: 77616 0    I: 41401 1
22,2530     C: 00001 0    I: 65356 1    I: 41546 0    I: 65302 0    I: 41021 1    C: 06520 0    C: 21712 0    I: 77725 1

22,2540     C: 03271 0    I: 41316 0    C: 00005 1    I: 52415 0    C: 00003 1    I: 77604 0    C: 21712 0    C: 16231 0
22,2550     C: 03273 1    I: 41316 0    C: 00005 1    I: 52415 0    C: 00003 1    I: 77604 0    C: 21712 0    C: 16241 1
22,2560     C: 03275 1    I: 41315 0    C: 00005 1    I: 52415 0    C: 00003 1    I: 77604 0    C: 21712 0    C: 02251 0
22,2570     I: 41345 0    C: 03271 0    C: 03273 1    I: 72405 0    C: 00005 1    I: 41325 0    C: 03275 1    C: 00001 0

22,2600     I: 43206 1    C: 00007 0    I: 41112 0    C: 21712 0    C: 16237 0    I: 62421 1    I: 77604 0    C: 21712 0
22,2610     C: 16233 1    C: 03271 0    I: 41205 0    C: 03275 1    C: 00005 1    I: 65352 0    C: 03273 1    I: 41405 0
22,2620     C: 00001 0    I: 62415 0    C: 00007 0    I: 77604 0    C: 21712 0    C: 16235 1    I: 62421 1    I: 77604 0
22,2630     C: 21712 0    C: 16245 0    C: 03273 1    I: 41205 0    C: 03275 1    C: 00005 1    I: 65352 0    C: 03271 0

22,2640     I: 41405 0    C: 00001 0    I: 62415 0    C: 00007 0    I: 77604 0    C: 21712 0    C: 16247 1    I: 62421 1
22,2650     I: 77604 0    C: 21712 0    C: 02243 0    I: 77616 0    I: 67543 1    C: 00007 0    I: 71406 0    I: 41152 1
22,2660     C: 21712 0    C: 00051 0    I: 57543 1    C: 00015 0    I: 67471 1    C: 00051 0    I: 51123 0    C: 00001 0
22,2670     C: 44702 1    I: 57545 1    I: 43244 1    C: 44677 1    C: 06520 0    I: 77650 1    C: 44701 1    I: 77625 0

22,2700     C: 06520 0    I: 77606 1    I: 57543 1    C: 00013 0    I: 67471 1    C: 00051 0    I: 51123 0    C: 00011 1
22,2710     C: 44722 0    I: 57545 1    I: 43244 1    C: 44717 0    C: 06520 0    I: 77650 1    C: 44723 1    I: 52025 1
22,2720     C: 06520 0    C: 44723 1    I: 77745 1    I: 43466 1    I: 77776 1       05567 0    C: 00401 1       12732 1
22,2730        04616 1    C: 40153 1       04616 1    C: 40165 1       34752 0       00004 0       05203 0    C: 03234 1

22,2740     C: 44066 1       15155 1    I: 77776 1       12732 1    I: 77614 1    C: 01074 0    I: 70740 0    C: 01325 1
22,2750     C: 04772 1    I: 45002 1    C: 44527 1    I: 74343 0    C: 04772 1    C: 03271 0    C: 17326 0    C: 03336 1
22,2760     I: 55605 1    C: 05002 0    C: 04772 1    I: 77661 0    C: 20606 0    C: 03334 0    I: 77614 1    C: 01035 0
22,2770     C: 45010 1    C: 00221 0    C: 24255 0    C: 00554 0    C: 02660 0    C: 02660 0    C: 13301 1    C: 16161 0
```

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OCTAL LISTING FOR PARAGRAPH # 132,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3000    C: 30707 1   C: 00003 1   C: 04000 0      04616 1   C: 54262 0      10000 0      12730 0      06037 0
22,3010    I: 75160 1   C: 03246 1   C: 02230 1   I: 77624 1   C: 44312 1   I: 45575 1   C: 50514 1   I: 77626 0
22,3020    C: 50522 1   I: 77626 0   C: 74530 1   I: 45160 1   C: 03246 1   C: 44654 0   I: 77634 0   C: 21620 0
22,3030    C: 03304 0   I: 77414 0   C: 01215 0   C: 45122 1      34752 0      55272 0      51272 1      31676 1

22,3040       00006 1      51272 1      21703 0      00006 1      73121 1      10000 0      64753 1      13051 1
22,3050       40000 0      51272 1      55640 0      51272 1      31703 1      51272 1      57676 1      51272 1
22,3060       55635 1      11272 0      13035 0      00003 1      03075 0      13170 0      34753 1      00004 0
22,3070       05203 0   C: 03213 1   C: 44066 1      00003 1      15155 1      00006 1      40025 1      53710 1

22,3100       00006 1      31734 0      21710 1      11707 1      00002 0      13107 0      13117 1      11710 1
22,3110       00002 0      13113 0      40000 0      63166 0      00006 1      63117 0      24002 0      24002 0
22,3120       00002 0   C: 03146 1   I: 77776 1      00006 1      30025 0      21734 1      00006 1      43166 1
22,3130       21734 1      00004 0      34752 0      55701 1      60000 1      55702 1      50000 1      31725 0

22,3140       51701 0      55643 0      00006 1      63145 1      40000 0      00006 1      73167 0      00006 1
22,3150       51702 0      71725 1      00006 1      51701 0      11530 1      51701 0      55277 0      11701 1
22,3160       13133 1      30025 0      63166 0      57706 1      13034 1   C: 00000 1   C: 00144 0   C: 75777 1
22,3170       40025 1      61706 1      10000 0      64753 1      13177 1      64735 1      40000 0      00004 0

22,3200       05203 0   C: 03206 0   C: 44066 1      33166 0      27706 0      15155 1      37714 1      05105 0
22,3210    C: 03003 1   C: 44066 1      05261 1      34755 1      55642 1      55645 0      55301 0      55641 1
22,3220       55644 1      55300 1      30323 0      55637 0      30322 1      55636 1      30321 1      55635 1
22,3230       34755 1      55643 0      55640 0      55277 0      31311 0      54063 0      34755 1      53310 0

22,3240       05116 1      05261 1      06037 0   I: 52014 0   C: 03712 0   C: 45465 1   C: 45247 1   I: 77776 1
22,3250       34752 0      55051 0      34753 1      55052 0      33316 0      04616 1   C: 20334 1      05472 0
22,3260       03262 1      03254 1      34750 1      05203 0   C: 03430 0   C: 44064 0      00003 1      33320 0
22,3270       54003 0      34755 1      55537 0      35021 1      05105 0   C: 03321 1   C: 44064 0      00003 1

22,3300       36245 1      71537 0      10000 0      03310 0      34777 1      04616 1   C: 01735 1      03300 1
22,3310       33317 1      04616 1   C: 20334 1      05563 1      05563 1      03267 1   C: 01014 0   C: 04054 1
22,3320    C: 02140 0      06037 0   I: 77634 0   C: 21573 0   C: 00041 1   C: 02205 1   I: 77776 1      41052 0
22,3330       64753 1      00006 1      13356 0      06037 0   I: 77624 1   C: 27043 0   I: 77775 1   C: 00001 0

22,3340    C: 26207 0   C: 00007 0   C: 02215 0   I: 77743 1   C: 73774 1   C: 00037 0   I: 77743 1   C: 72411 0
22,3350    C: 02201 0   I: 46135 1   C: 00050 1   C: 45367 1   I: 77650 1   C: 45373 1      06037 0   I: 77624 1
22,3360    C: 27057 0   I: 77650 1   C: 45336 0   C: 00001 0   C: 11530 1   C: 00002 0   C: 31230 1   I: 43145 0
22,3370    C: 06315 0   C: 03635 1   C: 45377 0   I: 51575 1   C: 02023 1   I: 77614 1   C: 03475 1   C: 36203 0
```

OCTAL LISTING FOR PARAGRAPH # 133, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
22,3400     C: 45551 1   I: 45234 0   C: 21573 0   C: 02205 1   C: 02205 1   I: 53145 1   C: 02143 0   C: 45420 0
22,3410     I: 43345 1   C: 02143 0   C: 02205 1   C: 02143 0   I: 77776 1      34753 1      55537 0      05155 0
22,3420     I: 43345 1   C: 02141 1   C: 02205 1   C: 02141 1   I: 77776 1      34752 0      55537 0      05155 0
22,3430        34747 1      71044 1      10000 0      03441 0      37713 0      05072 1   C: 05472 0   C: 04062 1

22,3440        05261 1      34777 1      05203 0   C: 03430 0   C: 44064 0      36245 1      71537 0      50000 1
22,3450        03451 1      05261 1      03460 0      34777 1      54001 1      34755 1      21541 1      05261 1
22,3460        34777 1      54001 1      34755 1      21543 0      05261 1   I: 77776 1      35021 1      05105 0
22,3470     C: 03503 1   C: 44054 0      00003 1      10067 1      05122 0      33317 1      04616 1   C: 20334 1

22,3500        05563 1      05563 1      03475 1      06037 0   I: 52175 0   C: 01221 1   C: 45507 1   C: 26207 0
22,3510     C: 01227 1   C: 02215 0   I: 52014 0   C: 04304 1   C: 45516 1   C: 45527 0   I: 71214 0   C: 03475 1
22,3520     C: 04001 1   C: 14037 0   C: 05364 0   C: 26201 0   C: 02023 1   I: 52046 1   C: 45536 0   I: 71214 0
22,3530     C: 03675 0   C: 04003 0   C: 14037 0   C: 05366 1   C: 16201 0   C: 06315 0   C: 36203 0   C: 45551 1

22,3540     I: 77776 1      34747 1      71044 1      00006 1      15472 1      34777 1      04616 1   C: 01735 1
22,3550        03503 1   I: 44001 0   C: 00001 0   C: 00051 0   I: 77214 0   C: 03755 0   C: 45565 0   C: 02207 0
22,3560     I: 77752 1   C: 26207 0   C: 02215 0   I: 77752 1   C: 02215 0   I: 77624 1   C: 57361 1   I: 77624 1
22,3570     C: 57427 1   I: 77625 0   C: 02203 1   I: 64414 1   C: 03755 0   C: 45576 1   I: 77624 1   C: 45636 0

22,3600     C: 16120 0   C: 00017 1   I: 77625 0   C: 02203 1   C: 00161 1   I: 64414 1   C: 03755 0   C: 45610 1
22,3610     I: 77624 1   C: 45636 0   C: 16122 1   C: 00161 1   I: 51025 1   C: 02201 0   C: 45622 0   I: 52145 0
22,3620     C: 06522 1   C: 45626 1   I: 45145 0   C: 00017 1   C: 57465 1   I: 77676 0   C: 16143 0   C: 02201 0
22,3630     I: 45015 1   C: 02203 1   C: 57470 0   I: 77676 0   C: 36141 0   C: 00051 0   I: 51025 1   C: 05646 0

22,3640     C: 45643 1   I: 43415 0   C: 05646 0   I: 43545 1   C: 05646 0   C: 01065 0   C: 05603 1   C: 00021 1
22,3650     C: 14161 1   C: 01440 0   C: 00000 1   C: 14000 1   C: 00000 1   C: 30000 1   C: 00000 1   C: 77534 0
22,3660     C: 45074 0      31235 1      55075 0      05504 0   C: 00036 1      04616 1   C: 17310 0      44743 1
22,3670        00006 1      03011 1      05327 1   C: 00005 1   C: 05022 1   C: 20000 0      06037 0   I: 43014 0

22,3700     C: 01464 0   C: 03664 0   I: 45014 0   C: 03267 1   C: 27467 1   I: 77414 0   C: 03671 1      31260 1
22,3710        04640 1   I: 51575 1   C: 02643 1   C: 24045 0   C: 02651 1   I: 41446 1   I: 50025 0   C: 00045 0
22,3720     C: 45723 0   I: 45545 1   C: 77732 1   I: 51575 1   C: 02657 1   I: 45206 1   C: 00045 0   I: 71240 1
22,3730     C: 45733 1   I: 77626 0   C: 77732 1   I: 66145 1   C: 00045 0   C: 00044 1   I: 62101 0   C: 00047 1

22,3740     C: 00002 0   I: 53775 1   C: 02643 1   C: 20201 0   C: 26643 1   C: 02651 1   I: 77657 0   C: 20201 0
22,3750     C: 26651 1   C: 02657 1   I: 66057 0   C: 20201 0   C: 00045 0   C: 02657 1   I: 54150 1   C: 02103 1
22,3760     C: 00045 0   I: 77660 1   C: 00045 0   I: 70130 1   C: 02103 1   C: 00045 0   I: 40270 0   C: 00044 1
22,3770     C: 00003 1   I: 77650 1   C: 46667 1   C: 03773 1   C: 03774 0   CKSM 00471 0        @            @
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OCTAL LISTING FOR PARAGRAPH # 134,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2000      04645 1     55113 1     34752 0     55052 0     36242 0     55051 0     32037 1     04616 1
23,2010   C: 20353 0     15472 1     12017 1     12006 1     34751 0     05464 1     05155 0     31052 1
23,2020      74752 1     10000 0     12026 0     05504 0  C: 00012 1     12034 0     05516 0  C: 00012 1
23,2030      05504 0  C: 00264 1     05504 0  C: 00126 1     00003 1     31113 0     14640 0  C: 01014 0

23,2040   C: 77757 1  I: 47135 0  C: 03753 0  C: 21576 0  I: 41401 1  C: 00001 0  I: 57556 0  C: 14043 0
23,2050   I: 41546 0  I: 47135 0  C: 03754 1  C: 21576 0  I: 71406 0  I: 72405 0  C: 00001 0  C: 14045 0
23,2060   I: 41356 1  I: 77752 1  C: 24041 1  C: 00041 1  I: 77616 0  C: 14025 0  C: 00155 0  I: 40234 0
23,2070   C: 21576 0  C: 00001 0  I: 73406 1  I: 77676 0  C: 14043 0  I: 41546 0  I: 47135 0  C: 00026 0

23,2100   C: 21576 0  I: 77650 1  C: 46054 1     35010 0     04616 1  C: 20476 0     15472 1     12111 0
23,2110      12103 0     05504 0  C: 00124 0     04616 1  C: 54123 0     15472 1     04645 1     55143 1
23,2120      05504 0  C: 00024 1     02127 1     04645 1     55143 1     05516 0  C: 00024 1     34747 1
23,2130      70075 1     00006 1     12271 0     06037 0  I: 77775 1  C: 06514 1  C: 03765 0  I: 43234 0

23,2140   C: 21573 0  C: 15712 1  C: 34041 0  C: 51255 1  I: 77775 1  C: 01102 0  C: 03773 1  I: 45034 1
23,2150   C: 46277 1  C: 56032 0  C: 00322 1  I: 77776 1     05353 1  C: 04022 0     34747 1     70075 1
23,2160      00006 1     12271 0     04616 1  C: 54255 1     10000 0     02257 0     06037 0  I: 45175 0
23,2170   C: 01102 0  C: 47646 0  I: 45345 1  C: 00162 1  C: 06275 1  I: 77440 1  C: 46213 0     35015 0

23,2200      54003 0     00004 0     00006 1     30322 1     53636 1     30323 0     55637 0     00003 1
23,2210      35016 0     54003 0     02236 1  I: 77776 1     00004 0     04674 0  C: 40153 1     04674 0
23,2220   C: 40140 0     05516 0  C: 00124 0     05504 0  C: 00077 1     04616 1  C: 54123 0     00004 0
23,2230      04674 0  C: 40123 0     05353 1  C: 04022 0     05516 0  C: 00077 1     30075 0     74742 0

23,2240      10000 0     02262 0     11745 1     02245 0     02262 0     55745 1     32276 0     05173 1
23,2250   C: 02252 0     05155 0     37714 1     05105 0  C: 02127 1  C: 46067 1     05261 1     04616 1
23,2260   C: 54266 1     02236 1     31143 0     14640 0     32273 0     70074 0     00006 1     15155 1
23,2270      02236 1     04635 0  C: 50232 1  C: 00500 1  C: 17350 1  C: 34602 1  C: 01130 1     00004 0

23,2300      35015 0     56003 1     54070 1     31635 0     54154 0     00006 1     31637 1     52156 1
23,2310      30070 0     54003 0     00003 1     16477 1  C: 00302 0  C: 17755 0  I: 53754 1  C: 02777 1
23,2320   C: 57176 0  C: 26744 1  I: 53750 0  C: 02776 0  C: 57176 0  C: 02655 0  I: 45020 1  C: 03463 0
23,2330   C: 46344 0  C: 37671 0  C: 25674 0  I: 41401 1  C: 00003 1  I: 65225 1  C: 03671 1  C: 00001 0

23,2340   I: 45206 1  C: 03671 1  I: 52006 0  C: 03463 0  I: 41545 0  C: 06315 0  I: 63130 0  C: 00047 1
23,2350   C: 00002 0  I: 46135 1  C: 00050 1  C: 46357 1  I: 51575 1  C: 02023 1  I: 77725 1  I: 43545 1
23,2360   I: 77620 0  C: 03463 0  C: 37574 0  C: 27057 0  I: 77624 1  C: 46376 1  I: 77745 1  C: 03574 1
23,2370   C: 34041 0  C: 27043 0  I: 77624 1  C: 46406 1  I: 77650 1  C: 03463 0  I: 43175 0  C: 00001 0
```

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OCTAL LISTING FOR PARAGRAPH # 135,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2400     C: 01352 1    C: 46412 1    C: 27536 1    C: 00007 0    C: 03544 1    I: 77616 0    I: 43175 0    C: 00001 0
23,2410     C: 01352 1    C: 46402 0    C: 27552 0    C: 00007 0    C: 03560 1    I: 77616 0    I: 53754 1    C: 02777 1
23,2420     C: 57176 0    I: 63350 1    C: 02776 0    I: 63257 1    C: 57176 0    I: 77616 0    I: 53754 1    C: 02777 1
23,2430     C: 57576 1    I: 77616 0    I: 40220 0    C: 01164 0    C: 00001 0    I: 41575 0    C: 06514 1    I: 41434 1

23,2440     C: 21573 0    I: 77624 1    C: 55716 1    I: 74321 1    C: 01734 0    C: 16027 0    C: 26325 1    C: 02023 1
23,2450     I: 52446 0    C: 36333 1    C: 01164 0    C: 00046 0    C: 07374 0    C: 04145 0    C: 15527 0    C: 00007 0
23,2460     C: 23346 1       06037 0    I: 43175 0    C: 03545 0    C: 03347 1    C: 66415 1    I: 64252 0    C: 01734 0
23,2470     C: 37521 0    C: 67130 1    I: 76575 1    C: 03553 1    I: 77721 0    C: 01734 0    C: 27527 1    C: 01726 0

23,2500     I: 53435 0    C: 01720 0    C: 03720 1    I: 77776 1       00006 1       34755 1       52755 1       04635 0
23,2510     C: 66420 1    C: 10000 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 20000 0
23,2520     C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 37777 1
23,2530     C: 37777 1    I: 77620 0    C: 02772 1    I: 66370 0    C: 00066 1    C: 00051 0    C: 00022 1    I: 66374 1

23,2540     C: 00022 1    C: 00052 0    C: 00006 1    I: 63775 1    C: 03525 0    C: 02467 0    C: 12665 1    I: 77775 1
23,2550     C: 03533 1    I: 52717 1    C: 02555 0    C: 75112 1    C: 12665 1    I: 77775 1    C: 03541 1    I: 52717 1
23,2560     C: 02643 1    C: 75112 1    C: 12665 1    I: 77700 0    C: 46565 0    I: 43104 0    C: 46543 1    C: 02706 1
23,2570     C: 46574 0    I: 77775 1    C: 06522 1    C: 02657 1    I: 77201 1    C: 00001 0    C: 02643 1    I: 47036 1

23,2600     C: 21633 1    I: 47515 0    C: 02651 1    I: 76234 0    C: 21633 1    I: 47515 0    C: 02657 1    I: 76234 0
23,2610     C: 21633 1    I: 77171 0    C: 02707 0    C: 00000 1    C: 02665 0    I: 40151 0    C: 02707 0    C: 46620 1
23,2620     C: 02670 1    I: 77654 0    C: 46631 1    I: 40112 1    C: 46631 1    C: 02670 1    I: 52114 1    C: 00001 0
23,2630     C: 46623 1    I: 61551 1    C: 02665 0    I: 75405 1    C: 02670 1    I: 76257 0    C: 57576 1    C: 02665 0

23,2640     I: 63101 1    C: 00050 1    C: 77775 1    I: 77134 1    C: 02103 1    C: 00242 0    I: 40265 1    C: 06512 1
23,2650     C: 00001 0    C: 03500 1    I: 60351 0    C: 02665 0    C: 00047 1    I: 65345 0    C: 00155 0    C: 03547 1
23,2660     I: 77701 1    C: 00051 0    I: 70460 1    C: 00050 1    I: 41471 0    I: 77650 1    C: 45711 1    I: 77731 1
23,2670     C: 00052 0    C: 00066 1    I: 60775 1    C: 02643 1    C: 75134 0    I: 77206 0    C: 02651 1    I: 53303 1

23,2700     C: 75112 1    I: 77206 0    C: 02657 1    I: 53303 1    C: 75070 1    I: 61006 0    C: 46672 0    I: 45575 1
23,2710     C: 74260 0    I: 45575 1    C: 74266 0    I: 45575 1    C: 74274 0    I: 77214 0    C: 02706 1    C: 46722 1
23,2720     C: 06522 1    C: 03517 1    I: 66374 1    C: 00022 1    C: 00052 0    C: 00006 1    I: 77773 1    C: 74252 1
23,2730     I: 53761 1    C: 00001 0    C: 20201 0    C: 12707 1    I: 77304 0    C: 46726 0    C: 02673 1    I: 77732 1

23,2740     C: 02673 1    I: 77650 1    C: 02772 1    I: 45020 1    C: 02772 1    C: 27414 0    I: 74375 0    C: 03503 1
23,2750     C: 03500 1    C: 26713 0    C: 03511 1    I: 77761 1    C: 03500 1    C: 26721 1    C: 03517 1    I: 77761 1
23,2760     C: 03500 1    C: 02727 1    I: 77776 1       33244 0       55320 0       55321 1       34755 1       55322 1
23,2770        55323 0       05353 1    C: 04022 0       05504 0    C: 00236 0       31321 0       55320 0       31323 1
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OCTAL LISTING FOR PARAGRAPH # 136,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3000        55322 1       06037 0    I: 73150 1    C: 01320 1    C: 01322 0    I: 70731 0    C: 00051 0    C: 00006 1
23,3010     C: 75134 0    I: 60276 1    C: 00052 0    I: 65161 1    C: 02713 0    C: 00051 0    I: 57144 1    C: 00047 1
23,3020     C: 02103 1    I: 65057 0    C: 57576 1    C: 00051 0    I: 77653 1    C: 02467 0    C: 02735 1    I: 57543 1
23,3030     C: 75134 0    I: 74301 0    C: 00052 0    C: 02721 1    I: 71124 0    C: 00051 0    C: 00047 1    I: 53674 1

23,3040     C: 02103 1    C: 57576 1    I: 52724 1    C: 00051 0    C: 02555 0    C: 02743 0    I: 77614 1    C: 02746 0
23,3050     C: 47070 0    I: 57543 1    C: 75134 0    I: 74301 0    C: 00052 0    C: 02727 1    I: 71124 0    C: 00051 0
23,3060     C: 00047 1    I: 53674 1    C: 02103 1    C: 57576 1    I: 52724 1    C: 00051 0    C: 02643 1    C: 02751 0
23,3070     I: 77624 1    C: 11244 0    I: 77776 1       31320 1       63245 1       55321 1       31322 0       67746 0

23,3100        55323 0       06037 0    I: 66350 1    C: 01320 1    C: 00051 0    C: 00006 1    I: 77775 1    C: 02735 1
23,3110     C: 06467 1    I: 77775 1    C: 02743 0    C: 06555 1    I: 77214 0    C: 02746 0    C: 47126 1    C: 02751 0
23,3120     C: 06643 0    I: 52100 1    C: 47124 0    C: 47134 1    I: 77634 0    C: 46771 1    I: 43335 0    C: 01324 0
23,3130     C: 07247 1    I: 52030 0    C: 47134 1    C: 47121 0    I: 77624 1    C: 11244 0    I: 53375 0    C: 01701 0

23,3140     C: 02701 0    C: 03472 0    I: 47014 1    C: 00707 1    C: 47234 1    C: 26770 0    I: 77004 0    C: 57753 1
23,3150     C: 00000 1    I: 77014 1    C: 04344 0    C: 47155 0    C: 00002 0    I: 53775 1    C: 02665 0    C: 57205 1
23,3160     I: 40055 0    C: 01521 0    C: 47174 0    C: 25521 0    C: 02673 1    I: 53257 1    C: 57202 0    C: 01527 0
23,3170     I: 77600 1    C: 47200 0    C: 35527 1    C: 47207 1    I: 53375 0    C: 01535 0    C: 02665 0    C: 01535 0

23,3200     I: 53375 0    C: 01543 1    C: 02673 1    C: 01543 1    I: 45134 0    C: 02030 0    C: 23441 1    I: 77624 1
23,3210     C: 11244 0    I: 47014 1    C: 00707 1    C: 47237 1    C: 26747 1    I: 77624 1    C: 26070 1    I: 77624 1
23,3220     C: 11244 0    I: 77214 0    C: 02746 0    C: 47226 1    C: 03472 0    C: 01701 0    I: 66150 0    C: 02772 1
23,3230     C: 00052 0    I: 77776 1       04635 0    C: 27425 1    I: 52034 1    C: 26723 0    C: 47146 1    I: 45034 1

23,3240     C: 26674 0    C: 26114 1    I: 77650 1    C: 47217 0    C: 00066 1    C: 77771 0    C: 00014 1    I: 71220 1
23,3250     C: 00051 0    C: 02665 0    I: 65325 0    C: 06522 1    C: 02671 0    I: 55476 1    I: 77656 1    C: 14027 1
23,3260     C: 00027 1    I: 77742 0    C: 14023 0    C: 00033 1    I: 77742 0    C: 34021 0    C: 47320 0    C: 16742 1
23,3270     C: 02667 1    I: 77742 0    C: 14023 0    C: 00027 1    I: 65205 0    C: 02671 0    C: 00033 1    I: 45205 1

23,3300     C: 02665 0    I: 77626 0    C: 43756 1    C: 47320 0    C: 25744 1    C: 00027 1    I: 77641 1    C: 02701 0
23,3310     C: 24021 1    C: 00027 1    I: 77641 1    C: 02673 1    C: 34023 1    C: 47320 0    C: 36740 1    C: 00051 0
23,3320     I: 51545 1    C: 00023 0    I: 50025 0    C: 07534 1    C: 47333 1    I: 72545 0    C: 00021 1    I: 75326 1
23,3330     C: 00023 0    C: 00025 0    I: 77616 0    I: 72545 0    C: 00023 0    I: 77736 0    C: 14025 0    C: 00021 1

23,3340     I: 77640 0    C: 47344 1    I: 43545 1    C: 00025 0    I: 75345 1    C: 06520 0    C: 00023 0    I: 77625 0
23,3350     C: 00025 0    C: 00025 0    I: 77616 0    I: 77601 0    C: 00001 0    I: 47375 0    C: 02665 0    C: 02651 1
23,3360     I: 41456 0    I: 44041 1    C: 02701 0    C: 00051 0    C: 24021 1    C: 00001 0    I: 77641 1    C: 02673 1
23,3370     C: 34023 1    C: 47320 0    C: 26740 0    C: 00001 0    I: 50235 0    C: 02665 0    C: 02651 1    I: 77752 1
```

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OCTAL LISTING FOR PARAGRAPH # 137,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPPETIVE OPERATOP WORDS) OR "C" (CONSTANTS)

23,3400     C: 24021 1   C: 02651 1   I: 77641 1   C: 02665 0   C: 34023 1   C: 47320 0   C: 02744 1   I: 45246 0
23,3410     C: 07536 0   I: 77644 1   C: 47431 1   I: 50375 0   C: 02657 1   C: 00001 0   C: 24021 1   C: 02643 1
23,3420     I: 45441 1   C: 43754 0   C: 47320 0   C: 26742 1   C: 02740 0   I: 77634 0   C: 21620 0   C: 34322 0
23,3430     C: 00051 0   I: 77776 1      05567 0   C: 00401 1      05504 0   C: 00056 1      06037 0   I: 77650 1

23,3440     C: 47413 1   I: 66370 0   C: 02714 1   C: 00051 0   C: 02700 1   I: 77601 0   C: 00001 0   I: 46773 0
23,3450     C: 02723 0   C: 02731 0   I: 77656 1   C: 06731 1   I: 77773 1   C: 02723 0   I: 76433 1   C: 02731 0
23,3460     C: 06737 1   I: 77700 0   C: 47447 0   I: 66160 0   C: 00006 1   C: 00036 1   I: 66370 0   C: 00022 1
23,3470     C: 00051 0   C: 00006 1   I: 60374 1   C: 00005 1   C: 00052 0   C: 00002 0   I: 76720 0   C: 00036 1

23,3500     C: 00001 0   I: 62757 0   C: 75062 1   C: 00007 0   I: 77757 1   C: 75054 1   C: 30031 0   C: 00015 0
23,3510     I: 53357 0   C: 75046 1   I: 76455 1   C: 00031 0   I: 53520 0   C: 00036 1   C: 06707 1   I: 77700 0
23,3520     C: 47521 1   I: 77704 1   C: 47476 1   I: 77775 1   C: 02665 0   C: 26707 0   C: 02673 1   C: 26715 0
23,3530     C: 02701 0   C: 02723 0   I: 77616 0   C: 05520 0   C: 26075 1   C: 05252 1   C: 25253 1   I: 77776 1

23,3540        03547 1      06037 0   I: 77616 0   I: 77776 1      03555 1      06037 0   I: 77616 0      30032 0
23,3550        54772 1      30033 1      54766 1      30034 0      54770 0      00006 1      22142 0      34751 0
23,3560        76242 1      54143 0      50143 1      30766 0      52155 1      52127 1      04713 0   C: 21576 0
23,3570        00006 1      30155 0      50143 1      52767 0      04713 0   C: 01517 0      52155 1      50143 1

23,3600        52745 0      00006 1      50143 1      30767 1      04713 0   C: 01531 1      52127 1      52155 1
23,3610        50143 1      52737 0      10143 0      13560 0      00142 0      00004 0      00006 1      22061 0
23,3620        34751 0      76242 1      54062 1      50062 0      30766 0      05033 1      00006 1      74736 0
23,3630        50062 0      52737 0      50062 0      30766 0      05032 0      00006 1      74736 0      50062 0

23,3640        52745 0      10062 1      13621 0      30061 0      00003 1      00000 1   I: 77776 1      03547 1
23,3650        13653 0   I: 77776 1      03555 1      07532 1      46245 0      03675 0      06037 0   I: 43575 1
23,3660     C: 00123 1   I: 77776 1      03547 1      13666 0   I: 77776 1      03555 1      07532 1      36245 1
23,3670        13655 0   I: 77776 1      13653 0   I: 77776 1      13666 0      54142 1      00006 1      22145 1

23,3700        10142 1      40142 1      66245 1      00006 1      50000 1      33764 1      52144 1      34753 1
23,3710        54130 1      00006 1      50143 1      40123 0      13716 0      52131 0      52155 1      33762 1
23,3720        60143 1      54116 0      07107 0      10142 1      52155 1      13730 1      00006 1      40155 1
23,3730        52160 1      36242 0      26116 0      00006 1      50130 0      50143 1      30123 1      52155 1

23,3740        07107 0      52155 1      20160 1      52160 1      20001 1      50130 0      50143 1      52123 0
23,3750        52131 0      10000 0      13715 0      00006 1      26142 1      10142 1      13700 1      00145 1
23,3760        13700 1      00145 1   C: 00736 0   C: 00004 0   C: 00002 0   C: 00000 1   C: 00004 0   C: 03767 1
23,3770     C: 03770 1 CKSM 57135 1         @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 140,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2000         05327 1   C: 00004 0   C: 05022 1   C: 26000 0      02667 1      02007 1      02036 0      05504 0
24,2010      C: 00026 0      34753 1      55145 1      32311 0      04616 1   C: 20633 0      06001 0      02021 0
24,2020         02013 1      42312 1      61145 0      00006 1      12040 0      32315 1      04616 1   C: 20476 0
24,2030         05001 0      02033 0      02025 1      06037 0   I: 77650 1   C: 64217 1      05516 0   C: 00026 0

24,2040         04616 1   C: 11254 1      05504 0   C: 00027 1      05504 0   C: 00031 0      05504 0   C: 00010 0
24,2050         05516 0   C: 00037 0      05516 0   C: 00040 0      05516 0   C: 00063 1      05516 0   C: 00126 1
24,2060         05516 0   C: 00041 1      06011 1      05353 1   C: 04022 0      34755 1      55462 1      06037 0
24,2070      I: 77634 0   C: 21573 0   C: 34041 0   C: 51255 1   I: 77624 1   C: 53565 1   I: 77776 1      50154 1

24,2100         02101 0      02111 1      32305 0      04616 1   C: 21562 0      06022 1      02102 0      02063 0
24,2110         05155 0      05353 1   C: 04022 0      02667 1      02117 1      04616 1   C: 46116 0      05353 1
24,2120      C: 05022 1   C: 10000 0      37714 1      05146 1      30075 0      74747 0      00006 1      12232 1
24,2130         34752 0      00006 1      02033 0      00006 1      12170 1      46007 1      61011 0      00006 1

24,2140         12153 0      67746 0      00006 1      12153 0      32307 1      04616 1   C: 21562 0      06022 1
24,2150         02117 1      02117 1      05155 0      32306 0      04616 1   C: 20623 1      06022 1      02117 1
24,2160         02667 1      02166 1      03135 0      05504 0   C: 00040 0      02117 1      04364 1      02117 1
24,2170         40110 0      74737 1      00006 1      12205 0      34355 0      70076 1      00006 1      12211 0

24,2200         05516 0   C: 00037 0      05516 0   C: 00040 0      02232 0      32304 1      04616 1   C: 01735 1
24,2210         02170 0      06037 0   I: 77634 0   C: 21573 0   C: 34041 0   C: 50316 0   I: 77776 1      05353 1
24,2220      C: 04022 0      30074 1      74745 1      00006 1      15155 1      30075 0      74747 0      00006 1
24,2230         12264 1      02674 0      32304 1      05173 1   C: 02244 1      30075 0      74747 0      00006 1

24,2240         15155 1      05353 1   C: 40072 0      05155 0      30074 1      74745 1      00006 1      15261 0
24,2250         30075 0      74747 0      00006 1      12261 1      37714 1      05105 0   C: 02627 0   C: 50067 0
24,2260         05261 1      05221 0   C: 02734 0      02244 1      32666 0      05173 1   C: 02270 0      05155 0
24,2270         30075 0      74747 0      10000 0      12277 0      05221 0   C: 02734 0      02270 0      37714 1

24,2300         05105 0   C: 02211 1   C: 50067 0      05261 1   C: 00372 1   C: 00526 0   C: 00201 1   C: 00514 1
24,2310      C: 00074 1   C: 00012 1   C: 00001 0   C: 10000 0   C: 00000 1   C: 01441 1   I: 45020 1   C: 01757 0
24,2320      C: 27414 0   I: 77624 1   C: 26644 0   I: 43014 0   C: 02756 1   C: 50336 1   C: 01476 0   I: 43014 0
24,2330      C: 04307 1   C: 50333 1   C: 01475 0   I: 77614 1   C: 00747 0   C: 50370 0   I: 77614 1   C: 01474 1

24,2340      I: 77624 1   C: 27134 1   I: 77624 1   C: 11244 0   I: 77624 1   C: 27414 0   I: 43145 0   C: 01571 0
24,2350      C: 01674 0   I: 77624 1   C: 26644 0   C: 34041 0   C: 27134 1   I: 77214 0   C: 04347 0   C: 50216 1
24,2360      C: 01661 1   I: 77742 0   C: 26352 1   C: 01667 1   I: 77742 0   C: 02360 0   I: 77650 1   C: 01757 0
24,2370      I: 45014 0   C: 01674 0   C: 27134 1   I: 77624 1   C: 11244 0   I: 77624 1   C: 27414 0   I: 71214 0
```

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OCTAL LISTING FOR PARAGRAPH # 141,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2400    C: 01474 1   C: 01643 1   I: 77650 1   C: 50351 0      05327 1   C: 00004 0   C: 05022 1   C: 26000 0
24,2410       04616 1   C: 11254 1      05504 0   C: 00031 0      05504 0   C: 00006 1      05353 1   C: 04022 0
24,2420       34743 0      70074 0      00006 1      15155 1      34747 1      70075 1      00006 1      12437 1
24,2430       34757 0      55745 1      04616 1   C: 46123 0      02416 0      05353 1   C: 00112 0      32450 1

24,2440       05173 1   C: 02443 0      05155 0      35024 1      05105 0   C: 02416 0   C: 50067 0      05261 1
24,2450    C: 13560 0      05353 1   C: 04022 0      34745 0      70074 0      00006 1      15155 1      34747 1
24,2460       70075 1      00006 1      12636 1      34736 1      00006 1      02012 0      00006 1      12111 0
24,2470       34752 0      00006 1      02033 0      00006 1      12476 1      02135 1      40110 0      74737 1

24,2500       00006 1      12627 1      05353 1   C: 00152 1      04616 1   C: 64366 0      50154 1      02510 1
24,2510       02531 1      02217 1      32663 0      04616 1   C: 21562 0      06022 1      02521 0      02512 0
24,2520       05155 0      05353 1   C: 04022 0      32664 1      04616 1   C: 20507 1      06022 1      02531 1
24,2530       02217 1      05353 1   C: 04022 0      02667 1      02551 1      30075 0      74747 0      00006 1

24,2540       12636 1      04616 1   C: 51333 0      50154 1      02545 1      02551 1      04616 1   C: 46116 0
24,2550       02636 0      40075 1      74746 1      00006 1      12627 1      30075 0      74745 1      00006 1
24,2560       12627 1      37714 1      55056 1      06037 0   I: 77650 1   C: 54412 1   I: 77776 1      05353 1
24,2570    C: 04022 0      12622 1   I: 77776 1      34755 1      55746 1      05353 1   C: 04022 0      37715 0

24,2600       05072 1   C: 02644 0   C: 50067 0      06037 0   I: 77735 0   C: 03747 0   I: 50054 0   C: 50604 0
24,2610    C: 50616 0   I: 77776 1      02667 1      02636 0      34755 1      02632 1   I: 77624 1   C: 11244 0
24,2620    I: 77650 1   C: 55431 1      25462 0      02667 1      02640 1      34756 1      02632 1      02667 1
24,2630       02640 1      34752 0      55745 1      04616 1   C: 46123 0      02451 0      32666 0      02233 1

24,2640       35000 1      04616 1   C: 01735 1      02451 0      32665 0      04616 1   C: 20507 1      06022 1
24,2650       44753 0      55746 1      05155 0      05353 1   C: 00152 1      04616 1   C: 53103 0      04616 1
24,2660    C: 17714 0      02217 1      02451 0   C: 00525 0   C: 01405 1   C: 01461 0   C: 02734 0      40104 0
24,2670       74744 0      10000 0      24002 0      00002 0      44736 0      00006 1      03012 1      02667 1

24,2700       02705 1      34755 1      55107 1      55110 1      02715 0      34740 0      70110 0      10000 0
24,2710       02725 0      34735 1      55107 1      44736 0      55110 1      05516 0   C: 00012 1      04616 1
24,2720    C: 52475 0      02722 1      04616 1   C: 17714 0      02760 1      05504 0   C: 00041 1      32310 1
24,2730       55114 0      36245 1      55456 0      06037 0   I: 43234 0   C: 21573 0   C: 11120 1   C: 34041 0

24,2740    C: 51255 1   I: 77776 1      05504 0   C: 00012 1      05516 0   C: 00126 1      06037 0   I: 77624 1
24,2750    C: 52373 1   I: 77776 1      02777 1      02111 1      04616 1   C: 17714 0      02760 1      02767 0
24,2760       32775 0      04616 1   C: 21562 0      06022 1      02772 1      02211 1      05155 0      05516 0
24,2770    C: 00041 1      03121 0      05353 1   C: 04022 0      03206 0   C: 00503 1   C: 00527 1      32310 1
```

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OCTAL LISTING FOR PARAGRAPH # 1, 2,   WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3000        55423 1        05504 0     C: 00005 1        05516 0     C: 00041 1        06037 0     I: 77634 0     C: 21573 0
24,3010     I: 77615 0     C: 11116 1     C: 03425 1     C: 34041 0     C: 51255 1     I: 77624 1     C: 52373 1     I: 77776 1
24,3020        03033 1        05155 0        06027 1     C: 52573 1        06037 0     I: 77614 1     C: 00345 0     C: 51043 1
24,3030     I: 77614 1     C: 00225 1     C: 51037 1        11423 1        03036 1        03105 0        55423 1        06037 0

24,3040     I: 52145 0     C: 03425 1     C: 51010 1     I: 77745 1     C: 03425 1     C: 34041 0     C: 50316 0     I: 77776 1
24,3050        05504 0     C: 00264 1        05516 0     C: 00012 1        05504 0     C: 00126 1        04616 1     C: 52475 0
24,3060        03061 0        06037 0     I: 44234 1     C: 21573 0     C: 03425 1     C: 03427 0     I: 77776 1        00006 1
24,3070        31427 1        05277 0     C: 03075 0     C: 50067 0        05155 0        06027 1     C: 52602 1        06011 1

24,3100        37714 1        05105 0     C: 02725 0     C: 50067 0        05261 1        33114 0        04616 1     C: 21562 0
24,3110        06022 1        06022 1        06022 1        05155 0     C: 00530 1     C: 00000 1     C: 01750 1     C: 00000 1
24,3120     C: 00062 0        05353 1     C: 04022 0        33134 1        04616 1     C: 20710 0        06022 1        02232 0
24,3130        03123 1        34745 0        05464 1        05155 0     C: 01510 1        05504 0     C: 00126 1        00004 0

24,3140        04674 0     C: 40140 0        00003 1        34736 1        00006 1        05012 1        33205 0        04616 1
24,3150     C: 20623 1        03176 1        03154 1        03201 1        00004 0        04523 1     C: 00035 1        03166 0
24,3160        04674 0     C: 40123 0        00003 1        05516 0     C: 00126 1        02163 1        00003 1        33204 1
24,3170        04616 1     C: 21562 0        03176 1        03167 1        03201 1        05155 0        05516 0     C: 00126 1

24,3200        06022 1        04616 1     C: 46116 0        03143 1     C: 00501 0     C: 00205 0        05504 0     C: 00037 0
24,3210        05516 0     C: 00041 1        34755 1        55733 0        55734 1        55735 0        05353 1     C: 04022 0
24,3220        33254 1        04616 1     C: 20504 1        06022 1        03230 0        03234 1        04616 1     C: 55442 0
24,3230        06027 1     C: 55643 0        06011 1        12063 1        05353 1     C: 04022 0        06027 1     C: 55643 0

24,3240        06011 1        00003 1        34774 1        04616 1     C: 01735 1        02667 1        03251 1        04616 1
24,3250     C: 46116 0        34755 1        55306 1        03216 1     C: 04120 0     I: 43020 1     C: 01757 0     C: 01343 1
24,3260     C: 51264 0     I: 77614 1     C: 04307 1     C: 51274 1     I: 77624 1     C: 27100 0     I: 77775 1     C: 00001 0
24,3270     C: 26352 1     C: 00007 0     C: 16360 0     C: 00015 0     C: 34041 0     C: 27066 1     I: 52375 1     C: 00007 0

24,3300     C: 02360 0     I: 76521 0     C: 01734 0     I: 77776 1        06027 1     C: 52602 1        06037 0     C: 25761 0
24,3310     C: 00001 0     I: 43051 1     C: 02352 1     C: 00350 1     C: 51321 0     I: 77604 0     C: 57753 1     I: 77661 0
24,3320     C: 20212 1     I: 41056 1     C: 50102 1     I: 76521 0     C: 01734 0     C: 15102 0     C: 00045 0     C: 01767 0
24,3330     I: 77614 1     C: 00231 1     C: 01757 0        04545 1        55737 1        06037 0     I: 65545 0     C: 03745 1

24,3340     I: 50025 0     C: 11355 1     C: 51347 0     I: 77776 1        34753 1        54154 0        13352 1     I: 77776 1
24,3350        34755 1        54154 0        31737 0        04640 1     C: 02525 1     C: 12525 0        35031 0        05072 1
24,3360     C: 02547 0     C: 64063 0        34774 1        05224 0        40110 0        74742 0        10000 0        15261 0
24,3370        40076 1        74740 1        00006 1        13376 1        26076 1        13356 0        34753 1        13363 0
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OCTAL LISTING FOR PARAGRAPH # 143,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3400       37714 1       05072 1    C: 03413 1    C: 50067 0       35000 1       05224 0       30077 1       74743 1
24,3410       10000 0       13400 1       15261 0       30077 1       74741 0       10000 0       13475 0       30110 1
24,3420       74752 1       10000 0       13475 0       04616 1    C: 53103 0       04616 1    C: 17714 0       13475 0
24,3430       53106 0       52155 1       00004 0       00006 1       30036 1       52157 0       00006 1       30034 0

24,3440       52161 0       30032 0       54162 0       04616 1    C: 53105 0       04616 1    C: 17714 0       13466 1
24,3450       00004 0       53334 0       53757 1       52155 1       53755 0       52157 0       53753 0       52161 0
24,3460       53460 0       30162 1       55461 1       34753 1       55462 1       15155 1       40101 0       74742 0
24,3470       10000 0       13475 0       05516 0    C: 00120 1       13443 0       34755 1       55462 1       05516 0

24,3500    C: 00063 1       44736 0       00006 1       03012 1       15155 1       34753 1       55145 1       34752 0
24,3510       04616 1    C: 20633 0       06001 0       03515 0       03507 0       33665 1       04616 1    C: 20476 0
24,3520       06001 0       03523 0       03515 0       06037 0    I: 77745 1    C: 01046 1    C: 34041 0    C: 27414 0
24,3530    I: 43014 0    C: 00304 0    C: 51550 0    C: 01674 0    I: 70535 0    C: 01146 0    I: 43030 0    C: 51541 0

24,3540    C: 01474 1    I: 43014 0    C: 01676 1    C: 01673 1    I: 77624 1    C: 27134 1    I: 77650 1    C: 51571 0
24,3550    I: 77775 1    C: 03676 0    C: 25535 0    C: 03704 1    C: 15543 1    C: 03763 0    C: 01517 0    I: 43014 0
24,3560    C: 01676 1    C: 00263 0    I: 53135 0    C: 01164 0    C: 51567 1    I: 77614 1    C: 00063 1    I: 77624 1
24,3570    C: 27107 1    I: 77745 1    C: 00015 0    C: 27763 0    C: 00017 1    C: 27676 0    C: 00025 0    C: 03704 1

24,3600    I: 53646 0    C: 57576 1    C: 27712 0    C: 00001 0    I: 50256 0    C: 00007 0    I: 67471 1    C: 03712 0
24,3610    C: 03714 0    I: 67334 1    C: 01163 1    C: 01146 0    I: 46142 1    C: 51620 1    I: 77650 1    C: 51623 1
24,3620    I: 77614 1    C: 04307 1    C: 51625 1    I: 77614 1    C: 00064 0    I: 67214 1    C: 01663 0    C: 00050 1
24,3630    I: 43054 1    C: 51633 0    C: 01463 1    I: 77775 1    C: 00001 0    C: 16032 1    C: 00015 0    I: 45014 0

24,3640    C: 00662 0    C: 26351 1    I: 77605 1    C: 11667 0    C: 03716 1    I: 77776 1       33664 0       04616 1
24,3650    C: 20476 0       06001 0       06001 0       06037 0    I: 43345 1    C: 03763 0    C: 11663 1    C: 01046 1
24,3660    I: 77634 0    C: 51515 1    C: 00003 1    C: 25140 0    C: 01453 1    C: 01442 1    C: 00243 1    C: 32703 1
24,3670    I: 46020 1    C: 00050 1    C: 51712 1    I: 77624 1    C: 51720 0    I: 61375 1    C: 02013 1    C: 00025 0

24,3700    I: 77772 0    I: 51235 1    C: 00001 0    C: 00001 0    I: 77721 0    C: 00025 0    I: 40372 0    C: 00001 0
24,3710    I: 77650 1    C: 00050 1    I: 77624 1    C: 55743 1    I: 77624 1    C: 15753 1    I: 77650 1    C: 51701 0
24,3720    I: 40220 0    C: 00051 0    C: 00011 1    I: 77770 1    C: 00005 1    I: 65345 0    C: 14017 1    C: 14011 1
24,3730    I: 45006 0    C: 53743 1    I: 71406 0    C: 14041 1    I: 77756 0    C: 14043 0    C: 14015 0    I: 41525 0

24,3740    C: 14007 0    I: 45170 0    C: 00004 0    C: 53743 1    C: 14027 1    C: 14013 0    I: 41525 0    C: 14005 1
24,3750    I: 45170 0    C: 00005 1    C: 53743 1    I: 71406 0    I: 77606 1    C: 00025 0    I: 76405 1    C: 00041 1
24,3760    C: 14035 1    I: 76405 1    C: 00043 0    C: 14037 0    I: 41556 1    I: 77676 0    C: 14033 1    C: 00027 1
24,3770    C: 14007 0    I: 76405 1    C: 00041 1    I: 77650 1    C: 53671 1    C: 03775 1    C: 03776 1  CKSM 76466 1
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OCTAL LISTING FOR PARAGRAPH # 124,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2000    C: 47777 0   C: 00001 0   C: 01150 1      11755 0      12006 1      15261 0      05203 0   C: 02003 0
25,2010    C: 52064 1      37713 0      05072 1   C: 02023 1   C: 52064 1      34736 1      00006 1      71754 1
25,2020       51753 1      55751 1      15261 0      02047 0      04616 1   C: 17714 0      25756 1      00004 0
25,2030       30101 1      74741 0      10000 0      12037 0      53102 1      51754 0      53601 0      41754 1

25,2040       61752 0      00006 1      12045 0      31754 0      64752 0      55754 1      15155 1      34753 1
25,2050       54133 1      51751 0      32054 1      14622 1   C: 53105 0   C: 53103 0   C: 53101 1   C: 53077 1
25,2060    C: 53075 0   C: 53073 0      02071 0      05221 0   C: 00144 0      44753 0      70110 0      54110 0
25,2070       15261 0      00006 1      23315 1      34753 1      00006 1      05012 1      05221 0   C: 00002 0

25,2100       34755 1      54035 0      54036 0      44753 0      00006 1      03012 1      05221 0   C: 01750 1
25,2110       44737 1      70110 0      54110 0      30035 1      04512 0   C: 57777 1      12121 0      34755 1
25,2120       12122 0      34740 0      56110 1      77741 0      26110 0      04564 1      01315 1      02156 1
25,2130       05221 0   C: 00002 0      34740 0      70110 0      10000 0      34735 1      02241 1      34740 0

25,2140       70110 0      10000 0      44736 0      02244 1      44741 0      70110 0      54110 0      74742 0
25,2150       10000 0      12573 0      44752 1      00006 1      03012 1      15261 0      34752 0      00006 1
25,2160       02012 0      10000 0      00002 0      54112 1      54113 0      34752 0      00006 1      05012 1
25,2170       00002 0      34740 0      70110 0      10000 0      34735 1      02241 1      37740 0      02244 1

25,2200       40110 0      74740 1      10000 0      32232 0      62231 0      02241 1      40110 0      74740 1
25,2210       10000 0      34735 1      02241 1      40110 0      74740 1      10000 0      44736 0      02244 1
25,2220       02233 1      44736 0      70110 0      54110 0      34742 1      70110 0      00006 1      13555 0
25,2230       02602 1   C: 67070 1   C: 61615 1      22110 1      34740 0      00006 1      06001 0      54110 0

25,2240       00002 0      55316 0      34755 1      12246 1      55316 0      34753 1      55317 1      00006 1
25,2250       23315 1      12254 1      05221 0   C: 00062 0      40110 0      77710 1      00006 1      12144 0
25,2260       31316 1      00006 1      51317 0      20035 0      54061 1      00006 1      72305 1      54001 1
25,2270       30110 1      74752 1      56061 0      04512 0   C: 77644 1      10061 1      01315 1      11317 1

25,2300       12302 0      54061 0      53110 1      02306 0      12252 1   C: 22715 1      22002 0      34753 1
25,2310       54062 1      50000 1      31107 0      54061 1      04512 0   C: 77177 0      12335 1      30061 0
25,2320       50062 0      56112 0      40000 0      60061 0      64754 0      50062 0      54053 0      10062 1
25,2330       12310 0      35020 0      00006 1      05014 1      00001 0      10061 1      42315 0      12341 1

25,2340       32315 1      54061 1      12320 0      32372 0      70110 0      10000 0      13530 0      00004 0
25,2350       44737 1      70110 0      64737 0      54110 0      34753 1      05203 0   C: 02370 1   C: 52067 1
25,2360       40110 0      74752 1      10000 0      12366 1      05567 0   C: 00510 0      00003 1      14631 0
25,2370       02071 0      13546 1   C: 02001 1   I: 43020 1   C: 01113 0   C: 00271 0   I: 77624 1   C: 47537 0
```

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OCTAL LISTING FOR PARAGRAPH # 145,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2400      I: 45175 0   C: 01102 0   C: 47671 1   I: 77624 1   C: 26133 1   I: 77776 1      00004 0      04523 1
25,2410      C: 01107 0      02414 1      25113 0      02432 0      40104 0      74744 0      00006 1      12456 0
25,2420         02461 0      40104 0      74744 0      00006 1      12456 0      30074 1      74745 1      10000 0
25,2430         02471 1      15155 1      25113 0      40110 0      74742 0      26110 0      74741 0      10000 0

25,2440         12446 1      02156 1      34752 0      05203 0   C: 02573 1   C: 52067 1      31306 0      00006 1
25,2450         12452 1      05155 0      00003 1      25113 0      31113 0      14640 0      34755 1      55306 1
25,2460         12452 1      02233 1      04523 1   C: 01111 1      12471 0      02233 1      34736 1      26110 0
25,2470         12412 0      02233 1      25113 0      12456 0   C: 00074 1      04645 1      55113 1      05516 0

25,2500      C: 00041 1      32474 1      55114 0      00004 0      02540 1   C: 01107 0      12523 0      00003 1
25,2510         00006 1      31110 0      53753 0      06037 0   I: 77624 1   C: 46041 0   C: 01102 0   I: 77414 0
25,2520      C: 00071 1      00004 0      12433 0      02233 1      02540 1   C: 01107 0      12533 1      02233 1
25,2530         34736 1      26110 0      12507 0      02233 1      05567 0   C: 00502 0      06011 1      05155 0

25,2540         50002 0      30000 1      24002 0      00006 1      50000 1      30001 0      52062 1      22002 0
25,2550         34740 0      70110 0      10000 0      14550 1      30061 0      04512 0   C: 66161 1      00001 0
25,2560         30062 0      00006 1      62570 1      64562 1      04512 0   C: 64420 0      00001 0      04560 0
25,2570         62572 0      12544 0   C: 03512 1      40110 0      74736 0      10000 0      02602 1      02171 1

25,2600         05221 0   C: 00062 0      34741 1      70110 0      10000 0      12623 0      10110 0      12612 1
25,2610         12612 1      12630 1      40110 0      74742 0      10000 0      13546 1      11114 0      12627 1
25,2620         42635 1      00006 1      03012 1      44742 0      70110 0      54110 0      13562 1      55114 0
25,2630         37714 1      05105 0   C: 02636 0   C: 52067 1      12600 1   C: 20002 1      00006 1      30036 1

25,2640         53110 1      06037 0   I: 77201 1   C: 00001 0   C: 01102 0   I: 74214 0   C: 00311 1   C: 52661 1
25,2650      C: 01767 0   I: 63372 1   C: 01761 0   I: 53361 0   C: 13072 0   I: 45056 0   C: 47537 0   I: 77624 1
25,2660      C: 47671 1   C: 14041 1   C: 01111 1   I: 41434 1   C: 21576 0   I: 65356 1   I: 41546 0   I: 65205 0
25,2670      C: 00041 1   C: 00045 0   I: 44205 0   C: 00001 0   I: 77626 0   C: 76666 0   I: 47135 0   C: 01110 0

25,2700      C: 21576 0   I: 71406 0   I: 73525 1   I: 41206 0   C: 00003 1   I: 65352 0   C: 00005 1   I: 41325 0
25,2710      C: 00007 0   C: 00001 [illegible]   I: 55552 0   I: 77441 0   C: 00041 1      40154 0      00006 1      73066 0
25,2720         55107 1      40110 0      74740 1      00006 1      12727 0      31110 0      12730 0      41110 1
25,2730         00006 1      73066 0      55110 1      06037 0   I: 41345 0   C: 00003 1   C: 00005 1   I: 65352 0

25,2740      I: 65276 1   C: 00001 0   I: 72405 0   C: 00005 1   I: 43066 0   C: 00311 1   C: 52751 0   I: 77624 1
25,2750      C: 47673 0   I: 77441 0   C: 01102 0      00006 1      43070 1      20155 1      10154 0      34755 1
25,2760         12762 1      34753 1      54155 1      10110 0      12767 1      12767 1      13017 0      10155 1
25,2770         13000 0      40074 0      74747 0      10000 0      13005 0      34736 1      00006 1      05012 1
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                 3:15 DEC.  2,1970                     PAGE 1676

OCTAL LISTING FOR PARAGRAPH # 146,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3000        34750 1       00006 1       02033 0       10000 0       13017 0       44742 0       70110 0       00004 0
25,3010        54110 0       05614 0    C: 00041 1       44752 1       00006 1       03012 1       15155 1       30076 0
25,3020        77712 0       00006 1       13041 0       06037 0    I: 74375 0    C: 01102 0    C: 01767 0    I: 41572 1
25,3030     I: 74375 0    C: 01761 0    C: 13072 0    I: 53362 0    I: 77656 1    C: 15102 0    C: 00045 0    C: 01767 0

25,3040     I: 77776 1       00004 0       40110 0       74741 0       10000 0       02306 0       30076 0       74740 1
25,3050        00006 1       15155 1       11456 0       03064 0       00004 0       06027 1    C: 52602 1       00003 1
25,3060        10067 1       05122 0       04616 1    C: 50731 1       55456 0       05155 0    C: 21122 0    C: 07777 1
25,3070     C: 33005 1    C: 00310 0    C: 00000 1       03113 1    C: 00017 1       03114 0    C: 00016 0       03114 0

25,3100     C: 00015 0       03114 0    C: 00014 1       03113 1    C: 00012 1       03113 1    C: 00011 1       55105 0
25,3110        34756 1       51105 1       13075 1       34753 1       00004 0       55105 0       00006 1       74751 1
25,3120        53106 0       10000 0       55111 0       64753 1       55100 0       33147 0       00006 1       02033 0
25,3130        55113 1       43074 0       00006 1       03013 0       50002 0       30000 1       00006 1       05013 0

25,3140        00006 1       30025 0       21106 0       34755 1       54001 1       53102 1       12366 1    C: 00230 0
25,3150        00006 1       04007 1       54016 1       00006 1       22012 1       34757 0       00006 1       02013 1
25,3160        55335 1       00006 1       13166 1       30046 0       51335 0       55332 0       11100 0       13211 1
25,3170        13174 1       05567 0    C: 00520 0       05270 1       30107 1       74735 0       00006 1       13206 1

25,3200        40077 0       74743 1       00006 1       13206 1       05567 0    C: 00521 1       44753 0       55100 0
25,3210        03560 1       55100 0       34751 0       00006 1       02013 1       00006 1       13276 0       03364 0
25,3220        30110 1       00006 1       06033 1       74746 1       00006 1       13231 0       05567 0    C: 00522 1
25,3230        03206 0       36245 1       00006 1       06013 0       76245 0       00006 1       13272 1       34733 1

25,3240        70046 1       62000 0       54001 1       30046 0       60000 1       74753 0       52064 1       34744 1
25,3250        03442 0       11111 0       03262 1       44753 0       55100 0       40061 1       70110 0       54110 0
25,3260        03616 0       03553 1       55111 0       11100 0       13266 1       13461 0       34750 1       00006 1
25,3270        05013 0       05270 1       34747 1       54061 1       34743 0       03320 0       34741 1       70110 0

25,3300        10000 0       13206 1       40110 0       74745 1       10000 0       13206 1       34750 1       54061 1
25,3310        34753 1       00006 1       02013 1       54002 1       10000 0       13317 0       13331 1       34751 0
25,3320        54001 1       00006 1       02033 0       56001 0       70110 0       00006 1       06001 0       10000 0
25,3330        03350 1       34733 1       70046 1       54064 1       30046 0       60000 1       74753 0       54063 0

25,3340        10002 1       13402 0       00006 1       42002 0       20064 1       30061 0       03443 1       03253 0
25,3350        22110 1       64753 1       00006 1       06001 0       54110 0       33147 0       00006 1       02033 0
25,3360        55113 1       05504 0    C: 00120 1       13206 1       40101 0       74741 0       10000 0       00002 0
25,3370        43401 0       70110 0       54001 1       33401 1       00006 1       02033 0       60001 0       54110 0
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OCTAL LISTING FOR PARAGRAPH # 147,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3400       03553 1   C: 00220 1      10001 1      13405 1      13345 1      31335 0      74751 1      10000 0
25,3410       13417 1      52064 1      20001 1      20001 1      20001 1      52064 1      13345 1      10063 0
25,3420       13431 0      40064 1      63441 0      00006 1      63431 1      40107 0      74751 1      26107 0
25,3430       13434 0      44751 1      70107 0      54107 0      00006 1      30064 0      20001 1      20001 1

25,3440       13344 0   C: 00714 0      54061 1      00006 1      02033 0      54001 1      40061 1      71113 1
25,3450       60001 0      57113 0      70061 1      00001 0      10000 0      03263 0      52064 1      21102 1
25,3460       00002 0      40061 1      70110 0      60061 0      54110 0      52064 1      53102 1      03616 0
25,3470       13174 1      00004 0      40110 0      74746 1      26110 0      34745 0      00006 1      02033 0

25,3500       00006 1      13530 0      34737 0      00006 1      05012 1      33545 0      05203 0   C: 03543 0
25,3510    C: 52067 1      02366 0      55100 0      05221 0   C: 00144 0      34745 0      00006 1      02033 0
25,3520       00006 1      13535 0      11100 0      13512 0      44737 1      00006 1      03012 1      13562 1
25,3530       34753 1      05203 0   C: 03555 1   C: 52067 1      02366 0      35000 1      05224 0      44737 1

25,3540       00006 1      03012 1      13555 0      34317 0      13512 0   C: 01130 1      34745 0      70110 0
25,3550       10000 0      13555 0      13562 1      44755 0      54734 0      34752 0      04635 0   C: 17665 1
25,3560       44755 0      54734 0      34752 0      04635 0   C: 17662 0   I: 45345 1   C: 01767 0   C: 13600 0
25,3570    I: 77644 1   C: 53574 1   I: 43535 0   C: 06522 1   I: 43535 0   C: 13577 0   C: 00001 0   C: 26467 0

25,3600    C: 00000 1      34735 1      02241 1      44741 0      70110 0      54110 0      15261 0      34753 1
25,3610       71303 1      10000 0      14707 1      03630 1      03625 0      14707 1      34753 1      71303 1
25,3620       10000 0      00002 0      44747 0      60061 0      10000 0      44753 0      13664 1      14570 0
25,3630       54065 0      34747 1      54001 1      30107 1      74751 1      10000 0      13656 0      34747 1

25,3640       70110 0      10000 0      13656 0      30107 1      50065 1      74753 0      10000 0      14570 0
25,3650       00006 1      22066 1      04602 1      00006 1      22066 1      14570 0      50065 1      44753 0
25,3660       70107 0      54107 0      30001 0      13650 0      54065 0      34751 0      54001 1      34744 1
25,3670       13640 1   C: 14027 1   C: 00011 1   I: 76405 1   C: 00043 0   C: 14031 0   C: 06522 1   I: 57525 1

25,3700    C: 00043 0   I: 63325 0   C: 00041 1   C: 00033 1   I: 63361 0   C: 14003 1   C: 00011 1   I: 53361 0
25,3710    C: 14001 0   I: 77772 0   C: 24041 1   I: 53361 0   C: 14003 1   C: 00033 1   I: 52361 1   C: 14001 0
25,3720    I: 65372 1   C: 00007 0   I: 74346 0   C: 00011 1   I: 73525 1   C: 00007 0   I: 52361 1   C: 00025 0
25,3730    I: 77772 0   C: 14033 1   C: 00007 0   I: 74356 1   I: 71525 0   C: 00007 0   I: 53361 0   C: 00025 0

25,3740    I: 57572 0   C: 34025 1   C: 00051 0   I: 54345 1   C: 00007 0   C: 20617 0   I: 72371 1   C: 01707 0
25,3750    C: 00155 0   C: 14017 1   C: 00020 0   I: 77605 1   I: 43257 0   C: 20206 1   I: 67206 1   C: 00017 1
25,3760    I: 41261 1   C: 20212 1   C: 00013 0   I: 43257 0   C: 20213 0   I: 77600 1   C: 53767 1   I: 77616 0
25,3770    C: 03770 1   C: 03771 0 CKSM 10540 1          @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 130,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2000     C: 17775 1   C: 02052 1   C: 00333 1   C: 10374 0   C: 77665 1   C: 42175 1   C: 22211 0   C: 00625 0
26,2010     C: 77777 0   C: 77767 1   C: 37436 1   C: 01613 1   C: 32417 1   C: 32160 1   C: 02052 1   C: 35552 0
26,2020     C: 37116 0   C: 32523 1      04616 1   C: 11254 1      36245 1      55051 0      34753 1      55052 0
26,2030        32117 1      04616 1   C: 20476 0      05472 0      02036 0      02030 0      06037 0   I: 43234 0

26,2040     C: 21573 0   C: 14122 0   C: 02205 1   C: 34041 0   C: 27066 1   I: 77775 1   C: 00001 0   C: 16207 0
26,2050     C: 02205 1   C: 34041 0   C: 27100 0   I: 52375 1   C: 02207 0   C: 00001 0   I: 47121 0   C: 01734 0
26,2060     C: 21726 1   C: 03773 1   I: 77776 1      41052 0      64753 1      00006 1      12113 1      06037 0
26,2070     I: 77775 1   C: 06520 0   C: 37765 1   C: 56040 0   C: 00322 1   I: 77776 1      04616 1   C: 54266 1

26,2100        32120 0      04616 1   C: 20476 0      05472 0      02106 1      02036 0      05516 0   C: 00124 0
26,2110        04616 1   C: 54123 0      15472 1      06037 0   I: 52175 0   C: 06514 1   C: 54072 0   C: 01014 0
26,2120     C: 01422 1   C: 00000 1   C: 13560 0      04645 1      55164 1      34746 0      70101 0      10000 0
26,2130        12136 0      06037 0   I: 77624 1   C: 56040 0   C: 00322 1   I: 77776 1      04616 1   C: 54266 1

26,2140        32254 0      04616 1   C: 20710 0      02242 1      02150 1      02175 0      02201 0      05155 0
26,2150        34746 0      70101 0      10000 0      12161 1      06037 0   I: 77624 1   C: 56040 0   C: 00322 1
26,2160     I: 77776 1      04616 1   C: 54266 1      02255 1      10000 0      12140 1      32254 0      04616 1
26,2170     C: 20451 0      02201 0      04616 1   C: 17750 0      12140 1      05516 0   C: 00124 0      31164 0

26,2200        04640 1      40100 1      74740 1      10000 0      00002 0      30002 0      54156 1      46245 0
26,2210        60133 0      55055 1      05353 1   C: 00132 1      34745 0      05464 1      00156 0      37714 1
26,2220        05146 1      34747 1      70075 1      10000 0      12237 1      34745 0      70074 0      10000 0
26,2230        02234 0      05353 1   C: 40112 1      05155 0      05353 1   C: 40072 0      05155 0      05504 0

26,2240     C: 00077 1      01055 0      31011 0      00006 1      12175 1      30100 0      74740 1      00006 1
26,2250        16001 1      06022 1   C: 20100 1   C: 00203 0   C: 01422 1      00006 1      00030 1      74742 0
26,2260        10000 0      00002 0      00006 1      00031 0      74736 0      00002 0      04645 1      55342 1
26,2270        30321 1      54772 1      30322 1      54766 1      30323 0      54770 0      06037 0   I: 45001 1

26,2300     C: 00001 0   C: 47543 0   I: 41345 0   C: 00743 1   C: 00747 0   I: 57552 1   I: 65336 1   C: 00741 0
26,2310     C: 14023 0   C: 00747 0   I: 72405 0   C: 00751 1   C: 34021 0   C: 26510 1   I: 41325 0   C: 00741 0
26,2320     C: 00743 1   I: 41512 1   I: 65205 0   C: 00745 1   I: 65205 0   C: 00737 1   C: 00751 1   I: 72405 0
26,2330     C: 00745 1   I: 45425 0   C: 63756 0   C: 00737 1   I: 72405 0   C: 00751 1   I: 45415 0   C: 43754 0

26,2340     C: 26510 1   I: 55525 0   I: 77634 0   C: 21620 0   C: 02345 1   I: 77776 1      31342 0      04640 1
26,2350     I: 47375 0   C: 03255 0   C: 06520 0   I: 47256 0   C: 03765 0   I: 40056 0   C: 54372 0   C: 17271 0
26,2360     C: 00045 0   I: 50025 0   C: 14411 0   C: 54372 0   I: 77775 1   C: 03271 0   C: 17271 0   C: 06520 0
26,2370     I: 77650 1   C: 56072 1   I: 52175 0   C: 06520 0   C: 54366 0   C: 15555 0   C: 35172 0   C: 14113 1
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OCTAL LISTING FOR PARAGRAPH # 151,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2400     C: 36326 0    C: 07701 0    C: 35703 0    C: 04343 1    C: 21616 0    C: 03070 0    C: 34344 0    C: 00000 1
26,2410     C: 00001 0    C: 00000 1    I: 77624 1    C: 11244 0    I: 43014 0    C: 04307 1    C: 55200 0    C: 02466 1
26,2420     I: 45014 0    C: 00747 0    C: 54454 0    C: 27414 0    I: 45014 0    C: 01674 0    C: 26644 0    I: 77624 1
26,2430     C: 55242 0    I: 77624 1    C: 11244 0    I: 77624 1    C: 27414 0    I: 43014 0    C: 01676 1    C: 02756 1

26,2440     C: 54444 1    I: 43014 0    C: 01476 0    C: 01475 0    I: 43014 0    C: 01474 1    C: 01673 1    I: 45014 0
26,2450     C: 01472 1    C: 55242 0    I: 77650 1    C: 54504 1    I: 77624 1    C: 27414 0    I: 45014 0    C: 01474 1
26,2460     C: 26644 0    I: 77624 1    C: 55242 0    I: 77624 1    C: 11244 0    I: 77624 1    C: 27414 0    I: 43014 0
26,2470     C: 01676 1    C: 02756 1    C: 54476 0    I: 43014 0    C: 01476 0    C: 01475 0    I: 43014 0    C: 01673 1

26,2500     C: 01674 0    I: 45014 0    C: 01472 1    C: 55242 0    I: 45014 0    C: 02716 0    C: 54510 1    C: 55251 1
26,2510     I: 77414 0    C: 04307 1    C: 54520 1       34755 1       55745 1       04616 1    C: 46123 0       06037 0
26,2520     I: 43174 1    C: 00000 1    C: 04304 1    C: 54526 1    I: 77714 0    C: 00002 0    I: 45134 0    C: 03720 1
26,2530     C: 11244 0    I: 66170 1    C: 00001 0    C: 03745 1    I: 54335 0    C: 01775 0    C: 20635 0    I: 77634 0

26,2540     C: 21633 1    C: 00025 0    I: 77624 1    C: 55333 1    I: 57414 1    C: 00707 1    C: 54547 0    C: 27525 0
26,2550     C: 06522 1    C: 03533 1    C: 17541 1    C: 00045 0    I: 44257 1    C: 56174 0    C: 03757 1    I: 77657 0
26,2560     C: 55574 1    C: 17547 1    C: 00045 0    I: 63501 0    C: 00047 1    I: 53605 1    C: 01771 1    C: 20577 0
26,2570     I: 53657 0    C: 20601 1    C: 57176 0    I: 47057 0    C: 57176 0    C: 21633 1    C: 02707 0    I: 76276 0

26,2600     C: 00025 0    I: 72240 1    C: 54605 0    C: 00025 0    C: 02707 0    I: 77624 1    C: 55401 1    I: 45131 0
26,2610     C: 03746 1    C: 00002 0    C: 11244 0    I: 77624 1    C: 55333 1    I: 53725 1    C: 00045 0    C: 57202 0
26,2620     C: 24045 0    I: 57414 1    C: 00707 1    C: 54624 0    I: 77761 1    C: 00045 0    C: 27533 1    C: 01653 0
26,2630     I: 53257 1    C: 57170 0    C: 01667 1    I: 53715 1    C: 01601 1    C: 57170 0    I: 52255 1    C: 01615 1

26,2640     I: 50315 0    C: 00001 0    C: 00007 0    I: 53606 1    C: 56174 0    I: 57316 1    C: 01773 0    C: 02707 0
26,2650     I: 54335 0    C: 01776 0    C: 20621 0    C: 00031 0    I: 50025 0    C: 02707 0    C: 54662 1    I: 77745 1
26,2660     C: 00031 0    C: 02707 0    I: 60545 0    I: 53725 1    C: 03751 1    C: 56577 1    I: 77625 0    I: 77675 0
26,2670     C: 00045 0    C: 27547 1    C: 00001 0    I: 47235 0    I: 57414 1    C: 00707 1    C: 54677 0    I: 77657 0

26,2700     C: 57200 1    C: 27525 0    C: 06522 1    C: 00025 0    C: 27541 1    C: 03525 0    I: 60246 1    C: 00025 0
26,2710     I: 51575 1    C: 03533 1    I: 71301 0    C: 00027 1    C: 00027 1    I: 50025 0    C: 00025 0    C: 54723 0
26,2720     I: 52150 1    C: 00026 0    C: 54725 0    I: 77750 0    C: 00024 1    I: 53775 1    C: 03525 0    C: 20201 0
26,2730     C: 27525 0    C: 03533 1    I: 77657 0    C: 20201 0    C: 17533 1    C: 03547 1    I: 77657 0    C: 20201 0

26,2740     C: 03547 1    I: 53745 1    C: 00045 0    C: 20200 1    I: 41316 0    C: 02707 0    I: 47012 1    C: 21633 1
26,2750     C: 36707 1    C: 55401 1    I: 77624 1    C: 11244 0    I: 77414 0    C: 04307 1    C: 55176 1       33332 0
26,2760        54006 0       31457 0       54766 1       31460 1       54770 0       31461 0       54772 1       06037 0
26,2770     I: 45175 0    C: 06520 0    C: 47664 0    I: 76505 0    C: 01734 0    C: 27677 1    C: 06516 0    I: 77624 1
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OCTAL LISTING FOR PARAGRAPH # 132,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3000     C: 47673 0   I: 76505 0   C: 01734 0   C: 27705 0   C: 06514 1   I: 77624 1   C: 47673 0   I: 76505 0
26,3010     C: 01734 0   C: 37713 0   C: 55361 0   I: 45131 0   C: 03746 1   C: 00003 1   C: 11244 0   I: 50375 0
26,3020     C: 03724 0   C: 03677 1   I: 77752 1   C: 24023 0   C: 03724 0   I: 72441 0   C: 03713 1   C: 34021 0
26,3030     C: 26510 1   I: 41221 0   C: 03736 0   C: 15441 1   I: 41472 0   I: 52545 1   C: 01701 0   I: 44257 1

26,3040     C: 56176 1   I: 53605 1   C: 03722 0   C: 21601 0   C: 27547 1   C: 03724 0   I: 76435 1   C: 03705 0
26,3050     I: 77656 1   I: 57414 1   C: 00747 0   C: 55054 0   C: 27525 0   C: 06522 1   C: 03533 1   C: 17541 1
26,3060     C: 03722 0   I: 53657 0   C: 20577 0   C: 56176 1   C: 03541 1   I: 77735 0   C: 02011 0   I: 41215 1
26,3070     C: 15436 1   C: 03722 0   I: 41257 1   C: 21601 0   C: 03722 0   I: 53657 0   C: 20577 0   C: 57176 0

26,3100     I: 47057 0   C: 57176 0   C: 21633 1   C: 36707 1   C: 55401 1   I: 77624 1   C: 11244 0   I: 77624 1
26,3110     C: 55361 0   I: 45131 0   C: 03746 1   C: 00004 0   C: 11244 0   I: 47375 0   C: 03724 0   C: 03705 0
26,3120     I: 47372 1   C: 03724 0   I: 77772 0   I: 57414 1   C: 00747 0   C: 55126 1   C: 27525 0   C: 06522 1
26,3130     C: 03533 1   C: 17541 1   C: 03722 0   I: 53657 0   C: 20577 0   C: 56176 1   C: 03543 0   I: 77735 0

26,3140     C: 02012 0   I: 41215 1   C: 15436 1   C: 03722 0   I: 41257 1   C: 21601 0   C: 03722 0   I: 53657 0
26,3150     C: 20577 0   C: 57176 0   I: 47057 0   C: 57176 0   C: 21633 1   C: 16707 0   C: 03732 1   I: 44336 1
26,3160     C: 03734 1   I: 56405 0   C: 15441 1   I: 52525 1   C: 01703 1   I: 44257 1   C: 56176 1   I: 53605 1
26,3170     C: 03722 0   C: 21601 0   C: 37547 0   C: 55401 1   I: 77624 1   C: 11244 0   I: 77650 1   C: 50566 1

26,3200     I: 77624 1   C: 27414 0   I: 43014 0   C: 01472 1   C: 01674 0   I: 77624 1   C: 55242 0   I: 77624 1
26,3210     C: 11244 0   I: 45014 0   C: 02666 0   C: 27414 0   I: 46145 0   C: 03463 0   C: 55231 1   I: 43014 0
26,3220     C: 01675 1   C: 01476 0   I: 43014 0   C: 01474 1   C: 01673 1   I: 77624 1   C: 55242 0   I: 77650 1
26,3230     C: 54510 1   I: 77624 1   C: 55251 1   I: 45014 0   C: 01474 1   C: 26644 0   I: 77624 1   C: 55242 0

26,3240     I: 77650 1   C: 54510 1   I: 71220 1   C: 03675 0   C: 03755 0   C: 34041 0   C: 27134 1   I: 77650 1
26,3250     C: 03675 0   I: 77776 1      33331 0      54006 0      33437 1      55257 1      34755 1      51257 0
26,3260        55400 0      11257 1      03255 0      33332 0      54006 0      06037 0   I: 67214 1   C: 04307 1
26,3270     C: 55274 0   C: 02001 1   I: 77650 1   C: 55276 1   I: 77735 0   C: 02007 1   I: 77661 0   C: 20606 0

26,3300     C: 02401 0   C: 02411 1   C: 02421 1   I: 67214 1   C: 04307 1   C: 55311 1   C: 02002 1   I: 77650 1
26,3310     C: 55313 0   I: 77735 0   C: 02010 1   C: 02511 0   C: 02521 0   C: 02531 1   I: 77735 0   C: 02003 0
26,3320     C: 02621 0   I: 77735 0   C: 02004 1   C: 02631 1   I: 66214 0   C: 02476 0   C: 03463 0   C: 00000 1
26,3330     I: 77616 0   C: 54065 0   C: 54067 1   I: 77201 1   C: 00001 0   C: 01645 1   I: 77754 1   C: 03720 1

26,3340     I: 53257 1   C: 57165 1   C: 01661 1   I: 53715 1   C: 01573 1   C: 57165 1   I: 52255 1   C: 01607 1
26,3350     I: 41434 1   C: 21724 0   C: 17724 0   C: 00045 0   I: 77657 0   C: 20201 0   C: 24045 0   C: 03724 0
26,3360     I: 77616 0   I: 45020 1   C: 03675 0   C: 55333 1   I: 50276 1   C: 03705 0   I: 41572 1   C: 03732 1
26,3370     I: 44316 0   C: 06512 1   I: 41366 1   C: 00045 0   I: 60352 0   C: 00047 1   C: 03722 0   I: 77650 1
```

OCTAL LISTING FOR PARAGRAPH # 153, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
26,3400      C: 03675 0    I: 45020 1    C: 03675 0    C: 46531 1    I: 51575 1    C: 02673 1    I: 53754 1    C: 03720 1
26,3410      C: 56174 0    C: 24317 1    C: 02665 0    I: 53646 0    C: 56174 0    C: 00315 0    I: 54335 0    C: 02005 0
26,3420      C: 20613 1    I: 50025 0    C: 00315 0    C: 50572 1    I: 45335 0    C: 02006 0    C: 00317 1    I: 77640 0
26,3430      C: 50572 1    I: 77624 1    C: 46743 0    I: 77650 1    C: 03675 0    C: 00103 0    C: 03370 0    C: 00241 0

26,3440      C: 31103 1    C: 36652 0       34755 1       55736 0       34736 1       00006 1       05012 1       34736 1
26,3450         70076 1       00006 1       15155 1       33713 1       00004 0       05203 0    C: 03643 0    C: 54067 1
26,3460         00003 1       40110 0       74736 0       00006 1       15155 1       06037 0    I: 43234 0    C: 21573 0
26,3470      C: 15715 0    C: 34041 0    C: 27100 0    I: 77775 1    C: 00001 0    C: 27676 0    C: 00007 0    C: 17740 1

26,3500      C: 00015 0    C: 34041 0    C: 27066 1    I: 52375 1    C: 00001 0    C: 03676 0    I: 77656 1    C: 27712 0
26,3510      C: 00007 0    I: 47256 0    C: 00001 0    I: 77656 1    C: 03704 1    I: 52375 1    C: 00007 0    C: 03740 1
26,3520      I: 76521 0    C: 01734 0    C: 03740 1    I: 53135 0    C: 03737 1    C: 55636 1    I: 53025 0    C: 15711 1
26,3530      C: 55623 0    I: 77775 1    C: 03720 1    C: 24015 0    C: 03726 1    C: 00023 0    I: 77761 1    C: 15705 1

26,3540      C: 27726 1    C: 00015 0    I: 53361 0    C: 06520 0    C: 03720 1    I: 77656 1    C: 27720 1    C: 00015 0
26,3550      I: 77761 1    C: 15705 1    C: 27726 1    C: 00023 0    I: 52361 1    C: 06520 0    C: 03726 1    I: 77656 1
26,3560      C: 03726 1    I: 53361 0    C: 15707 0    C: 03712 0    I: 64256 1    C: 01734 0    I: 77772 0    C: 25102 0
26,3570      C: 03740 1    C: 01741 0    I: 77776 1       00004 0       06027 1    C: 52602 1       44735 0       70110 0

26,3600         64735 1       54110 0       06037 0    I: 77624 1    C: 52373 1    I: 77776 1       03675 0       03675 0
26,3610         00006 1       30036 1       53753 0       06037 0    I: 77624 1    C: 46061 0    I: 65545 0    C: 00045 0
26,3620      C: 03735 0    I: 77776 1       05155 0    I: 47375 0    C: 03704 1    C: 03712 0    I: 77656 1    C: 27720 1
26,3630      C: 03712 0    I: 53435 0    C: 03720 1    C: 03726 1    I: 77650 1    C: 55561 0    I: 64375 1    C: 03712 0

26,3640      C: 01734 0    I: 52152 1    C: 55567 0       30074 1       74745 1       00006 1       15261 0       37713 0
26,3650         05105 0    C: 03654 0    C: 54067 1       05261 1       34750 1       00006 1       02033 0       00006 1
26,3660         13667 1       46242 1       61736 1       00006 1       13442 1       25736 1       13444 1       33703 0
26,3670         55733 0       00004 0       06027 1    C: 52602 1       05155 0       05567 0    C: 00527 1       00004 0

26,3700         06027 1    C: 55643 0       05155 0    C: 25547 0    C: 33555 1    C: 01106 1    C: 01642 0    C: 11045 0
26,3710      C: 00001 0    C: 00000 1    C: 00454 1    C: 01130 1    C: 00000 1    C: 00226 1    I: 46020 1    C: 00050 1
26,3720      C: 55733 0    I: 77624 1    C: 51720 0    I: 77775 1    C: 02013 1    I: 53235 0    C: 00001 0    C: 00001 0
26,3730      I: 52105 1    C: 00025 0    C: 51706 1    I: 77624 1    C: 55743 1    I: 77624 1    C: 15753 1    I: 76521 0

26,3740      C: 00025 0    I: 77650 1    C: 55725 1    I: 40220 0    C: 00051 0    C: 00011 1    I: 77770 1    C: 00000 1
26,3750      I: 65345 0    C: 01712 1    C: 14021 1    I: 45006 0    C: 53743 1    I: 41401 1    C: 00023 0    I: 65346 0
26,3760      C: 00023 0    I: 65356 1    C: 06522 1    I: 73525 1    C: 00023 0    I: 65276 1    C: 00023 0    I: 63346 0
26,3770      C: 06522 1    I: 41525 0    C: 06520 0    I: 77650 1    C: 00051 0    C: 03775 1    C: 03776 1  CKSM 73435 1
```

```
OCTAL LISTING FOR PARAGRAPH # 154, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2000     C: 00000 1    C: 07622 0    C: 00000 1    C: 00762 1    C: 00030 1    C: 35104 1    C: 00016 0    C: 36237 1
27,2010     C: 35711 0    C: 35663 1    C: 03631 0    C: 23146 0    C: 33226 1    C: 14632 0    C: 05306 1    C: 15503 0
27,2020     C: 26337 1    C: 30000 1    C: 55340 0    C: 61710 0    C: 00072 1    C: 16206 1    C: 00344 1    C: 24331 0
27,2030     C: 24775 1    C: 30424 0    I: 40020 1    C: 03325 0    C: 56035 1    I: 52164 0    C: 03246 1    C: 56046 0

27,2040     I: 40020 1    C: 03325 0    C: 56043 0    I: 47164 1    C: 03246 1    C: 44403 0    C: 34032 1    C: 44410 1
27,2050     I: 61375 1    C: 03773 1    C: 03247 0    I: 77656 1    C: 00035 1    I: 53435 0    C: 03765 0    I: 57400 1
27,2060     C: 56174 1    C: 17271 0    C: 00045 0    I: 50025 0    C: 14411 0    C: 56170 1    I: 50375 0    C: 03765 0
27,2070     C: 00035 1    I: 65552 0    I: 77624 1    C: 44527 1    I: 75160 1    C: 03246 1    C: 02230 1    I: 77624 1

27,2100     C: 44312 1    I: 51545 1    C: 00007 0    I: 50025 0    C: 14376 0    C: 56160 0    I: 51545 1    C: 03765 0
27,2110     I: 51025 1    C: 14400 0    C: 56160 0    I: 77775 1    I: 77626 0    C: 50514 1    I: 77626 0    C: 50522 1
27,2120     I: 77626 0    C: 50530 1    C: 03255 0    I: 57444 1    C: 56125 1    I: 50035 1    C: 03765 0    C: 56134 1
27,2130     I: 57575 1    C: 03765 0    C: 37271 1    C: 56137 1    I: 77775 1    C: 03765 0    C: 03271 0    I: 51545 1

27,2140     C: 03765 0    I: 51025 1    C: 14402 1    C: 56147 0    I: 52145 0    C: 14406 0    C: 56151 1    I: 77745 1
27,2150     C: 14404 1    I: 77624 1    C: 44527 1    I: 75160 1    C: 03246 1    C: 02230 1    I: 77624 1    C: 44312 1
27,2160     I: 45160 1    C: 00000 1    C: 44654 0    I: 40234 0    C: 21620 0    C: 00001 0    I: 77650 1    C: 03325 0
27,2170     I: 50375 0    C: 00035 1    C: 03765 0    I: 72240 1    C: 54350 0    C: 00032 0    I: 77650 1    C: 03325 0

27,2200        22062 0       24002 0       00006 1       22061 0       54063 0       75012 0       64741 1       54064 1
27,2210        45012 0       70063 0       54063 0       22007 0       50001 0       41410 1       60064 0       00006 1
27,2220        12232 1       44747 0       60001 0       00006 1       12230 0       24001 0       24001 0       12214 0
27,2230        52062 1       52006 0       45012 0       50001 0       71411 0       00006 1       60063 1       00006 1

27,2240        12242 0       12221 0       34353 0       50001 0       55410 1       12230 0    I: 71220 1    C: 03632 0
27,2250     C: 03442 0    C: 03763 0    I: 77614 1    C: 01347 0    C: 54336 1    I: 77201 1    C: 00001 0    C: 03650 1
27,2260     C: 02331 1    I: 53435 0    C: 03642 1    C: 27673 0    C: 03642 1    C: 02323 1    I: 65236 0    C: 00045 0
27,2270     I: 56205 0    C: 16412 1    I: 41205 0    C: 03664 0    C: 01245 0    I: 77671 1    C: 03735 0    C: 24017 1

27,2300     C: 03656 1    I: 74241 0    C: 03673 0    C: 03673 0    I: 41552 0    I: 65245 1    C: 03656 1    C: 00017 1
27,2310     I: 63356 1    C: 00007 0    I: 53435 0    C: 03673 0    I: 45561 1    C: 50076 0    I: 65256 0    C: 00017 1
27,2320     I: 74346 0    I: 74255 0    C: 03701 1    C: 00045 0    I: 53352 0    I: 77626 0    C: 74076 0    I: 77656 1
27,2330     C: 27673 0    C: 03701 1    I: 45006 0    C: 15733 1    I: 77650 1    C: 03632 0    I: 77745 1    C: 03442 0

27,2340     C: 00041 1    I: 77621 1    C: 03631 0    C: 37452 0    C: 27057 0    I: 40375 1    C: 00001 0    C: 00001 0
27,2350     C: 03642 1    C: 02323 1    I: 77656 1    C: 27537 0    C: 00007 0    C: 03650 1    C: 02331 1    I: 65345 0
27,2360     C: 06522 1    C: 16406 1    I: 43214 1    C: 03745 1    C: 56366 1    C: 16410 0    I: 66006 1    C: 02776 0
27,2370     I: 45134 0    C: 02777 1    C: 22000 1    I: 41575 0    C: 02366 0    C: 03701 1    I: 77656 1    C: 17673 0
```

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OCTAL LISTING FOR PARAGRAPH # 155, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2400    C: 00045 0   C: 37664 1   C: 15733 1   I: 77650 1   C: 03632 0   C: 00707 1   C: 03434 1   C: 03070 0
27,2410    C: 34344 0   C: 00024 1   C: 13714 1   I: 77775 1   C: 03673 0   I: 76521 0   C: 01734 0   C: 27773 1
27,2420    C: 06520 0   C: 27765 0   C: 03673 0   C: 03607 0   I: 53435 0   C: 03642 1   I: 46125 0   C: 00045 0
27,2430    C: 56441 0   I: 45575 1   C: 74162 1   I: 76435 1   C: 03607 0   I: 77676 0   C: 03623 0   I: 43414 1

27,2440    C: 01073 1   I: 47375 0   C: 03607 0   C: 03650 1   I: 41456 0   I: 77650 1   C: 56431 1   I: 77614 1
27,2450    C: 01347 0   C: 56731 1   I: 52375 1   C: 03701 1   C: 03527 1   C: 03707 1   I: 76521 0   C: 01734 0
27,2460    C: 03254 1   I: 51575 1   C: 03707 1   C: 03664 0   I: 77201 1   C: 00001 0   C: 03707 1   C: 27701 1
27,2470    C: 03527 1   I: 57414 1   C: 01344 0   C: 00052 0   I: 77656 1   I: 41441 0   C: 03707 1   I: 56244 0

27,2500    C: 55526 0   C: 03743 1   I: 41215 1   C: 06520 0   I: 56261 1   C: 20613 1   C: 00045 0   I: 43205 1
27,2510    C: 16535 0   C: 03741 0   C: 03517 1   I: 77615 0   C: 01235 1   C: 17442 0   C: 03517 1   I: 51025 1
27,2520    C: 16537 1   C: 61111 1   I: 43014 0   C: 01066 0   C: 01224 1   C: 00052 0   I: 77776 1      05567 0
27,2530    C: 01407 0      06037 0   I: 77650 1   C: 61111 1   C: 77715 1   C: 77777 0   C: 00000 1   C: 00620 0

27,2540       06037 0   I: 43001 1   C: 00001 0   C: 01266 1   I: 51575 1   C: 03701 1   I: 41325 0   C: 21021 1
27,2550    C: 34017 0   I: 72471 0   C: 01245 0   I: 41421 0   I: 43014 0   C: 05342 1   C: 56626 0   C: 02463 1
27,2560    I: 56345 0   C: 16001 1   C: 01245 0   I: 50021 1   C: 00001 0   C: 56610 0   I: 41325 0   C: 03737 1
27,2570    C: 16700 1   I: 65221 0   C: 01245 0   C: 03735 0   I: 60405 0   C: 16702 0   I: 41471 0   I: 51021 0

27,2600    C: 00003 1   C: 56626 0   I: 55345 0   I: 43205 1   C: 16702 0   C: 16676 1   I: 77650 1   C: 56616 0
27,2610    I: 41345 0   C: 01245 0   I: 41542 1   I: 56215 1   C: 16003 0   C: 16005 0   I: 77414 0   C: 01066 0
27,2620       07257 0      30154 1      56001 0      34755 1      53517 1      12650 1   I: 41345 0   C: 00001 0
27,2630    C: 01245 0   I: 43006 0   C: 05302 0   C: 56071 1   I: 43071 0   C: 16007 1   C: 02663 0   I: 41400 0

27,2640    C: 56653 1   I: 51025 1   C: 16704 0   C: 56061 0   I: 52015 1   C: 16704 0   C: 56616 0   I: 77776 1
27,2650       05353 1   C: 00003 1      05155 0   I: 40545 1   I: 77671 1   C: 16011 0   C: 03517 1   I: 77776 1
27,2660       12650 1   I: 51025 1   C: 16706 1   C: 56666 1   I: 77614 1   C: 02463 1   I: 77745 1   I: 77776 1
27,2670       12620 0   I: 62471 1   C: 34007 1   I: 77650 1   C: 56667 0   C: 00144 0   C: 00000 1   C: 01274 1

27,2700    C: 00000 1   C: 00764 1   C: 00000 1   C: 01130 1   C: 00000 1   C: 21304 0   C: 00000 1      06037 0
27,2710    I: 77601 0   C: 00001 0   I: 71214 0   C: 01072 0   C: 06522 1   I: 77725 1   C: 16406 1   I: 43214 1
27,2720    C: 03745 1   C: 56723 1   C: 15410 0   I: 45006 0   C: 22002 0   I: 77776 1      05353 1   C: 00002 0
27,2730       15155 1   I: 51575 1   C: 01221 1   I: 53744 0   C: 02777 1   C: 57576 1   C: 27715 1   C: 03444 0

27,2740    I: 47051 0   C: 01221 1   C: 21724 0   C: 17656 1   C: 00045 0   I: 53674 1   C: 00046 0   C: 57576 1
27,2750    C: 00037 0   I: 41301 0   C: 00050 1   C: 03715 1   I: 57101 0   C: 00047 1   C: 00046 0   I: 77734 1
27,2760    C: 03766 0   C: 17725 1   C: 00037 0   I: 65342 1   C: 03715 1   I: 65342 1   C: 03723 1   I: 43342 0
27,2770    I: 45415 0   C: 74044 1   I: 41225 1   C: 00037 0   C: 03721 0   I: 77621 1   C: 03717 0   I: 45325 1
```

```
OCTAL LISTING FOR PARAGRAPH # 156,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3000     C: 03733 0   C: 03715 1   I: 70501 1   C: 00047 1   I: 41271 0   C: 03725 1   I: 53664 0   C: 00046 0
27,3010     C: 57575 1   I: 77754 1   C: 03766 0   I: 75366 0   C: 02673 1   C: 00041 1   I: 41345 0   C: 03733 0
27,3020     C: 03721 0   I: 77621 1   C: 03717 0   I: 45325 1   C: 03733 0   C: 03723 1   I: 70501 1   C: 00047 1
27,3030     I: 41271 0   C: 03725 1   I: 53664 0   C: 00046 0   C: 57575 1   I: 65366 1   C: 03733 0   I: 56225 1

27,3040     C: 00037 0   C: 03733 0   I: 41566 1   I: 67542 0   I: 65205 0   C: 17216 1   I: 56325 0   C: 00037 0
27,3050     C: 03733 0   I: 77600 1   C: 57053 0   I: 41366 1   I: 44242 0   I: 65365 1   C: 02673 1   C: 17216 1
27,3060     I: 45302 1   I: 65205 0   C: 03733 0   C: 03733 0   I: 75442 1   I: 77605 1   I: 52525 1   C: 03717 0
27,3070     I: 55366 1   I: 43225 0   C: 03631 0   C: 01235 1   C: 14037 0   I: 77765 0   C: 00037 0   C: 00037 0

27,3100     I: 77214 0   C: 03705 0   C: 57123 0   C: 03656 1   I: 53451 1   C: 03537 0   I: 63361 0   C: 00037 0
27,3110     C: 03656 1   I: 53455 0   C: 03537 0   I: 53361 0   C: 00041 1   I: 53744 0   C: 02777 1   C: 57177 1
27,3120     C: 02337 1   I: 77650 1   C: 57166 1   I: 50375 0   C: 03656 1   C: 03537 0   I: 77240 1   C: 57146 0
27,3130     C: 03656 1   I: 63362 0   C: 03537 0   I: 53362 0   I: 77656 1   I: 57406 1   I: 75235 1   C: 02674 0

27,3140     C: 02673 1   I: 74256 0   C: 00037 0   I: 77715 1   I: 77650 1   C: 57113 0   I: 74575 0   C: 03537 0
27,3150     I: 74515 0   C: 03656 1   I: 53451 1   I: 77606 1   I: 75235 1   C: 02674 0   C: 02673 1   I: 74256 0
27,3160     C: 00041 1   I: 77715 1   I: 53361 0   C: 00037 0   I: 77650 1   C: 57115 0   I: 77651 0   C: 03553 1
27,3170     C: 02366 0   I: 53135 0   C: 03000 1   C: 57177 1   I: 52175 0   C: 02366 0   C: 57212 1   I: 53575 0

27,3200     C: 01221 1   I: 45345 1   C: 01235 1   C: 03512 1   I: 56205 0   C: 16023 1   C: 00043 0   I: 53361 0
27,3210     C: 03521 1   C: 02366 0   C: 02366 0   I: 77650 1   C: 56455 0   C: 31103 1   C: 36652 0      05516 0
27,3220     C: 00137 1      45017 0      00006 1      03012 1      35014 1      00006 1      05012 1      05221 0
27,3230     C: 13550 0      45014 0      00006 1      03012 1      35017 1      00006 1      05012 1      31402 0

27,3240        05173 1   C: 03260 0      31401 0      05224 0      44740 1      00006 1      03012 1      30102 1
27,3250        74742 0      00006 1      13264 0      34737 0      05072 1   C: 02323 1   C: 02067 1      05261 1
27,3260        44742 0      00006 1      03012 1      13247 1      05504 0   C: 00137 1      05261 1   I: 76521 0
27,3270     C: 01734 0   I: 77650 1   C: 47646 0   I: 50375 0   C: 03254 1   C: 02146 0   I: 51025 1   C: 02577 0

27,3300     C: 57307 1   I: 50375 0   C: 02146 0   C: 03537 0   I: 50025 0   C: 02601 1   C: 30351 0   I: 77614 1
27,3310     C: 04631 1   C: 00715 1   I: 50375 0   C: 03537 0   C: 03720 1   I: 41312 1   C: 03631 0   C: 02335 0
27,3320     I: 77616 0      00006 1      33357 0      53253 0      40103 1      74745 1      26103 1      34735 1
27,3330        54107 0      00006 1      34755 1      52753 1      30102 1      74744 0      10000 0      13343 1

27,3340        00006 1      34755 1      52755 1      00006 1      34755 1      52757 0      00006 1      34755 1
27,3350        52765 1      34764 0      54001 1      40000 0      52761 0      15644 0   C: 03770 1   C: 64067 1
27,3360     C: 00037 0   I: 53575 0   C: 02207 0   I: 77725 1   C: 00045 0   C: 00015 0   I: 77701 1   C: 00047 1
27,3370     C: 24041 1   C: 02215 0   I: 77761 1   C: 00037 0   C: 02170 0   I: 47361 0   C: 00041 1   I: 47572 1
```

```
OCTAL LISTING FOR PARAGRAPH # 157,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3400      C: 14035 1    C: 06512 1    I: 63271 0    C: 00041 1    C: 02170 0    I: 57436 1    C: 00025 0    I: 43257 0
27,3410      C: 20573 1    I: 77626 0    C: 77744 0    I: 41457 1    C: 20173 0    I: 75446 0    I: 77701 1    C: 00050 1
27,3420      C: 00031 0    I: 75316 1    I: 55254 1    C: 57425 0    C: 06512 1    C: 00027 1    I: 77616 0    I: 41345 0
27,3430      C: 00033 1    C: 00035 1    I: 57457 0    C: 20571 0    I: 51415 0    C: 17765 0    I: 43366 0    C: 06512 1

27,3440      I: 55206 0    C: 00035 1    I: 53657 0    C: 20601 1    C: 20572 0    C: 14017 1    I: 41005 1    C: 00027 1
27,3450      C: 57753 1    I: 53654 0    C: 57461 0    C: 57603 0    I: 40057 1    C: 57576 1    C: 57461 0    I: 77644 1
27,3460      C: 57453 1    I: 77745 1    C: 17771 0    C: 00021 1    I: 77616 0    I: 77614 1    C: 03436 0    C: 57472 1
27,3470      I: 77614 1    C: 03676 0    C: 00023 0    I: 77657 0    C: 20201 0    C: 00021 1    I: 44205 0    C: 00033 1

27,3500      C: 06512 1    I: 41206 0    C: 00021 1    I: 53725 1    C: 00035 1    C: 20573 1    I: 43276 0    I: 77657 0
27,3510      C: 20601 1    I: 71214 0    C: 03756 0    C: 57515 1    C: 06522 1    I: 75440 0    C: 57650 0    I: 41076 0
27,3520      C: 57753 1    C: 24045 0    C: 02170 0    I: 52441 1    C: 02207 0    C: 00017 1    I: 44240 1    C: 57550 0
27,3530      C: 00045 0    C: 14043 0    C: 00033 1    I: 44205 0    C: 00041 1    I: 51406 1    I: 40015 1    C: 17757 1

27,3540      C: 57561 1    I: 65345 0    C: 06522 1    I: 57545 1    C: 00033 1    I: 71240 1    C: 57655 0    I: 77616 0
27,3550      I: 77745 1    I: 45345 1    C: 00023 0    C: 00015 0    C: 14043 0    C: 00045 0    I: 52015 1    C: 00017 1
27,3560      C: 57535 0    I: 65215 1    C: 17761 1    C: 00043 0    I: 53605 1    C: 00031 0    C: 57201 0    I: 77671 1
27,3570      I: 40145 0    C: 00043 0    C: 57653 0    I: 45471 1    C: 77732 1    I: 63406 0    I: 41206 0    C: 00035 1

27,3600      I: 75261 0    C: 20206 1    C: 00045 0    C: 14045 0    I: 41206 0    C: 00033 1    I: 77657 0    C: 20201 0
27,3610      C: 00043 0    I: 41234 1    C: 57735 1    I: 44302 0    C: 00023 0    I: 41215 1    C: 00015 0    I: 51042 0
27,3620      C: 57641 0    I: 75206 1    C: 00017 1    I: 71244 0    C: 57645 1    C: 00027 1    I: 51076 1    C: 57645 1
27,3630      I: 77676 0    I: 56205 0    C: 17755 0    C: 00031 0    I: 53657 0    C: 57602 1    C: 57602 1    I: 43257 0

27,3640      C: 57576 1    I: [illegible] 0    C: 00037 0    C: 57651 1    I: 77616 0    I: 77745 1    I: 77650 1    C: 57641 0
27,3650      I: 77745 1    I: 43545 1    C: 17771 0    I: 77712 0    I: 41465 0    I: 45345 1    C: 00045 0    C: 00017 1
27,3660      C: 14013 0    I: 77626 0    C: 77732 1    I: 53605 1    C: 00027 1    C: 57576 1    I: 41206 0    C: 00045 0
27,3670      I: 41057 0    C: 57576 1    C: 21712 0    C: 00043 0    I: 41234 1    C: 57735 1    C: 00043 0    I: 45242 1

27,3700      C: 17763 0    I: 41405 0    I: 41345 0    C: 00045 0    C: 00015 0    I: 43312 0    C: 00017 1    C: 14045 0
27,3710      C: 00035 1    I: 53605 1    C: 00027 1    C: 57575 1    I: 53765 0    C: 00045 0    C: 57576 1    C: 14045 0
27,3720      C: 00027 1    I: 4136[illegible] 1    C: 17755 0    I: 77615 0    I: 45257 0    C: 57577 0    C: 00013 0    I: 53605 1
27,3730      C: 00027 1    C: 57601 1    I: 52057 1    C: 57602 1    C: 57641 0       07222 1    C: 00004 0    C: 12525 0

27,3740      C: 12525 0    C: 71463 0    C: 57703 1    C: 04423 0    C: 17645 0    C: 74604 0    C: 43667 1    C: 01626 1
27,3750      C: 37256 1    C: 77404 1    C: 52071 0       06061 0    C: 06220 1    C: 37553 0    C: 37777 1    C: 37700 1
27,3760      C: 00000 1    C: 00100 0    C: 04000 0    C: 00000 1    C: 02000 0    C: 00000 1    C: 00305 1    C: 11205 0
27,3770      C: 37777 1    C: 37777 1    C: 03772 0    C: 03773 1  CKSM 45310 1         @             @             @
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OCTAL LISTING FOR PARAGRAPH # 160,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2000    C: 02445 0    C: 00274 0    I: 77615 0    C: 02201 0    C: 02201 0    I: 47573 0    C: 02555 0    I: 77615 0
30,2010    C: 02203 1    C: 02203 1    I: 47573 0    C: 02643 1    I: 77615 0    C: 02205 1    C: 02205 1    I: 75500 0
30,2020    C: 62137 0    I: 77661 0    C: 20613 1    C: 16205 1    C: 02203 1    I: 77766 0    C: 16203 1    C: 02201 0
30,2030    I: 77766 0    C: 02201 0    I: 52000 0    C: 60035 1    C: 60042 1    I: 77745 1    C: 06530 1    C: 02201 0

30,2040    C: 02203 1    C: 02205 1    I: 45345 1    C: 02201 0    C: 20060 0    I: 71240 1    C: 60051 0    C: 20060 0
30,2050    C: 02201 0    I: 66150 0    C: 00051 0    C: 00052 0    I: 77776 1       04635 0    C: 27425 1    C: 01670 1
30,2060    C: 17000 1       05353 1    C: 04024 0       04616 1    C: 11254 1       05504 0    C: 00141 0       05504 0
30,2070    C: 00307 0       05504 0    C: 00015 0       06011 1       05516 0    C: 00010 0       36000 1       55251 1

30,2100       34751 0       55515 0       34755 1       55462 1       33035 1       04616 1    C: 20476 0       16001 1
30,2110       12112 0       12104 1       05353 1    C: 04024 0       06037 0    I: 77624 1    C: 46432 0    I: 45014 0
30,2120    C: 04464 0    C: 60254 1    I: 77745 1    C: 25761 0    C: 17517 1    C: 03442 0    C: 34041 0    C: 27057 0
30,2130    I: 64375 1    C: 00007 0    C: 01734 0    I: 77772 0    C: 27601 0    C: 00001 0    I: 52521 0    C: 01734 0

30,2140    C: 37521 0    C: 67130 1    I: 53575 0    C: 03521 1    C: 37537 1    C: 57312 0    I: 57461 0    C: 20606 0
30,2150    C: 17643 0    C: 06456 0    C: 16277 1    C: 06460 0    C: 02273 0    I: 77776 1       05353 1    C: 04024 0
30,2160       33034 0       04616 1    C: 20476 0       16001 1       12166 0       12160 0       32320 1       55455 0
30,2170       05353 1    C: 04024 0       06037 0    I: 54345 1    C: 03643 0    C: 20206 1    I: 77615 0    C: 02335 0

30,2200    C: 27633 1    C: 03537 0    I: 53361 0    C: 06454 1    C: 03601 0    C: 03527 1    I: 72441 0    C: 03537 0
30,2210    C: 27474 0    C: 03537 0    I: 53435 0    C: 03720 1    C: 03726 1    I: 77614 1    C: 04421 1    C: 60321 1
30,2220    I: 77745 1    C: 02361 1    I: 65316 0    C: 02355 0    I: 43316 1    I: 75454 0    C: 60232 1    I: 55352 0
30,2230    C: 02355 0    I: 77736 0    C: 26363 0    C: 03254 1    I: 50256 0    C: 03537 0    I: 65552 0    I: 77676 0

30,2240    C: 02365 0    I: 77776 1       05353 1    C: 04024 0       05516 0    C: 00213 1       00004 0       04674 0
30,2250    C: 40142 1       00003 1       04635 0    C: 74126 1    I: 77745 1    C: 16013 1    C: 03641 1    C: 03637 0
30,2260    C: 17635 1    C: 16017 0    C: 16263 1    C: 16021 0    C: 16271 1    C: 34013 1    I: 54276 0    C: 20214 1
30,2270    C: 02267 0    I: 57535 0    C: 26001 1    I: 77702 1    C: 02265 1    I: 43414 1    C: 04747 1    C: 60300 1

30,2300    I: 43345 1    C: 25757 0    C: 02333 0    C: 17631 0    C: 06522 1    C: 03654 0    C: 03633 1    C: 02273 0
30,2310    C: 26275 0    C: 01563 0    I: 64235 1    C: 01555 0    C: 01734 0    I: 77656 1    C: 03720 1    I: 77616 0
30,2320    C: 02022 0    I: 51575 1    C: 03521 1    C: 26301 1    C: 03726 1    I: 72441 0    C: 03527 1    C: 26313 1
30,2330    C: 03726 1    I: 76435 1    C: 03537 0    C: 02303 0    I: 72441 0    C: 03527 1    C: 36311 1    C: 57312 0

30,2340    I: 77775 1    C: 03563 1    I: 50341 1    C: 27147 0    C: 03537 0    I: 47315 0    C: 03537 0    C: 03527 1
30,2350    I: 56236 0    C: 02301 1    I: 43352 1    I: 77626 0    C: 61462 0    C: 02277 1    I: 77625 0    C: 02313 1
30,2360    C: 02343 1    I: 65361 0    C: 03726 1    C: 02275 0    I: 77625 0    C: 02311 0    C: 02341 0    I: 65361 0
30,2370    C: 02303 0    C: 02273 0    I: 77625 0    C: 03474 0    C: 02337 1    I: 53361 0    C: 03537 0    I: 76455 1
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OCTAL LISTING FOR PARAGRAPH # 161, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2400     I: 77626 0    C: 74131 1    I: 41345 0    C: 03517 1    C: 02315 1    I: 76561 1    C: 03537 0    I: 77645 0
30,2410     C: 03646 0    C: 03646 0    I: 76521 0    C: 02146 0    C: 27502 0    C: 03646 0    I: 43046 1    C: 04745 0
30,2420     C: 60425 1    I: 77671 1    C: 20001 1    C: 37517 0    C: 60746 1    I: 41471 0    C: 02265 1    I: 44205 0
30,2430     C: 26201 0    C: 17771 0    I: 41205 0    C: 02271 1    I: 77625 0    C: 02267 0    C: 03517 1    I: 57461 0

30,2440     C: 20614 0    C: 17454 1    C: 03517 1    I: 45214 1    C: 03710 1    C: 60451 1    C: 21021 1    I: 77640 0
30,2450     C: 30355 1    I: 77745 1    C: 03517 1    I: 50025 0    C: 21023 0    C: 60612 1    I: 45345 1    C: 02271 1
30,2460     C: 03517 1    I: 45071 0    C: 02271 1    C: 61036 0    I: 41461 1    C: 20206 1    I: 44265 0    C: 03517 1
30,2470     C: 02271 1    I: 43006 0    C: 04703 1    C: 60502 0    I: 45345 1    C: 03517 1    C: 21025 0    I: 43044 0

30,2500     C: 60510 0    C: 04463 1    I: 77745 1    C: 06522 1    C: 02351 1    C: 02353 0    I: 77650 1    C: 60572 1
30,2510     I: 45345 1    C: 03517 1    C: 00003 1    I: 72406 0    I: 52421 1    C: 03517 1    I: 41325 0    C: 03517 1
30,2520     C: 03474 0    I: 45215 0    C: 02301 1    C: 03631 0    I: 41325 0    C: 02337 1    C: 00005 1    I: 62415 0
30,2530     I: 56271 0    C: 00007 0    C: 03517 1    C: 02351 1    I: 71240 1    C: 60541 1    C: 06522 1    C: 36351 0

30,2540     C: 60553 1    I: 56202 1    C: 02271 1    I: 51025 1    C: 26203 1    C: 60553 1    I: 41345 0    C: 26203 1
30,2550     C: 02271 1    I: 77612 1    C: 02351 1    I: 77745 1    C: 03517 1    I: 43205 1    C: 02311 0    C: 02335 0
30,2560     I: 65225 1    C: 03633 1    C: 02341 0    I: 43205 1    C: 00005 1    I: 56312 1    I: 40271 1    C: 03517 1
30,2570     C: 00005 1    C: 02353 0    I: 41345 0    C: 02351 1    C: 00003 1    I: 56325 0    C: 02337 1    C: 00001 0

30,2600     I: 45302 1    I: 77626 0    C: 61432 0    C: 02353 0    I: 65205 0    I: 60465 0    C: 02341 0    I: 77625 0
30,2610     C: 00001 0    C: 02347 0    I: 71201 1    C: 00001 0    C: 27147 0    I: 77605 1    C: 02351 1    I: 56215 1
30,2620     C: 02345 1    C: 02271 1    I: 45352 1    C: 02315 1    C: 16357 1    C: 27147 0    I: 43205 1    C: 02353 0
30,2630     C: 02347 0    I: 72471 0    C: 02271 1    C: 02355 0    I: 65361 0    C: 02303 0    C: 02357 1    I: 53361 0

30,2640     C: 03537 0    I: 41572 1    I: 65246 1    C: 02263 1    I: 45316 1    C: 00043 0    I: 41525 0    C: 02263 1
30,2650     I: 45316 1    C: 00043 0    I: 71240 1    C: 60657 0    C: 00011 1    I: 52166 1    C: 60665 1    I: 55345 0
30,2660     C: 00007 0    I: 77761 1    C: 00001 0    C: 14001 0    C: 06522 1    I: 77765 0    C: 02343 1    C: 02361 1
30,2670     I: 77761 1    C: 03726 1    I: 53372 1    C: 00001 0    C: 03254 1    I: 43001 1    C: 00001 0    C: 04704 0

30,2700     C: 60220 1    I: 77614 1    C: 04701 0    C: 60755 0    I: 57575 1    C: 03537 0    C: 17262 1    C: 03654 0
30,2710     I: 51025 1    C: 01235 1    C: 60721 0    I: 77614 1    C: 04711 1    C: 57273 0    I: 43014 0    C: 01664 1
30,2720     C: 06666 1    I: 77776 1       30105 0       74742 0       10000 0       12747 0       06037 0    I: 77624 1
30,2730     C: 61111 1    I: 77776 1       30105 0       74742 0       10000 0       12747 0       30104 1       74742 0

30,2740        10000 0       12747 0       33033 1       04616 1    C: 20451 0       12747 0    I: 77776 1       15155 1
30,2750     I: 77776 1       00004 0       04674 0    C: 40153 1       12732 1    I: 45345 1    C: 02301 1    C: 02333 0
30,2760     I: 50025 0    C: 26700 1    C: 16667 1    I: 43014 0    C: 04661 1    C: 04711 1    C: 60704 1    I: 43345 1
30,2770     C: 01235 1    C: 25755 1    C: 37654 1    C: 60704 1    I: 77614 1    C: 04631 1    C: 60763 0       05353 1
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OCTAL LISTING FOR PARAGRAPH # 1 2,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3000     C: 04024 0       33017 1       04616 1    C: 20476 0       13007 1       13007 1       12777 0       05353 1
30,3010     C: 04024 0       00004 0       04674 0    C: 40123 0       05516 0    C: 00215 1       16001 1    C: 04125 0
30,3020     C: 00062 0    C: 00000 1    C: 00031 0    C: 00000 1    C: 00175 1    C: 00000 1    C: 00045 0    C: 20000 0
30,3030     C: 00010 0    C: 14400 0    C: 00000 1    C: 01477 1    C: 01514 0    C: 01441 1    I: 44301 0    C: 00163 0

30,3040     C: 17771 0    I: 77776 1       07222 1    C: 00006 1    C: 00000 1    C: 00002 0    C: 76777 1    C: 77175 1
30,3050     C: 77400 0    C: 75416 0    C: 77507 0    C: 65515 0    C: 77741 0    C: 63547 1    C: 77052 0    C: 55373 0
30,3060     C: 01167 0    C: 30361 0    C: 76520 1    C: 75267 0       34755 1       54156 1       00006 1       33103 0
30,3070        52155 1       52132 0       30162 1       07307 1       52156 1       52155 1       52132 0       20155 1

30,3100        06037 0    I: 43476 0    C: 00542 1    C: 34414 1    I: 77775 1    C: 06520 0    C: 03270 1    C: 03262 1
30,3110     I: 77616 0    I: 77775 1    C: 03254 1    I: 40200 1    C: 61113 0    C: 00023 0    I: 77420 1    C: 03247 0
30,3120        33751 1       56003 1       55646 0       30111 0       74737 1       10000 0       34753 1       55650 1
30,3130        34743 0       55652 0       70111 1       55651 0       00004 0       30032 0       54772 1       30033 1

30,3140        54766 1       30034 0       54770 0       34742 1       00006 1       02030 0       10000 0       13164 0
30,3150        34736 1       00006 1       02031 1       10000 0       13164 0       55652 0       31635 0       54772 1
30,3160        31636 0       54766 1       31637 1       54770 0       06037 0    I: 77634 0    C: 21726 1    C: 24001 0
30,3170     C: 03262 1    I: 47034 0    C: 21726 1    C: 47615 0    C: 24015 0    C: 00325 0    I: 53404 1    C: 61750 1

30,3200     I: 45000 0    C: 61215 0    C: 47671 1    I: 77776 1       31671 0       22157 1       03503 1       55671 1
30,3210        31673 1       22161 1       03503 1       55673 0       06037 0    I: 46135 1    C: 03252 1    C: 61223 0
30,3220     I: 45175 0    C: 00015 0    C: 61523 1    I: 77775 1    C: 02162 0    C: 34015 1    C: 61523 1    I: 57575 1
30,3230     C: 02146 0    C: 00015 0    I: 47375 0    C: 00015 0    C: 00001 0    I: 41456 0    I: 76435 1    C: 00001 0

30,3240     C: 00015 0    I: 63361 0    C: 03274 0    I: 51361 1    C: 03272 0    I: 53372 1    C: 00001 0    I: 77656 1
30,3250     C: 00001 0    I: 76435 1    C: 00015 0    C: 00007 0    I: 47276 1    C: 00001 0    I: 77772 0    C: 00015 0
30,3260     I: 77624 1    C: 61533 0    I: 77776 1       30156 0       54001 1       33773 1       03727 0       56156 0
30,3270        00006 1       20156 1       00006 1       13275 0       13756 1       00004 0       22007 0       34752 0

30,3300        54142 1       30001 0       00006 1       70000 0       64350 0       00006 1       63311 1       34755 1
30,3310        55651 0       50142 0       30154 1       50142 0       54321 0       00006 1       50142 0       21635 1
30,3320        40000 0       50142 0       55675 0       54001 1       10142 1       13300 0       11652 0       13752 0
30,3330        30101 1       74745 1       00006 1       13752 0       23677 0       51650 0       33767 1       03727 0

30,3340        55677 1       31676 1       00006 1       70746 0       54001 1       51636 0       33771 0       03727 0
30,3350        00006 1       10746 0       57676 1       00006 1       70740 0       20001 1       40000 0       00006 1
30,3360        21675 0       54001 1       51650 0       33767 1       03727 0       55675 0       11651 0       41675 0
30,3370        55675 0       41676 0       00006 1       70740 0       20001 1       27675 0       41675 0       55643 0
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OCTAL LISTING FOR PARAGRAPH # 163,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3400       41676 0      00006 1      70740 0      20001 1      27643 0      27643 0      41676 0      00006 1
30,3410       70750 1      20001 1      00006 1      70746 0      55644 1      41677 1      00006 1      70742 1
30,3420       27644 1      27644 1      27644 1      31676 1      00006 1      70742 1      20001 1      00006 1
30,3430       70746 0      55645 0      41677 1      00006 1      70750 1      27645 0      27645 0      27645 0

30,3440       34752 0      54142 1      50142 0      31675 1      00006 1      73774 1      03743 1      50142 0
30,3450       55640 0      50142 0      11643 0      64753 1      13456 1      64753 1      00006 1      50142 0
30,3460       71643 0      00006 1      74741 0      00006 1      50142 0      11530 1      54001 1      33771 0
30,3470       03727 0      50142 0      55277 0      10142 1      13441 1      31546 1      54003 0      06037 0

30,3500    I: 52001 1   C: 00001 0   C: 03247 0      00006 1      22142 0      54143 0      40000 0      60001 0
30,3510       00006 1      51650 0      73762 0      54001 1      33764 1      03727 0      60143 1      54001 1
30,3520       33765 0      03727 0      00142 0   I: 63441 0   C: 00001 0   I: 50025 0   C: 21767 1   C: 61232 0
30,3530    I: 43531 1   C: 03252 1   C: 00000 1   I: 63545 0   C: 00003 1   I: 51021 0   C: 06512 1   C: 61542 0

30,3540    I: 77745 1   C: 06522 1   I: 77566 1      00006 1      30155 0      20001 1      54145 0      13552 1
30,3550       34733 1      54145 0      50120 1      30002 0      22154 1      03622 1      54156 1      34755 1
30,3560       03600 1      34751 0      03600 1      40141 1      03622 1      54155 1      34750 1      03600 1
30,3570       33577 1      03600 1      40141 1      03622 1      54154 0      06037 0   I: 77616 0   C: 00016 0

30,3600       60120 1      54116 0      50116 1      30000 1      00006 1      63607 0      40000 0      60145 1
30,3610       00006 1      63617 1      00006 1      50116 1      30001 0      00006 1      10145 0      54001 1
30,3620       22141 0      00002 0      00006 1      13665 0      00006 1      22144 0      54142 1      30001 0
30,3630       54143 0      34755 1      00006 1      10142 1      00006 1      13654 1      10143 0      34755 1

30,3640       13644 0      40142 1      54142 1      34735 1      54143 0      30142 0      03672 1      03743 1
30,3650       00006 1      20143 0      03743 1      00144 0      40143 0      03672 1      64736 1      54143 0
30,3660       10142 1      30143 1      13652 1      40143 0      13652 1      10001 1      34755 1      00002 0
30,3670       34735 1      00002 0      60000 1      54021 0      13700 1      50000 1      44734 1      54021 0

30,3700       00006 1      70000 0      54141 1      00006 1      73726 0      63725 1      00006 1      70141 1
30,3710       63724 0      00006 1      70141 1      63723 1      00006 1      70141 1      63722 0      00006 1
30,3720       70021 0      00002 0   C: 24406 0   C: 00660 1   C: 16204 0   C: 50744 0   C: 20315 1      54141 1
30,3730       34755 1      00006 1      10141 1      10000 0      22141 0      13737 0      13741 1      30001 0

30,3740       00002 0      40141 1      00002 0      10000 0      64753 1      00002 0      40000 0      00002 0
30,3750       05567 0   C: 00402 1      00004 0      04674 0   C: 40165 1      13475 0      05567 0   C: 00401 1
30,3760       13275 0   C: 03246 1   C: 06315 0   C: 03146 1   C: 00071 1   C: 02041 0   C: 01673 1   C: 03434 1
30,3770    C: 00266 0   C: 01616 1   C: 00133 0   C: 14344 1   C: 01463 1   C: 03775 1   C: 03776 1 CKSM 71361 0
```

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OCTAL LISTING FOR PARAGRAPH # 164,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2000     C: 00222 0    C: 33316 0    C: 07401 0    C: 06613 0    C: 00024 1    C: 00307 0    C: 17534 0       06037 0
31,2010     I: 77624 1    C: 62120 0    I: 77776 1       00006 1       31601 1       53607 0       00006 1       31603 0
31,2020        53611 1       00006 1       31605 0       53613 0       32143 0       04616 1    C: 20334 1       15472 1
31,2030        12032 0       12024 1       22007 0       34756 1       54002 1       50002 0       41600 1       50002 0

31,2040        61606 0       26001 1       10002 1       12034 0       22000 1       00006 1       12051 0       05504 0
31,2050     C: 00160 0       06037 0    I: 77414 0    C: 03707 1    C: 62056 0       15472 1    I: 77745 1    C: 02201 0
31,2060     I: 72412 0    C: 14001 0    C: 02203 1    C: 14003 1    C: 02205 1    I: 77661 0    C: 20213 0    C: 00005 1
31,2070     I: 72014 1    C: 04307 1    C: 62102 0    C: 00000 1    I: 72130 0    C: 02000 0    C: 00002 0    I: 52130 1

31,2100     C: 02001 1    C: 62110 0    I: 66150 0    C: 00000 1    C: 02006 0    I: 66150 0    C: 00002 0    C: 02007 1
31,2110     I: 66150 0    C: 00004 0    C: 02003 0    I: 77730 0    C: 02002 1    I: 77414 0    C: 02676 1       15472 1
31,2120     I: 40020 1    C: 00001 0    C: 62123 0    I: 45014 0    C: 03667 0    C: 27414 0    I: 71331 0    C: 00051 0
31,2130     C: 00006 1    C: 06522 1    C: 02201 0    C: 02203 1    C: 02205 1    I: 77770 1    C: 00066 1    I: 47573 0

31,2140     C: 02467 0    I: 77650 1    C: 00002 0    C: 01543 1       05353 1    C: 04024 0       00004 0       04616 1
31,2150     C: 40153 1       04616 1    C: 40127 1       06037 0    I: 43014 0    C: 04067 1    C: 04666 0    I: 77214 0
31,2160     C: 05062 0    C: 01221 1    C: 16032 1    C: 01235 1    I: 45014 0    C: 01463 1    C: 26351 1    I: 77201 1
31,2170     C: 00001 0    C: 01221 1    I: 65352 0    C: 01235 1    I: 45006 0    C: 51670 1    C: 02023 1    I: 77776 1

31,2200        32215 0       04616 1    C: 20476 0       16001 1       12206 0       12200 0       06037 0    I: 77775 1
31,2210     C: 06520 0    C: 36231 1    C: 33506 1    I: 77776 1       16001 1    C: 01453 1       31246 0       00006 1
31,2220        72417 0       00006 1       23607 1       02400 1       53470 1       00006 1       31464 0       02400 1
31,2230        55615 0       53466 0       41617 1       60025 0       74733 0       40000 0       65002 0       00006 1

31,2240        62244 1       00006 1       31611 0       21470 1       35014 1       54003 0       00006 1       31507 1
31,2250        52131 0       35016 0       54003 0       44755 0       55606 1       40131 0       61620 1       00006 1
31,2260        62272 1       40130 1       61465 1       00006 1       62267 0       31467 0       12277 0       42002 0
31,2270        61467 0       12301 0       40131 0       61465 1       00006 1       62302 1       32003 0       53466 0

31,2300        34737 0       55606 1       03740 1       00006 1       31466 1       55620 0       53613 0       00006 1
31,2310        41470 1       21613 0       31612 0       61606 0       55614 1       54055 0       34750 1       00006 1
31,2320        05014 1       30025 0       55617 1       31762 0       54130 1       41011 1       62501 1       00006 1
31,2330        12335 1       31235 1       54130 1       35003 1       12336 1       35000 1       54002 1       00006 1

31,2340        74746 1       22131 1       40130 1       60025 0       62004 1       74357 0       22007 0       00006 1
31,2350        10002 1       00006 1       71612 1       60000 1       53611 1       11612 1       64753 1       12361 0
31,2360        64753 1       00006 1       71612 1       00006 1       10131 0       22007 0       21611 1       01607 1
31,2370        34737 0       55606 1       44755 0       55620 0       53612 1       00006 1       23607 1       12312 1
```

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OCTAL LISTING FOR PARAGRAPH # 165,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2400        00006 1      22130 0      52155 1      07103 1   C: 01244 1      07103 1   C: 02005 0      07257 0
31,2410        30154 1      00006 1      12415 1      34733 1      00130 0      52156 1      00130 0   C: 04143 0
31,2420        12641 1      12641 1      12630 1      12621 1      13003 0      13013 1      12704 1      13013 1
31,2430        13061 1      13061 1      13061 1      13531 1      13245 0      13245 0      13245 0      13432 0

31,2440        13331 1      13352 1      13360 0      13473 0      13477 1      13527 0      13733 1      13735 1
31,2450        13735 1   C: 00000 1   C: 00000 1   C: 00034 0   I: 77776 1      34752 0      55647 1      12603 1
31,2460        55647 1      13003 0      05353 1   C: 00035 1      05353 1   C: 05023 0   C: 21000 1      00006 1
31,2470        00030 1      74747 0      10000 0      12551 0      05321 1   C: 00103 0      12557 0      03740 1

31,2500        05311 1   C: 00102 1      00006 1      31474 1      53645 0      06037 0   I: 41535 1   C: 01457 0
31,2510     I: 41535 1   C: 01455 1   I: 55535 1   C: 01453 1   I: 43161 0   C: 25537 1   C: 00463 0   C: 26631 1
31,2520     C: 01255 1   I: 77676 0   C: 27764 1   C: 06522 1   C: 17767 1   C: 02540 1   C: 17757 1   C: 01235 1
31,2530     C: 03760 0   I: 77776 1      34755 1      55620 0      55610 0      55611 1      55647 1      34752 0

31,2540        55621 1      55351 0      04616 1   C: 40165 1      05516 0   C: 00311 1      05516 0   C: 00143 1
31,2550        13531 1      05311 1   C: 00103 0      34755 1      55746 1      34363 0      12536 1      34737 0
31,2560        00006 1      02031 1      10000 0      12601 0      41011 1      62501 1      00006 1      12574 1
31,2570        31746 0      00006 1      12601 0      12477 0      30075 0      74740 1      00006 1      12505 1

31,2600        13531 1      34755 1      55746 1      00006 1      31625 1      53574 1      03740 1      00006 1
31,2610        31561 1      53625 0      00006 1      31643 1      53553 1      11623 0      12641 1      51351 1
31,2620        12421 0      05311 1   C: 00101 1      44752 1      55647 1      05516 0   C: 00311 1      12641 1
31,2630        05311 1   C: 00100 0      31425 0      27552 0      34740 0      00006 1      05013 0      05516 0

31,2640     C: 00143 1      06037 0   I: 45345 1   C: 03625 0   C: 03574 1   I: 41461 1   C: 21214 0   I: 47361 0
31,2650     C: 03635 1   C: 02325 1   I: 47045 0   C: 03635 1   C: 21726 1   I: 76561 1   C: 02333 0   C: 17545 0
31,2660     I: 77776 1      52155 1      21553 1      03740 1      00006 1      31553 0      53643 0      00006 1
31,2670        31545 1      53635 1      00006 1      31547 0      53637 0      00006 1      31551 1      53641 1

31,2700        03704 1      03740 1      51351 1      12425 1      30102 1      74746 1      00006 1      13013 1
31,2710        31666 0      00006 1      13013 1      00004 0      31267 0      55554 0      31266 1      55556 1
31,2720        03740 1      34755 1      55267 1      55266 0      55555 1      55557 0      30120 1      54166 1
31,2730        06037 0   I: 52375 1   C: 03635 1   C: 03521 1   I: 41434 1   C: 21726 1   I: 76435 1   C: 02154 0

31,2740     I: 65361 0   C: 03555 1   C: 03557 0   I: 52361 1   C: 02154 0   I: 41455 0   I: 45345 1   C: 00001 0
31,2750     C: 05660 1   I: 71240 1   C: 62755 1   C: 05660 1   C: 00001 0   I: 45345 1   C: 03635 1   C: 03521 1
31,2760     I: 74271 0   C: 00001 0   I: 53455 0   C: 03521 1   I: 76561 1   C: 02333 0   C: 03545 0   I: 77776 1
31,2770        03740 1      00006 1      31545 1      53635 1      00006 1      31547 0      53637 0      00006 1
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OCTAL LISTING FOR PARAGRAPH # 166,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3000       31551 1      53641 1      13013 1      06037 0   I: 64375 1   C: 00025 0   C: 01734 0   I: 53362 0
31,3010    C: 03254 1   C: 03527 1   I: 77776 1      06037 0   I: 47375 0   C: 03521 1   C: 02325 1   I: 70455 1
31,3020    C: 03527 1   C: 02265 1   I: 77721 0   C: 02603 0   C: 03627 1   I: 55525 0   C: 06522 1   I: 52446 0
31,3030    C: 26263 1   C: 03521 1   I: 41451 1   C: 03635 1   I: 76521 0   C: 02603 0   C: 02637 1   I: 77646 0

31,3040    C: 26625 1   I: 50234 1   C: 21726 1   C: 02146 0   I: 77776 1      30120 1      54166 1      30154 1
31,3050       60000 1      04616 1   C: 61672 0      63753 0      00006 1      73752 0      55667 0      51351 1
31,3060       12431 1      03677 1   I: 77743 1   C: 02431 0   C: 23571 0   C: 02427 1   C: 17567 0   C: 03633 1
31,3070    I: 42605 1   C: 05656 1   C: 02425 0   C: 23565 0   C: 02407 0   I: 41225 1   C: 02643 1   C: 05654 0

31,3100    C: 03563 1   I: 77776 1      34744 1      55572 1      00006 1      31643 1      52155 1      34752 0
31,3110       54001 1      33746 1      03553 1      51351 1      12447 0      00006 1      30155 0      53643 0
31,3120       03704 1      41642 1      41426 0      64733 1      54001 1      40001 1      60001 0      22007 0
31,3130       00006 1      11642 1      54130 1      00006 1      70000 0      54131 0      60130 0      56131 1

31,3140       60131 1      54154 0      60131 1      50120 1      54032 1      60131 1      50120 1      54034 1
31,3150       60130 0      64733 1      60131 1      60131 1      50120 1      54036 0      34755 1      54163 1
31,3160       03677 1   I: 65361 0   C: 03627 1   C: 00035 1   I: 62757 0   C: 02411 1   C: 02403 1   I: 70251 0
31,3170    C: 02637 1   C: 03643 0   I: 74342 1   C: 00033 1   I: 53255 0   I: 74341 1   C: 03643 0   C: 05656 1

31,3200    I: 73725 0   C: 00037 0   C: 02417 1   I: 77655 1   I: 76505 0   C: 02603 0   I: 70315 1   C: 01237 0
31,3210    C: 05652 0   I: 45445 0   C: 74523 0   I: 77646 0   C: 17464 1   C: 03254 1   I: 65316 0   C: 03256 0
31,3220    I: 65316 0   C: 05650 1   I: 63471 0   C: 01245 0   I: 45225 0   I: 71244 0   C: 63230 0   C: 06522 1
31,3230    I: 43366 0   C: 03260 0   I: 44244 0   C: 63236 0   C: 03260 0   C: 03260 0   I: 77776 1      03740 1

31,3240       31351 1      55621 1      25623 1      51351 1      12435 0      35014 1      54003 0      00006 1
31,3250       51351 1      52452 0      31435 1      24006 1      24006 1      61642 0      56001 0      61642 0
31,3260       10000 0      10001 1      13313 1      13313 1      13265 1      03677 1   I: 53575 0   C: 03635 1
31,3270    C: 16603 0   C: 03643 0   I: 74203 0   C: 02433 1   C: 02265 1   I: 77655 1   C: 03635 1   I: 47051 0

31,3300    C: 03521 1   C: 21726 1   I: 47035 1   C: 03635 1   C: 21726 1   C: 26611 0   C: 02603 0   I: 76435 1
31,3310    C: 02611 0   C: 02617 0   I: 77776 1      51351 1      31423 0      61642 0      00006 1      51351 1
31,3320       62441 1      03740 1      31621 0      64753 1      55351 0      34755 1      55623 0      51621 0
31,3330       12441 0      06037 0   I: 47175 1   C: 03254 1   C: 21726 1   I: 74361 0   C: 03423 1   C: 22001 0

31,3340    C: 03254 1   I: 77776 1      11647 1      12460 0      11646 0      13350 0      05567 0   C: 01412 1
31,3350       04635 0   C: 65102 1      06037 0   I: 77775 1   C: 03537 0   C: 03262 1   I: 77776 1      13432 0
31,3360       06037 0   I: 52375 1   C: 03635 1   C: 03521 1   I: 77634 0   C: 21726 1   C: 03262 1   I: 50235 0
31,3370    C: 02146 0   C: 02611 0   I: 77776 1      40154 0      63754 1      64733 1      54130 1      40130 1
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OCTAL LISTING FOR PARAGRAPH # 167,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3400       26130 1      43755 1      60154 1      64733 1      54131 0      40131 0      26131 0      34751 0
31,3410       76242 1      54002 1      35014 1      54003 0      30130 0      00006 1      50002 0      71616 0
31,3420       24006 1      50002 0      53662 0      00006 1      70131 0      50002 0      21662 0      10002 1
31,3430       13410 0      24006 1      30076 0      74741 0      00006 1      13443 0      30121 0      00006 1

31,3440       13453 1      05567 0   C: 01410 0      34737 0      00006 1      02031 1      00006 1      13460 1
31,3450       04616 1   C: 40165 1      13460 1      02216 0      06037 0   I: 77624 1   C: 61111 1   I: 77776 1
31,3460       00006 1      34755 1      52757 0      40104 0      74742 0      00006 1      13476 0      51621 0
31,3470       12443 1      05353 1   C: 00035 1      33756 0      04616 1   C: 20470 0      15155 1      31666 0

31,3500       00006 1      13523 1      40102 0      74746 1      00006 1      13525 1      33757 1      04616 1
31,3510    C: 20462 0      16001 1      13515 1      13477 1      13476 0      34755 1      55267 1      55266 0
31,3520       05504 0   C: 00143 1      15155 1      05516 0   C: 00143 1      33757 1      13474 1      33760 0
31,3530       13474 1      11647 1      13545 1      13543 1      06037 0   I: 52375 1   C: 02511 0   C: 03627 1

31,3540    I: 52141 1   C: 02517 0   C: 63204 1      04635 0   C: 65270 1      05353 1   C: 00003 1      06037 0
31,3550    I: 52175 0   C: 03527 1   C: 65517 1      00006 1      22132 1      54117 1      52160 1      33676 0
31,3560       54141 1      54161 0      10160 1      54162 0      34755 1      54163 1      00006 1      30155 0
31,3570       52127 1      50157 1      30005 1      07307 1      04713 0   C: 01226 0      52155 1      52125 0

31,3600       00006 1      50117 0      30004 0      52155 1      30160 0      54140 0      64753 1      07316 1
31,3610       00006 1      50117 0      30002 0      52155 1      50141 0      52004 1      44752 1      26117 1
31,3620       44752 1      26141 1      10140 0      13605 0      00006 1      30127 0      52155 1      00006 1
31,3630       30162 1      07215 0      00006 1      30127 0      52155 1      52131 0      00006 1      30160 0

31,3640       07215 0      04713 0   C: 00353 1      00006 1      40155 1      20127 1      04713 0   C: 01226 0
31,3650       00006 1      [illegible]0125 0      20155 1      30163 0      74750 0      10000 0      00132 1      24163 0
31,3660       10154 0      13624 0      13664 1      13670 1      10155 1      13624 0      13670 1      13670 1
31,3670       52127 1      52155 1      30163 0      54156 1      50132 1      10002 1   C: 00147 0      51351 1

31,3700       42452 1      50120 1      54046 1      16037 1      31642 0      00006 1      74750 0      53476 1
31,3710       35014 1      54003 0      31470 0      24006 1      24006 1      61642 0      00006 1      73751 0
31,3720       63747 0      64735 1      54001 1      40001 1      60001 0      63750 0      64733 1      55666 1
31,3730       41666 1      27666 1      00002 0      05652 0   C: 01406 1      05567 0   C: 01406 1      13443 0

31,3740       35007 0      56003 1      52002 1      55442 0      22003 1      00000 1   C: 01565 0   C: 77630 1
31,3750    C: 00143 1   C: 75340 1   C: 00264 1   C: 00056 1   C: 01542 0   C: 01022 0   C: 01477 1   C: 01500 0
31,3760    C: 01474 1   C: 03761 1   C: 03762 1 CKSM 53641 1          @            @            @            @
31,3770          @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 170,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2000     C: 00044 1   C: 70123 0   C: 40702 0   C: 13337 1   C: 10776 0      34737 0      70077 0      10000 0
32,2010        02017 0      05567 0   C: 00220 1      05472 0      00006 1      30014 1      53421 0      00006 1
32,2020        31421 1      53052 0      32172 1      04616 1   C: 20334 1      05472 0      02036 0      44746 1
32,2030        60154 1      00006 1      12014 1      00006 1      31052 1      02016 1      06037 0   I: 77614 1

32,2040     C: 01076 1   I: 77414 0   C: 02076 1      32172 1      04616 1   C: 20620 1      06037 0   I: 77634 0
32,2050     C: 21573 0   C: 34041 0   C: 27057 0   I: 77624 1   C: 64132 0   C: 16201 0   C: 00015 0   C: 34041 0
32,2060     C: 27043 0   I: 77624 1   C: 64132 0   C: 16207 0   C: 00015 0   I: 56225 1   C: 02021 0   C: 24175 1
32,2070     C: 02215 0   I: 77776 1      34753 1      54332 1      32176 0      04616 1   C: 01735 1      31324 0

32,2100        54332 1      34744 1      70074 0      10000 0      02122 1      11304 0      12111 0      12115 1
32,2110        12111 0      34363 0      04616 1   C: 01735 1      12105 0      04616 1   C: 16714 1      04616 1
32,2120     C: 17716 1      02122 1      05516 0   C: 00054 0      32173 0      04616 1   C: 20342 0      15472 1
32,2130        15472 1      05472 0   I: 64375 1   C: 00025 0   C: 01734 0   I: 72561 0   C: 24202 1   I: 53255 0

32,2140     C: 24204 1   C: 24212 0   I: 77634 0   C: 21772 0   C: 24025 0   C: 00017 1   I: 74321 1   C: 01734 0
32,2150     C: 24200 0   I: 53212 0   C: 24204 1   I: 47055 1   C: 24212 0   C: 21772 0   I: 77750 0   C: 00024 1
32,2160     I: 72130 0   C: 00155 0   C: 00026 0   I: 72130 0   C: 00160 0   C: 00030 1   I: 43530 0   C: 00162 1
32,2170     C: 00216 1   C: 14400 0   C: 01420 0   C: 14420 1   C: 03100 0   C: 00000 1   C: 03720 1   C: 15077 0

32,2200     C: 05041 1   C: 24412 1   C: 25724 1   C: 00000 1   C: 60000 1   C: 00000 1   C: 60000 1   C: 00000 1
32,2210     C: 60000 1   C: 00000 1   C: 37777 1   C: 00000 1   C: 37777 1   C: 00000 1   C: 37777 1   I: 77624 1
32,2220     C: 27414 0   I: 77745 1   C: 03442 0   C: 03661 0   C: 00041 1   I: 43014 0   C: 01674 0   C: 01673 1
32,2230     I: 43014 0   C: 01676 1   C: 01675 1   I: 77624 1   C: 27134 1   I: 77624 1   C: 11244 0   I: 77775 1

32,2240     C: 00017 1   C: 17631 0   C: 00015 0   C: 34041 0   C: 27414 0   I: 43014 0   C: 01474 1   C: 01673 1
32,2250     I: 43014 0   C: 01676 1   C: 02756 1   C: 64257 0   I: 43014 0   C: 01476 0   C: 01475 0   I: 77624 1
32,2260     C: 27134 1   I: 77624 1   C: 11244 0   I: 77775 1   C: 00025 0   C: 25761 0   C: 00017 1   C: 01102 0
32,2270     I: 53435 0   C: 01761 0   C: 24025 0   C: 03631 0   I: 53435 0   C: 00025 0   C: 27637 0   C: 01102 0

32,2300     I: 50256 0   C: 03637 0   I: 77752 1   C: 02732 0   I: 44316 0   C: 10314 0   I: 77766 0   C: 26730 1
32,2310     C: 01102 0   C: 26655 0   C: 01761 0   I: 77676 0   C: 02744 1   I: 45014 0   C: 03666 1   C: 24732 1
32,2320     I: 77676 0   C: 03645 0   I: 77745 1   C: 00037 0   C: 27663 1   C: 03645 0   I: 77646 0   C: 24025 0
32,2330     C: 00001 0   C: 03653 1   I: 53435 0   C: 03631 0   I: 53435 0   C: 03653 1   I: 76561 1   C: 00025 0

32,2340     C: 37665 0   C: 11244 0   I: 77624 1   C: 27414 0   I: 44345 0   C: 03663 1   C: 03661 0   C: 25517 0
32,2350     C: 03653 1   C: 01535 0   C: 25503 0   C: 03665 1   C: 35511 1   C: 23455 1   I: 45174 1   C: 00002 0
32,2360     C: 26661 1   I: 77624 1   C: 27423 1   I: 77776 1      04616 1   C: 50040 0      04645 1      55737 1
32,2370        05516 0   C: 00120 1      00004 0      34751 0      00006 1      02033 0      54001 1      44751 1
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OCTAL LISTING FOR PARAGRAPH # 171,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2400      70110 0     60001 0     54110 0     00003 1     04616 1  C: 53103 0     04616 1  C: 17714 0
32,2410      12542 1     00004 0     53106 0     52162 0     53102 1     53747 0     00006 1     30034 0
32,2420      52160 1     30032 0     54156 1     00006 1     30025 0     52155 1     00006 1     30036 1
32,2430      53110 1     00003 1     04616 1  C: 53105 0     04616 1  C: 17714 0     02536 0     00004 0

32,2440      53334 0     53761 1     52162 0     53755 0     52160 1     53460 0     00006 1     31110 0
32,2450      53753 0     30156 0     55461 1     06037 0  C: 14025 0  C: 03747 0  I: 57261 0  C: 20217 1
32,2460   C: 24002 0  C: 03751 1  I: 47135 0  C: 01110 0  C: 21576 0  C: 03734 1  I: 47135 0  C: 01111 1
32,2470   C: 21576 0  C: 17736 0  C: 01102 0  I: 66405 0  C: 24004 0  C: 37757 0  C: 46041 0  C: 17741 0

32,2500   C: 00025 0  C: 34041 0  C: 51255 1  I: 77776 1     31457 0     54766 1     31460 1     54770 0
32,2510      31461 0     54772 1     06037 0  I: 45175 0  C: 01102 0  C: 47651 0  I: 77641 1  C: 03741 0
32,2520   I: 65552 0  C: 01046 1  I: 00025 0  C: 24546 0  C: 64531 1  I: 77776 1     34752 0     54154 0
32,2530      12534 0  I: 77776 1     34755 1     54154 0     31737 0     04640 1     30101 1     74742 0

32,2540      10000 0     12404 1     34753 1     54154 0     02534 1  C: 00210 1  C: 21042 1     34753 1
32,2550      55107 1     34756 1     10000 0     54002 1     11107 1     12563 1     00006 1     50002 0
32,2560      31761 0     50002 0     21102 1     00006 1     50002 0     31102 0     50002 0     52156 1
32,2570      11107 1     12577 1     00006 1     50002 0     31761 0     50002 0     20156 1     10002 1

32,2600      12552 0     52156 1     52155 1     32774 1     54120 0     04713 0  C: 01023 1     07532 1
32,2610      11107 1     12613 0     12627 1     00004 0     00006 1     30036 1     53767 1     30033 1
32,2620      54766 1     30034 0     54770 0     30032 0     54772 1     04616 1  C: 47615 0     46245 0
32,2630      04616 1  C: 47675 0     11107 1     12635 1     12702 1     00004 0     55107 1     31766 1

32,2640      05032 0     54166 1     41766 0     05033 1     54163 1     00006 1     70124 1     52155 1
32,2650      31767 0     05033 1     55766 0     00006 1     70166 1     00006 1     70122 1     20155 1
32,2660      31767 0     05032 0     55767 1     00006 1     70166 1     00006 1     70126 0     20155 1
32,2670      00006 1     30155 0     20155 1     10000 0     34736 1     12676 0     00006 1     05012 1

32,2700      00003 1     12551 0     31767 0     00006 1     70122 1     53110 1     41766 0     00006 1
32,2710      70126 0     21110 1     40163 1     00006 1     71766 0     00006 1     70122 1     52155 1
32,2720      30166 0     00006 1     70124 1     20155 1     40163 1     00006 1     71767 1     00006 1
32,2730      70126 0     20155 1     30154 1     00006 1     72775 1     57107 0     00006 1     72775 1

32,2740      55110 1     34750 1     00006 1     02033 0     00004 0     00006 1     12752 1     04616 1
32,2750   C: 52306 0     12770 1     44742 0     70110 0     54110 0     44752 1     00006 1     03012 1
32,2760      34743 0     26077 0     11056 1     44776 1     64777 1     05203 0  C: 03400 0  C: 50067 0
32,2770      44740 1     70076 1     54076 1     15155 1  C: 00052 0  C: 56655 1     05353 1  C: 04024 0
```

OCTAL LISTING FOR PARAGRAPH # 172, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
32,3000       04616 1   C: 11254 1      33253 0      55455 0      32000 0      55251 1      34751 0      55515 0
32,3010       44753 0      55351 0      34755 1      55623 0      44736 0      00006 1      03012 1      06037 0
32,3020    I: 43014 0   C: 02663 0   C: 03271 0   I: 43014 0   C: 05660 1   C: 03067 0   I: 43014 0   C: 00266 0
32,3030    C: 00270 1   I: 77201 1   C: 00001 0   C: 02023 1   I: 41525 0   C: 02401 0   C: 37625 1   C: 55716 1

32,3040    I: 64312 0   C: 01734 0   C: 37635 0   C: 46432 0   I: 45345 1   C: 02401 0   C: 25260 1   C: 34041 0
32,3050    C: 27057 0   I: 77331 0   C: 03647 1   C: 00050 1   C: 06520 0   C: 26603 0   C: 06516 0   C: 26611 0
32,3060    C: 06514 1   C: 16617 0   C: 25256 1   C: 27665 1   C: 06522 1   C: 17254 1   C: 06522 1   C: 03643 0
32,3070    I: 77745 1   C: 00015 0   C: 27561 0   C: 00017 1   I: 64312 0   C: 01734 0   C: 37521 0   C: 67130 1

32,3100    C: 35237 1   C: 62454 0      55646 0      06037 0   I: 57345 1   C: 03627 1   C: 02501 1   I: 44232 1
32,3110    C: 03633 1   I: 45325 1   C: 02477 1   C: 02643 1   I: 65222 0   C: 02641 0   I: 57316 1   C: 02503 0
32,3120    I: 65232 1   C: 02637 1   I: 57225 0   C: 02475 0   C: 02501 1   I: 51515 1   C: 03627 1   I: 57225 0
32,3130    C: 02473 0   C: 02505 0   I: 43215 0   I: 56215 1   I: 77661 0   C: 21613 0   I: 43206 1   C: 03561 0

32,3140    C: 14041 1   I: 45246 0   C: 25262 0   I: 45040 1   C: 65163 0   C: 27414 0   I: 43014 0   C: 01473 0
32,3150    C: 00063 1   I: 77745 1   C: 03561 0   C: 25517 0   C: 00017 1   C: 25535 0   C: 00025 0   C: 35543 0
32,3160    C: 27107 1   I: 77650 1   C: 65070 0   I: 54335 0   C: 03423 1   C: 20617 0   I: 77621 1   C: 00041 1
32,3170    C: 27442 0   C: 03527 1   I: 53435 0   C: 03521 1   I: 72441 0   C: 03635 1   C: 26627 0   C: 03254 1

32,3200    C: 02631 1   I: 77776 1      05353 1   C: 04024 0      44362 0      04616 1   C: 74664 0      15155 1
32,3210       06037 0   I: 47131 1   C: 02747 1   C: 65215 1   C: 31135 1   I: 53575 0   C: 02631 1   C: 27773 1
32,3220    C: 06520 0   C: 03765 0   I: 77776 1      35016 0      54003 0      00004 0      04674 0   C: 40142 1
32,3230       00003 1      04616 1   C: 54123 0      05353 1   C: 04024 0      34746 0      00006 1      02033 0

32,3240       00006 1      13247 1      33254 1      04616 1   C: 20623 1      16001 1      13235 1      04616 1
32,3250    C: 67721 1      04635 0   C: 74126 1   C: 02076 1   C: 00500 1   C: 00035 1   C: 30373 0   C: 00004 0
32,3260    C: 01610 1   C: 00000 1   C: 00010 0      37710 0      05105 0   C: 03275 1   C: 64067 1      15261 0
32,3270       05353 1   C: 00003 1      34777 1      05173 1   C: 03263 0      00004 0      34755 1      57746 0

32,3300       00006 1      71756 0      21645 0      00006 1      30040 0      53764 1      52071 0      30041 1
32,3310       57765 1      56072 1      00006 1      30025 0      53762 1      31763 1      61160 1      54154 0
32,3320       31764 0      61161 0      54157 0      31765 1      61162 0      54161 0      41763 0      61254 0
32,3330       60070 0      55766 0      41764 1      61255 1      60071 1      55770 1      41765 0      61256 1

32,3340       60072 1      55772 0      34755 1      54155 1      54160 1      54162 0      55254 1      55255 0
32,3350       55256 0      44753 0      54163 1      06037 0   I: 65361 0   C: 26022 0   C: 03762 1   I: 77625 0
32,3360    C: 01235 1   C: 00037 0   I: 63271 0   C: 27153 0   C: 01237 0   I: 74251 1   C: 02631 1   I: 53352 0
32,3370    C: 03527 1   I: 45455 1   C: 53746 1   C: 03521 1   I: 77656 1   C: 00017 1   I: 72441 0   C: 00031 0
```

```
OCTAL LISTING FOR PARAGRAPH # 173, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3400     C: 17474 0   C: 00037 0   I: 41261 1   C: 20214 1   C: 03474 0   I: 45215 0   C: 00045 0   C: 02333 0
32,3410     C: 17775 1   C: 03474 0   I: 56221 0   C: 03645 0   C: 02541 0   I: 51515 1   C: 01237 0   I: 60471 0
32,3420     C: 05652 0   C: 00025 0   I: 77615 0   I: 45115 0   C: 06520 0   C: 47661 0   I: 77641 1   C: 00017 1
32,3430     C: 00027 1   I: 45465 1   C: 50313 0   C: 03767 1   I: 53361 0   C: 26022 0   C: 02631 1   I: 65246 1

32,3440     C: 03762 1   I: 65225 1   C: 03760 0   C: 03762 1   C: 17760 0   I: 55271 0   C: 25535 0   I: 41325 0
32,3450     C: 03611 1   C: 25534 1   I: 56271 0   C: 01245 0   C: 22006 1   I: 65215 1   C: 00001 0   C: 00025 0
32,3460     I: 45271 1   C: 00027 1   I: 43205 1   C: 02543 1   C: 03464 1   I: 56325 0   C: 02547 0   C: 01245 0
32,3470     I: 56325 0   C: 02[illegible]5 1   C: 01245 0   I: 44206 0   C: 00003 1   I: 71240 1   C: 65504 0   I: 41545 0

32,3500     I: 51021 0   C: 00003 1   C: 65504 0   I: 77745 1   I: 77745 1   I: 77601 0   C: 00003 1   C: 17464 1
32,3510     I: 77776 1      52155 1      04616 1   C: 62221 1      06037 0   I: 77775 1   C: 00031 0   I: 53352 0
32,3520     C: 03734 1   I: 63342 1   C: 03521 1   I: 74256 0   C: 03474 0   I: 51372 0   I: 77646 0   C: 02263 1
32,3530     I: 77776 1      04616 1   C: 63463 0   C: 00001 0   C: 00000 1   C: 04000 0   C: 00000 1   C: 01217 1

32,3540        06037 0   I: 77624 1   C: 61104 0   I: 77776 1      34751 0      55515 0      33764 1      55455 0
32,3550        05516 0   C: 00214 0      05516 0   C: 00175 1      05516 0   C: 00161 1      05504 0   C: 00307 0
32,3560        05321 1   C: 00106 0      13707 0      06037 0   I: 77624 1   C: 65737 1   I: 54345 1   C: 34003 0
32,3570     C: 20205 1   I: 77665 1   C: 01245 0   C: 16271 1   C: 01245 0   I: 70471 1   C: 16015 1   C: 03635 1

32,3600     C: 03637 0   C: 03641 1   I: 77665 1   C: 25763 1   C: 16263 1   C: 34005 0   I: 54276 0   C: 20214 1
32,3610     C: 02267 0   I: 57535 0   C: 26002 1   I: 77702 1   C: 02265 1   I: 45014 0   C: 04467 0   C: 60300 1
32,3620     I: 52160 1   C: 00000 1   C: 65625 0   I: 77760 0   C: 00010 0   I: 41343 0   C: 02551 1   C: 03517 1
32,3630     I: 41213 1   C: 02553 0   C: 03517 1   I: 41213 1   C: 02555 0   C: 03517 1   I: 77613 0   C: 02557 1

32,3640     C: 02277 1   I: 51025 1   C: 02571 0   C: 65647 1   I: 77745 1   C: 02571 0   C: 02277 1   I: 77745 1
32,3650     C: 02575 1   C: 36273 1   C: 57312 0   I: 45246 0   C: 02573 1   I: 75240 0   C: 65661 0   C: 02335 0
32,3660     C: 03633 1   I: 45345 1   C: 03633 1   C: 02335 0   I: 77661 0   C: 20606 0   C: 03643 0   I: 77414 0
32,3670     C: 04461 0      05504 0   C: 00220 1      03746 1      05353 1   C: 04024 0      04616 1   C: 73747 1

32,3700        03746 1      00006 1      33766 0      53253 0      05353 1   C: 00004 0      15155 1      05516 0
32,3710     C: 00215 1      36000 1      55251 1      06037 0   I: 45014 0   C: 04707 0   C: 65724 0   C: 65737 1
32,3720     I: 52131 0   C: 00053 1   C: 65623 0   C: 60254 1   I: 72543 0   C: 03517 1   C: 37502 1   C: 60254 1
32,3730     I: 77776 1      05353 1   C: 04024 0      00006 1      31502 1      53517 1      13676 1   I: 45234 0

32,3740     C: 21573 0   C: 03442 0   I: 77661 0   C: 20214 1   C: 03517 1   I: 77616 0      34737 0      54055 0
32,3750        34750 1      00006 1      05014 1      00002 0   C: 00000 1   C: 01750 1   C: 00021 1   C: 33400 0
32,3760     C: 11021 1   C: 00000 1   C: 00507 0   C: 25605 0   C: 02112 1   C: 03642 1   C: 70067 1   C: 00003 1
32,3770        05353 1   C: 00035 1      15155 1   C: 03773 1   C: 03774 0   CKSM 71663 1       @            @
```

OCTAL LISTING FOR PARAGRAPH # 174, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
33,2000     C: 41545 0   C: 42341 1   C: 61000 0   C: 71210 1   C: 00000 1   C: 00000 1   C: 72333 1   C: 45546 1
33,2010     C: 65363 1   C: 64451 0   C: 21241 0   C: 03216 1   C: 30153 0   C: 23101 0   C: 63105 0   C: 61733 1
33,2020     C: 01507 1   C: 00321 1   C: 26706 1   C: 00150 0   C: 33343 0   C: 02630 0   C: 25010 1   C: 24402 1
33,2030     C: 26003 0   C: 61377 0   C: 55754 1   C: 77644 1   C: 65556 1   C: 64453 1   C: 55670 0   C: 00002 0

33,2040     C: 11777 0   C: 01023 1   C: 37155 1   C: 00065 1   C: 06244 0      40110 0      74742 0      00006 1
33,2050        12123 1      00004 0      26110 0      44736 0      00006 1      03012 1      44740 1      70076 1
33,2060        54076 1      44753 0      70074 0      54074 0      04616 1   C: 52156 1      34740 0      70110 0
33,2070        10000 0      12104 1      35031 0      05072 1   C: 02113 0   C: 66067 0      44742 0      70110 0

33,2100        54110 0      34736 1      26110 0      12570 0      34753 1      05203 0   C: 03601 0   C: 52067 1
33,2110        34741 1      26110 0      12570 0      34753 1      05203 0   C: 02171 1   C: 52067 1      04616 1
33,2120     C: 17714 0      15155 1      15155 1      00006 1      41235 0      52155 1      00006 1      30025 0
33,2130        20155 1      54163 1      30155 0      00006 1      74740 1      52155 1      06037 0   I: 52315 1

33,2140     C: 01726 0   C: 03527 1   I: 74325 0   I: 52255 1   C: 01720 0   C: 03521 1   I: 77414 0   C: 01043 1
33,2150     C: 66152 1      12570 0   C: 25102 0   C: 00001 0   I: 77761 1   C: 26177 1   C: 01761 0   I: 77414 0
33,2160     C: 01263 1      40074 0      74753 0      00006 1      12570 0      00004 0      26074 0      11056 1
33,2170        44776 1      64777 1      05203 0   C: 03356 1   C: 50067 0      12570 0   C: 00006 1   C: 10000 0

33,2200     C: 20000 0   C: 00000 1   C: 75751 0   C: 41775 1   C: 00022 1   C: 07212 1      05353 1   C: 16035 0
33,2210     C: 20000 0   C: 02217 1   C: 66067 0      37716 0      55075 0      04616 1   C: 15263 1      06037 0
33,2220     I: 51575 1   C: 00325 0   I: 77776 1      30154 1      55246 1      00006 1      72020 0      53514 1
33,2230        00006 1      31245 0      53571 1      40104 0      74744 0      00006 1      12254 1      30106 0

33,2240        74737 1      10000 0      00006 1      32001 1      54002 1      00006 1      31514 0      00006 1
33,2250        10002 1      00006 1      71244 0      21571 1      32021 0      07307 1      52155 1      21510 0
33,2260        02440 0      04616 1   C: 47615 0      32414 1      04616 1   C: 20037 1      06037 0   I: 45014 0
33,2270     C: 03307 0   C: 67032 1   C: 66776 1   I: 77776 1      03552 0      02423 0      55160 0      55161 1

33,2300        55162 1      44741 0      70076 1      54076 1      34745 0      70103 1      10000 0      12342 1
33,2310        40102 0      74752 1      10000 0      12346 0      41251 1      61246 0      00006 1      62352 1
33,2320        40076 1      747 1 0      26076 1      34753 1      55515 0      30106 0      74737 1      10000 0
33,2330        12375 0      34743 0      00006 1      02032 1      00006 1      12375 0      44736 0      70111 1

33,2340        54111 1      12400 0      44752 1      70102 0      54102 0      12375 0      40102 0      74752 1
33,2350        26102 0      12375 0      03552 0      11515 0      12366 1      10761 0      12400 0      05353 1
33,2360     C: 00374 1      37713 0      05072 1   C: 02571 0   C: 74067 0      12400 0      55570 0      03552 0
33,2370        31570 1      55515 0      00004 0      04674 0   C: 40165 1      40111 1      74736 0      26111 1
```

```
OCTAL LISTING FOR PARAGRAPH # 175,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2400        00003 1        04616 1     C: 40457 0        30167 1        75004 1        54166 1        22007 0        52121 1
33,2410        03552 0        00006 1        31253 1        52006 0     C: 02145 0     I: 77624 1     C: 66730 0     I: 77776 1
33,2420        32437 0        02424 1        05155 0        36007 0        00004 0        77747 0        54061 1        00006 1
33,2430        50061 0        31545 1        50061 0        53221 0        10061 1        12425 1        00002 0     C: 00022 1

33,2440        31156 1        54766 1        31157 0        54770 0        31155 1        54772 1        00002 0        00004 0
33,2450        45015 1        70107 0        65015 0        54107 0        37720 0        05105 0     C: 03670 0     C: 66067 0
33,2460        12540 0     I: 77776 1        40107 0        74735 0        00006 1        12546 0        34746 0        70107 0
33,2470        00006 1        12721 0        34743 0        70107 0        00006 1        12710 1        34741 1        70107 0

33,2500        00006 1        12515 0        34745 0        00006 1        02033 0        00006 1        13155 1        34737 0
33,2510        00006 1        02012 0        00006 1        12536 1        12540 0        31642 0        61427 1        00006 1
33,2520        62531 1        34741 1        56003 1        54001 1        41545 0        22003 1        61430 1        00006 1
33,2530        62447 1        34746 0        00006 1        02033 0        00006 1        13155 1        05567 0     C: 00511 1

33,2540        00004 0        43154 0        70107 0        54107 0        04674 0     C: 53607 0        03552 0        30077 1
33,2550        75014 0        10000 0        12564 0        30110 1        72250 0        10000 0        12564 0        30110 1
33,2560        77710 1        10000 0        12570 0        12045 0        00004 0        44742 0        70110 0        54110 0
33,2570        06037 0     I: 51575 1     C: 03573 0     I: 45206 1     C: 02333 0     C: 03535 1     C: 03775 1     I: 47075 0

33,2600     C: 26026 1     C: 21612 1     C: 27742 0     C: 03537 0     I: 53435 0     C: 03720 1     C: 27726 1     C: 03573 0
33,2610     I: 60505 1     C: 01734 0     C: 27545 0     C: 03601 0     I: 76505 0     C: 01734 0     C: 27553 1     C: 03537 0
33,2620     I: 51435 1     C: 03601 0     I: 63552 0     I: 77671 1     I: 47075 0     C: 26030 0     C: 21612 1     I: 77776 1
33,2630        00004 0        31536 0        55743 1        31540 1        55744 0        31542 0        55745 1        30154 1

33,2640        55716 1        00006 1        31573 1        53521 1        00006 1        31575 1        53523 0        00006 1
33,2650        31577 0        53525 0        00006 1        31601 1        53527 1        00006 1        31603 0        53531 0
33,2660        00006 1        31605 0        53533 1        12275 1        00006 1        50000 1        32700 1        52156 1
33,2670        00006 1        41535 1        20156 1        06727 0        34755 1        24133 0        14631 0     C: 00007 0

33,2700     C: 16100 1     C: 00615 0     C: 34200 1     C: 00000 1     C: 00364 0     C: 00010 0     C: 35600 1     C: 01414 1
33,2710        36242 0        04616 1     C: 66664 0        12476 1        05504 0     C: 00311 1        05504 0     C: 00253 0
33,2720        12476 1        34752 0        04616 1     C: 66664 0        12540 0        05504 0     C: 00256 0        12540 0
33,2730     I: 41456 0     C: 03537 0     I: 67340 1     C: 02777 1     C: 03000 1     I: 50076 0     C: 66765 0     I: 50375 0

33,2740     C: 06514 1     C: 03537 0     I: 41552 0     I: 44316 0     C: 27027 1     I: 56325 0     C: 26040 1     C: 00043 0
33,2750     C: 00041 1     I: 41205 0     C: 26042 0     I: 65361 0     C: 03537 0     I: 41205 0     C: 26044 0     C: 00041 1
33,2760     I: 76561 1     C: 06514 1     I: 45455 1     C: 74256 0     I: 41455 0     I: 60345 0     C: 00043 0     C: 00050 1
33,2770     I: 53663 1     C: 26032 1     C: 56623 0     I: 45561 1     C: 74214 0     I: 77616 0     I: 61375 1     C: 00325 0
```

```
OCTAL LISTING FOR PARAGRAPH # 176,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3000     C: 01734 0   I: 76561 1   C: 26022 0   C: 03527 1   I: 41562 0   I: 41455 0   C: 01237 0   I: 65255 0
33,3010     C: 01227 1   C: 01250 1   I: 74261 1   C: 20207 0   I: 44055 1   C: 01221 1   C: 00037 0   C: 37545 1
33,3020     C: 66730 0   I: 53255 0   I: 77655 1   C: 01227 1   C: 37553 0   C: 00037 0   C: 01463 1   C: 06315 0
33,3030     C: 00010 0   C: 00000 1   I: 41575 0   C: 02317 0   I: 65255 0   C: 01726 0   C: 01250 1   I: 74271 0

33,3040     C: 27031 0   I: 77655 1   C: 01720 0   C: 37573 1   C: 67130 1   I: 53255 0   C: 01726 0   I: 77626 0
33,3050     C: 74176 1   I: 77776 1      03552 0      06037 0   I: 77775 1   C: 03563 1   C: 26317 0   C: 03573 0
33,3060     C: 25720 0   C: 03601 0   C: 01726 0   I: 77776 1      03552 0      06037 0   I: 74375 0   C: 00325 0
33,3070     C: 26024 0   I: 53206 0   C: 01237 0   I: 53206 0   C: 03527 1   I: 56325 0   C: 01250 1   C: 27031 0

33,3100     I: 77761 1   I: 77655 1   C: 03521 1   C: 37573 1   C: 67130 1   I: 53255 0   I: 77655 1   C: 03527 1
33,3110     C: 03601 0   I: 77646 0   C: 27472 0   C: 03537 0   I: 72441 0   C: 03601 0   C: 27474 0   C: 03573 0
33,3120     I: 72435 0   C: 02325 1   C: 17734 1   C: 00045 0   I: 77625 0   C: 02333 0   C: 37535 0   C: 66461 1
33,3130     I: 77656 1   C: 17537 0   C: 00043 0   I: 55261 1   C: 20207 0   C: 26036 0   I: 74205 0   C: 27031 0

33,3140     C: 03537 0   C: 03563 1   I: 77616 0   C: 00303 1   C: 00005 1   C: 33212 0   C: 00014 1   C: 20000 0
33,3150     C: 00000 1   C: 00310 0   C: 00000 1   C: 00620 0   C: 00110 1      34742 1      70107 0      10000 0
33,3160        12540 0      34750 1      70107 0      00006 1      13310 1      30120 1      54166 1      06037 0
33,3170     I: 61375 1   C: 02273 0   C: 02146 0   I: 72515 0   C: 03601 0   I: 50255 0   C: 03734 1   C: 00001 0

33,3200     I: 77405 0   C: 01355 0      40110 0      74743 1      00006 1      13210 0      31356 0      07307 1
33,3210        06037 0   I: 54215 0   C: 03655 1   C: 20210 0   I: 74205 0   C: 26011 0   I: 45241 1   C: 03537 0
33,3220     C: 03535 1   C: 03665 1   I: 77776 1      30107 1      74741 0      00006 1      13243 0      06037 0
33,3230     I: 45246 0   C: 02521 0   I: 45252 0   C: 03535 1   I: 77776 1      25670 1      06723 1      13560 0

33,3240        13560 0      05516 0   C: 00263 0      40107 0      74744 0      10000 0      13310 1      06037 0
33,3250     I: 40545 1   C: 03535 1   I: 77776 1      00006 1      31665 0      52155 1      07544 0      00006 1
33,3260        13262 0      13310 1      54156 1      40001 1      61420 0      00006 1      63310 0      00006 1
33,3270        71421 0      00006 1      11420 1      54135 1      07313 1      06037 0   I: 77752 1   I: 53361 0

33,3300     C: 03537 0   C: 03573 0   C: 37657 1   C: 67130 1   I: 77776 1      03552 0      34755 1      03534 0
33,3310        03552 0      40107 0      74745 1      10000 0      13514 0      41651 0      54001 1      26001 1
33,3320        60001 0      60001 0      50120 1      52047 0      34741 1      54003 0      31655 0      54766 1
33,3330        31656 0      54770 0      31654 1      54772 1      04616 1   C: 47615 0      30120 1      54166 1

33,3340        06037 0   I: 45173 0   C: 02231 0   C: 47673 0   I: 54325 1   C: 03653 1   C: 20215 0   I: 41403 0
33,3350     C: 51764 0   I: 77776 1      44753 0      54163 1      31657 1      22007 0      52155 1      31660 0
33,3360        22007 0      52160 1      31661 1      22007 0      52162 0      35016 0      54003 0      06037 0
33,3370     I: 55361 0   C: 26022 0   C: 02253 1   I: 56225 1   C: 01235 1   C: 27151 1   I: 76561 1   C: 01237 0
```

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OCTAL LISTING FOR PARAGRAPH # 177, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3400    I: 53255 0   C: 03527 1   I: 53352 0   C: 03734 1   I: 51406 1   I: 43202 0   C: 27145 1   C: 24025 0
33,3410    I: 44241 0   C: 00001 0   I: 51406 1   I: 77425 1   C: 00025 0      25672 0      06723 1      13575 1
33,3420       13575 1      05516 0   C: 00262 1      30107 1      74740 1      00006 1      13435 1      05516 0
33,3430    C: 00250 0      31651 1      67746 0      00006 1      13514 0      40107 0      74744 0      10000 0

33,3440       13514 0      54155 1      31471 1      54130 1      31651 1      54131 0      35014 1      54003 0
33,3450       41527 1      60130 0      00006 1      63466 0      40130 1      61526 1      00006 1      63471 0
33,3460       00006 1      50131 1      71530 1      00006 1      11526 0      13472 1      50131 1      31533 0
33,3470       13472 1      34755 1      54154 0      44745 1      61011 0      00006 1      63501 0      31536 0

33,3500       54154 0      35016 0      54003 0      06037 0   I: 74205 0   I: 77655 1   C: 03601 0   C: 03657 0
33,3510    I: 77776 1      03552 0      36242 0      03534 0      03552 0      34747 1      70107 0      10000 0
33,3520       13527 0      41471 0      62707 0      00006 1      62540 1      05504 0   C: 00257 1      37720 0
33,3530       05072 1   C: 03616 0   C: 66067 0      12540 0      54130 1      00006 1      31657 1      50130 0

33,3540       53573 0      00006 1      31661 1      50130 0      53575 0      00006 1      31663 0      50130 0
33,3550       53577 1      00002 0      35007 0      56003 1      52002 1      55446 1      22003 1      00000 1
33,3560       41671 1      00006 1      13572 0      61670 1      77745 1      00006 1      13570 1      13572 0
33,3570       05504 0   C: 00263 0      31670 1      55671 1      13310 1      41673 0      00006 1      13607 1

33,3600    [illegible]  [illegible]     00006 1      13605 0      13607 1      05504 0   C: 00262 1      31672 0
33,3610       55673 0      11651 0      13514 0      05504 0   C: 00250 0      13514 0      34361 1      05203 0
33,3620    C: 03757 1   C: 70064 1      11651 0   [illegible]     34752 0      60000 1      04616 1   C: 53107 1
33,3630       04616 1   C: 17714 0      13665 0      11675 0      13666 0      00004 0      00006 1      31102 0

33,3640       53653 1      34741 1      54003 0      00006 1      31653 0      53740 1      00006 1      31655 0
33,3650       53735 0      31656 0      55736 0      35016 0      54003 0      40107 0      74745 1      26107 0
33,3660       11651 0      13663 0      34752 0      55651 0      15155 1      34752 0      55675 0      13660 0
33,3670       04616 1   C: 53471 0      04616 1   C: 17714 0      13703 1      37711 1      05146 1      03737 1

33,3700       05516 0   C: 00252 1      05155 0      33720 1      04616 1   C: 21562 0      16001 1      13712 1
33,3710       15155 1      05155 0      34745 0      00006 1      02033 0      00006 1      13675 1      13703 1
33,3720    C: 00523 0      04645 1      55656 1      34752 0      55674 1      55675 0      34755 1      55670 0
33,3730       55672 1      55671 1      55673 0      55651 0      03740 1      31656 0      04640 1      34752 0

33,3740       56002 0      55550 1      35014 1      54003 0      00006 1      50002 0      31523 1      54772 1
33,3750       22766 0      34755 1      54770 0      35016 0      54003 0      06037 0   I: 45175 0   C: 06516 0
33,3760    C: 47651 0   C: 26237 0   C: 06520 0   I: 77624 1   C: 47671 1   C: 02245 0   I: 76435 1   C: 02237 0
33,3770    C: 26231 0   [illegible]  I: 77624 1   C: 47671 1   C: 02273 0   I: 77776 1      01650 0 CKSM 07450 1
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OCTAL LISTING FOR PARAGRAPH # 200,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2000     I: 71220 1   C: 03632 0   C: 03442 0   C: 34641 0   C: 27057 0   I: 67175 0   C: 00001 0   C: 02777 1
34,2010     C: 03642 1   I: 57456 1   C: 27656 1   C: 00007 0   C: 03650 1   I: 53435 0   C: 03642 1   I: 66001 0
34,2020     C: 00001 0   C: 02776 0   I: 47206 0   C: 03656 1   I: 63372 1   I: 63315 0   C: 03656 1   C: 03434 1
34,2030     I: 76505 0   C: 00001 0   C: 03656 1   I: 77646 0   C: 27664 0   C: 03642 1   I: 53315 0   C: 03650 1

34,2040     C: 03656 1   I: 77624 1   C: 46316 1   I: 77624 1   C: 46426 0   I: 77624 1   C: 45636 0   C: 16321 0
34,2050     C: 00005 1   I: 77624 1   C: 46426 0   I: 77624 1   C: 45636 0   C: 36317 1   C: 03632 0   C: 00000 1
34,2060     C: 00020 0   C: 00003 1   C: 34661 1   C: 00606 1   C: 04467 0   C: 00601 0   C: 33216 1   C: 10000 0
34,2070     C: 00000 1   C: 00000 1   C: 00001 0   C: 00004 0   C: 31566 0   C: 00000 1   C: 01177 1   C: 00002 0

34,2100     C: 27311 1   C: 77754 1   C: 57611 0   C: 00000 1   C: 12326 0   C: 00116 1   C: 00730 0   C: 00000 1
34,2110     C: 06433 0   C: 00003 1   C: 25140 0   I: 43014 0   C: 03260 0   C: 03061 0   I: 43014 0   C: 03262 1
34,2120     C: 03063 1   I: 77745 1   C: 32420 0   C: 03606 1   C: 03614 1   I: 77201 1   C: 00001 0   C: 02303 0
34,2130     I: 41446 1   I: 70501 1   C: 00050 1   I: 51515 1   C: 03552 0   I: 55301 0   C: 00047 1   I: 53664 0

34,2140     C: 00046 0   C: 57175 0   I: 41215 1   C: 30070 0   I: 65301 0   C: 00047 1   C: 02321 0   I: 56342 1
34,2150     I: 75457 0   C: 20172 1   I: 53515 0   C: 02303 0   I: 47315 0   C: 02261 0   I: 77656 1   I: 72441 0
34,2160     C: 03472 0   I: 45421 1   C: 60203 0   C: 30062 0   C: 03612 1   I: 43345 1   C: 03606 1   C: 30072 1
34,2170     C: 03606 1   I: 77025 0   C: 30060 1   C: 00006 1   I: 77644 1   C: 70776 0   I: 77601 0   C: 00001 0

34,2200     I: 51545 1   C: 03574 1   I: 50025 0   C: 30064 0   C: 70224 1   I: 43174 1   C: 00007 0   C: 03300 1
34,2210     C: 70776 0   I: 43014 0   C: 03342 1   C: 70216 0   C: 03303 1   C: 70776 0   I: 71214 0   C: 03060 1
34,2220     C: 30066 1   I: 77765 0   C: 03574 1   C: 03574 1   I: 41575 0   C: 02303 0   I: 63256 0   C: 02261 0
34,2230     I: 53435 0   I: 76561 1   C: 03574 1   C: 02267 0   I: 40055 0   C: 03472 0   C: 70237 0   C: 37566 0

34,2240     C: 46416 0   C: 26744 1   I: 77614 1   C: 03466 0   C: 26655 0   C: 32414 1   C: 36730 0   C: 24732 1
34,2250     I: 72142 0   C: 02776 0   C: 37604 1   C: 46326 1   I: 77624 1   C: 46426 0   C: 17602 0   C: 03621 1
34,2260     I: 52054 1   C: 70263 1   C: 70372 0   I: 77745 1   C: 02752 0   I: 50025 0   C: 30110 1   C: 70372 0
34,2270     I: 45145 0   C: 00041 1   C: 46426 0   I: 60201 1   C: 00003 1   C: 00047 1   I: 50315 0   C: 02303 0

34,2300     C: 03566 1   I: 56246 1   C: 00003 1   I: 45257 0   C: 20201 0   C: 30100 0   I: 71240 1   C: 70372 0
34,2310     C: 02740 0   I: 45312 0   C: 30070 0   C: 14017 1   C: 02317 0   I: 56342 1   I: 41325 0   C: 02740 0
34,2320     C: 00041 1   I: 77624 1   C: 46426 0   I: 72412 0   I: 41366 1   I: 52414 1   C: 04343 1   C: 70330 0
34,2330     I: 50315 0   C: 02303 0   C: 03566 1   C: 03617 1   I: 77646 0   I: 41301 0   C: 00050 1   I: 53660 1

34,2340     C: 00047 1   C: 20204 0   C: 14015 0   C: 32420 0   C: 00021 1   I: 53575 0   C: 00015 0   C: 26730 1
34,2350     C: 02303 0   I: 75315 1   C: 03566 1   C: 03617 1   I: 45076 1   C: 46416 0   C: 26744 1   I: 77614 1
34,2360     C: 03466 0   C: 36655 1   C: 24732 1   I: 51125 0   C: 03617 1   C: 70376 1   I: 45345 1   C: 03604 0
34,2370     I: 52006 0   C: 70376 1   I: 71201 1   C: 00001 0   C: 32420 0   I: 77606 1   I: 41345 0   C: 03467 1
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OCTAL LISTING FOR PARAGRAPH # 201, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2400     C: 03604 0    I: 45261 0    C: 20217 1    I: 77615 0    C: 03634 0    C: 01777 1    I: 77021 1    C: 03636 1
34,2410     C: 00005 1    I: 40240 0    C: 70776 0    C: 00001 0    I: 63375 0    C: 03566 1    C: 02303 0    I: 77624 1
34,2420     C: 71062 0    C: 26311 0    C: 00007 0    C: 27514 1    C: 03506 1    I: 63201 1    C: 00001 0    C: 03500 1
34,2430     I: 77624 1    C: 71062 0    C: 27522 1    C: 00007 0    C: 37530 0    C: 71133 0    I: 40375 1    C: 02311 0

34,2440     C: 00001 0    I: 45115 0    C: 03544 1    C: 46316 1    I: 77624 1    C: 46426 0    C: 27604 0    C: 03544 1
34,2450     I: 63201 1    C: 00001 0    C: 02311 0    I: 65325 0    C: 01777 1    C: 03636 1    I: 41525 0    C: 33732 1
34,2460     I: 77624 1    C: 73466 1    I: 77624 1    C: 46402 0    I: 77745 1    C: 02257 0    I: 73401 0    C: 00007 0
34,2470     I: 53515 0    C: 03536 1    C: 00001 0    I: 47315 0    C: 02261 0    I: 77655 1    I: 71525 0    C: 02257 0

34,250      I: 45561 1    C: 77754 1    I: 74345 0    I: 76455 1    C: 00023 0    I: 50206 0    C: 03536 1    I: 41552 0
34,2510     I: 72316 0    C: 00155 0    I: 50315 0    C: 03536 1    C: 03536 1    I: 57551 1    C: 00155 0    I: 50315 0
34,2520     C: 03552 0    C: 03552 0    I: 76371 0    I: 71244 0    C: 70542 0    C: 03606 1    I: 77025 0    C: 30072 1
34,2530     C: 00001 0    I: 77654 0    C: 72036 1    I: 70545 1    C: 03612 1    C: 03612 1    I: 77621 1    C: 03576 0

34,2540     C: 37574 0    C: 70165 1    I: 41566 1    I: 45276 0    C: 00007 0    C: 14013 0    I: 45425 0    C: 77762 1
34,2550     I: 776[illegible]    C: 14017 1    C: 00013 0    I: 45246 0    C: 00017 1    I: 71240 1    C: 70561 1    C: 00015 0
34,2560     C: 00013 0    I: 77745 1    C: 00013 0    I: 76561 1    I: 53455 0    C: 03536 1    I: 53515 0    C: 03552 0
34,2570     I: 53515 0    C: 03560 1    I: 63235 0    C: 00007 0    C: 00007 0    I: 50235 0    C: 00001 0    I: 77626 0

34,2600     C: 53762 1    I: 72441 0    I: 75326 1    C: 00015 0    I: 41542 1    I: 71214 0    C: 03301 0    C: 70644 0
34,2610     C: 00001 0    I: 65225 1    C: 03610 0    C: 03574 1    I: 60225 1    C: 03576 0    C: 00047 1    I: 65265 0
34,2620     C: 00003 1    C: 03574 1    C: 03576 0    I: 43014 0    C: 03342 1    C: 70656 0    C: 03343 0    C: 70656 0
34,2630     I: 41345 0    C: 00003 1    C: 03610 0    I: 71244 0    C: 70663 0    C: 30062 0    I: 77765 0    C: 03612 1

34,2640     C: 03612 1    I: 43014 0    C: 03062 0    C: 03263 0    I: 77745 1    C: 00001 0    C: 17610 0    C: 03574 1
34,2650     C: 03576 0    I: 43025 1    C: 03612 1    C: 03261 1    C: 37574 0    C: 70165 1    I: 43014 0    C: 03302 0
34,2660     C: 70702 0    C: 03303 1    C: 70702 0    I: 75345 1    C: 30102 1    C: 00005 1    I: 77765 0    C: 03610 0
34,2670     C: 03612 1    I: 43276 0    C: 03574 1    C: 17574 1    C: 00001 0    I: 43014 0    C: 03063 1    C: 03062 0

34,2700     C: 37610 1    C: 70176 0    I: 60345 0    C: 00005 1    C: 00050 1    I: 54065 0    C: 00001 0    C: 00047 1
34,2710     I: 77657 0    C: 20601 1    C: 17612 1    C: 00001 0    C: 03610 0    I: 51545 1    C: 03612 1    I: 45206 1
34,2720     C: 30076 0    I: 712[illegible]0 1    C: 70737 0    I: 50025 0    C: 30106 0    C: 70732 0    I: 75345 1    C: 30106 0
34,2730     C: 03612 1    C: 03612 1    I: 45345 1    C: 03574 1    C: 03612 1    C: 37574 0    C: 70165 1    I: 77145 1

34,2740     C: 03602 0    C: 00002 0    I: 77750 0    C: 02776 0    I: 50023 0    C: 30072 1    C: 70776 0    I: 71374 1
34,2750     C: 00003 1    C: 03604 0    I: 50023 0    C: 30072 1    C: 70776 0    I: 45345 1    C: 01777 1    C: 03634 0
34,2760     C: 02253 1    I: 45374 0    C: 00004 0    C: 30112 0    I: 77040 0    C: 70776 0    C: 00005 1    I: 45345 1
34,2770     C: 03636 1    C: 01777 1    C: 02255 1    I: 51025 1    C: 30112 0    C: 72152 1    I: 43014 0    C: 03302 0
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OCTAL LISTING FOR PARAGRAPH # 202,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3000     C: 72040 0   C: 03343 0   C: 72040 0   I: 71334 0   C: 03613 0   C: 32420 0   I: 43014 0   C: 03260 0
34,3010     C: 03061 0   I: 43014 0   C: 03262 1   C: 03263 0   C: 37606 0   C: 70125 0   I: 71220 1   C: 03470 1
34,3020     C: 03442 0   C: 34041 0   C: 46360 0   I: 77214 0   C: 01067 1   C: 03560 1   C: 03530 1   C: 27506 1
34,3030     C: 03552 0   C: 03522 1   C: 03500 1   I: 47256 0   C: 03506 1   I: 77656 1   C: 26261 0   C: 03536 1

34,3040     C: 37642 0   C: 71052 0   C: 02311 0   C: 26303 0   C: 03544 1   C: 37650 0   C: 71052 0   C: 03514 1
34,3050     C: 37472 1   C: 03470 1   I: 41406 0   I: 74241 0   C: 02261 0   C: 02261 0   I: 51352 1   I: 63256 0
34,3060     I: 74246 1   I: 43572 0   I: 65325 0   C: 03634 0   C: 01777 1   I: 41525 0   C: 33732 1   I: 77650 1
34,3070     C: 73466 1   I: 65325 0   C: 01777 1   C: 03636 1   I: 41525 0   C: 32420 0   I: 77650 1   C: 73466 1

34,3100     I: 76020 1   C: 03470 1   C: 01521 0   I: 77624 1   C: 72370 0   I: 77624 1   C: 71120 1   I: 61375 1
34,3110     C: 03434 1   C: 00001 0   I: 77772 0   C: 03656 1   I: 51406 1   C: 27664 0   I: 77650 1   C: 03470 1
34,3120     I: 77201 1   C: 00047 0   C: 02261 0   I: 63276 1   C: 02303 0   I: 57456 1   I: 47206 0   C: 02261 0
34,3130     I: 77772 0   C: 00001 0   I: 77616 0   I: 77220 1   C: 03470 1   C: 02311 0   I: 53406 0   C: 27544 1

34,3140     C: 03522 1   I: 502[illegible]6 0   C: 03544 1   I: 72406 0   C: 16732 0   I: 65316 0   C: 06512 1   I: 45302 1
34,3150     I: 72566 1   I: 57515 1   I: 77635 1   C: 03522 1   I: 65241 0   C: 02261 0   I: 45565 0   C: 51047 0
34,3160     C: 03522 1   I: 45115 0   C: 03530 1   C: 46416 0   C: 26744 1   I: 77614 1   C: 03666 1   C: 36655 1
34,3170     C: 24732 1   I: 53754 1   C: 02777 1   C: 57576 1   C: 00023 0   I: 76441 1   C: 03544 1   I: 51515 1

34,3200     I: 63257 1   C: 57576 1   C: 02311 0   I: 65246 1   I: 77625 0   C: 00003 1   C: 17600 1   C: 02742 1
34,3210     I: 65301 0   C: 00047 1   C: 00041 1   I: 77624 1   C: 44426 0   I: 56362 0   I: 41457 1   C: 20174 1
34,3220     I: 65225 1   C: 03600 1   I: 56302 0   C: 00005 1   I: 75406 1   I: 41275 1   C: 00007 0   C: 00001 0
34,3230     I: 65272 0   C: 00003 1   I: 65301 0   C: 00047 1   C: 02321 0   I: 56342 1   I: 65257 1   C: 20174 1

34,3240     C: 00005 1   I: 65301 0   C: 00050 1   C: 02321 0   I: 56342 1   I: 44257 1   C: 57604 1   I: 63525 0
34,3250     C: 00011 1   I: 75421 1   I: 47315 0   C: 02261 0   C: 03544 1   I: 74256 0   C: 00013 0   I: 74315 0
34,3260     C: 03544 1   C: 00011 1   I: 76455 1   I: 77626 0   C: 74233 0   I: 77651 0   C: 03514 1   C: 36275 1
34,3270     C: 03470 1      04616 1   C: 72347 1      03276 1      04616 1   C: 72354 0      04616 1   C: 72361 0

34,3300        33641 1      55466 0      33632 0      03621 1      33633 1      04616 1   C: 20635 0      16001 1
34,3310        13315 1      13304 1      36245 1      05464 1      15155 1      34756 1      55144 0      34753 1
34,3320        55145 1      33634 0      04616 1   C: 20635 0      16001 1      13332 1      13321 0      34751 0
34,3330        05464 1      15155 1      06037 0   I: 70535 0   C: 01146 0   I: 71230 0   C: 71344 1   C: 03631 0

34,3340     C: 02303 0   I: 77614 1   C: 01230 1   C: 71375 0   I: 43014 0   C: 01070 1   C: 00670 0   I: 77624 1
34,3350     C: 71554 0   I: 43015 1   C: 03442 0   C: 00470 1   C: 03631 0   I: 77776 1      33635 1      04616 1
34,3360     C: 20635 0      16001 1      13367 1      13356 0      36242 0      05464 1      15155 1      00006 1
34,3370        31631 1      53046 0      33636 1      03621 1      06037 0   I: 45014 0   C: 04266 1   C: 20000 0
```

OCTAL LISTING FOR PARAGRAPH # 203, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
34,3400     I: 77624 1   C: 71554 0   I: 71214 0   C: 01350 0   C: 71424 0   C: 03631 0   C: 34041 0   C: 71605 1
34,3410     I: 53575 0   C: 00001 0   I: 47315 0   C: 00007 0   I: 60246 1   C: 00047 1   I: 56325 0   C: 02303 0
34,3420     I: 77657 0   C: 20172 1   C: 36305 1   C: 71430 0   I: 43345 1   C: 02303 0   C: 00037 0   C: 03631 0
34,3430     I: 45345 1   C: 03631 0   C: 02305 0   C: 02307 1   C: 34041 0   C: 71605 1   I: 77745 1   C: 03442 0

34,3440     C: 03610 0   I: 77331 0   C: 03471 0   C: 71447 0   C: 00001 0   I: 77624 1   C: 73327 0   I: 43014 0
34,3450     C: 04346 1   C: 71460 0   C: 01311 0   C: 71456 0   I: 77614 1   C: 00470 1   I: 77776 1      03505 1
34,3460     I: 51575 1   C: 02366 0   C: 27576 0   C: 03506 1   I: 51451 0   C: 03566 1   C: 26350 0   C: 03536 1
34,3470     I: 45115 0   C: 02337 1   C: 46316 1   I: 77624 1   C: 46426 0   C: 03606 1   I: 43014 0   C: 01311 0

34,3500     C: 71502 0   C: 00470 1   I: 77776 1      33637 0      03621 1      33640 0      03621 1      06037 0
34,3510     I: 77214 0   C: 01267 0   C: 02366 0   C: 37656 0   C: 73606 0   I: 52014 0   C: 04306 0   C: 71541 1
34,3520     C: 71400 0      04616 1   C: 72347 1      00006 1      31401 0      03532 0      04616 1   C: 72354 0
34,3530        00006 1      31403 1      53576 0      04616 1   C: 72361 0      06037 0   I: 45014 0   C: 04066 0

34,3540     C: 20000 0   I: 43234 0   C: 21573 0   C: 03576 0   C: 03442 0   C: 34041 0   C: 46360 0   I: 77624 1
34,3550     C: 73274 1   I: 52145 0   C: 02307 1   C: 71434 1   I: 71220 1   C: 03465 0   C: 03442 0   C: 34041 0
34,3560     C: 46360 0   I: 53775 1   C: 03552 0   C: 57176 0   C: 16655 0   C: 03621 1   I: 71406 0   C: 16732 0
34,3570     I: 43156 1   C: 03406 0   C: 26730 1   C: 03560 1   I: 77657 0   C: 57176 0   C: 36744 0   C: 24732 1

34,3600     I: 77624 1   C: 73274 1   I: 52145 0   C: 00037 0   C: 03465 0   I: 43020 1   C: 03465 0   C: 01352 1
34,3610     C: 71615 0   I: 77624 1   C: 27043 0   I: 77650 1   C: 03465 0   I: 77624 1   C: 27057 0   I: 77650 1
34,3620     C: 03465 0      00006 1      23465 1      55615 0      31615 1      04616 1   C: 20476 0      16001 1
34,3630        01465 1      13624 0   C: 01441 1   C: 01467 0   C: 01006 0   C: 01471 1   C: 01442 1   C: 01472 1

34,3640     C: 01521 0   C: 00002 0      05353 1   C: 00035 1      06037 0   I: 77614 1   C: 04705 1   C: 60321 1
34,3650     I: 45345 1   C: 03514 1   C: 26205 1   I: 43040 1   C: 60750 0   C: 04267 0   I: 67214 1   C: 02676 1
34,3660     C: 31716 0   I: 77471 0   C: 03514 1      52155 1      53641 1      53637 0      53635 1      53571 1
34,3670        06037 0   I: 43345 1   C: 03571 1   C: 03635 1   I: 43215 0   C: 03637 0   C: 03641 1   I: 41205 0

34,3700     C: 02265 1   C: 21032 0   I: 65252 1   C: 02271 1   I: 43342 0   I: 77625 0   C: 21027 1   C: 16271 1
34,3710     C: 02265 1   I: [illegible] 1   C: 02271 1   C: 36263 0   C: 60321 1   C: 00004 0      04616 1   C: 53073 0
34,3720        04616 1   C: 17714 0      13745 0      11674 1      13755 1      00004 0      00006 1      31102 0
34,3730        53655 1      00006 1      31561 1      53755 0      00006 1      31157 0      53460 0      31155 1

34,3740        55461 1      40107 0      74750 0      26107 0      05155 0      30101 1      74742 0      00006 1
34,3750        13754 0      05516 0   C: 00120 1      05155 0      34752 0      55674 1      05155 0      00006 1
34,3760        30025 0      53653 1      00006 1      30033 1      53655 1      30034 0      55656 1      30037 0
34,3770        55657 0      00006 1      30041 1      53661 0      05261 1   C: 03775 1   C: 03776 1 CKSM 60264 1
```

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OCTAL LISTING FOR PARAGRAPH # 204,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2000      05504 0   C: 00027 1      05504 0   C: 00031 0      32025 1      03712 0      33727 0      03712 0
35,2010      05516 0   C: 00027 1      06037 0   I: 77624 1   C: 70000 0   I: 77414 0   C: 00470 1      32026 1
35,2020      03712 0      06037 0   I: 77614 1   C: 01027 0   C: 72540 0   C: 01441 1   C: 01452 0      02347 0
35,2030      02032 1      02364 1      00006 1      32420 0      53621 1      02053 0   I: 77734 1   C: 03613 0

35,2040   I: 77740 1   C: 03613 0   I: 77533 1   C: 32423 0      30154 1      05744 0      35006 1      04616 1
35,2050   C: 20476 0      06001 0      02046 1      02361 1      32417 1      55467 1      55633 1      55634 0
35,2060      32410 0      03712 0      06037 0   I: 57545 1   C: 03634 0   I: 71240 1   C: 72113 1   C: 01643 1
35,2070   C: 34041 0   C: 46360 0   I: 53775 1   C: 03536 1   C: 57176 0   C: 26655 0   C: 03544 1   I: 43057 1

35,2100   C: 57176 0   C: 03466 0   C: 16744 1   C: 06530 1   C: 36756 0   C: 25547 0   I: 77615 0   C: 03574 1
35,2110   C: 03634 0   I: 77776 1      02060 0   I: 77776 1      33724 0      04616 1   C: 20476 0      06001 0
35,2120      02122 1      02114 1      33723 1      03712 0      06037 0   I: 77745 1   C: 03634 0   C: 37442 1
35,2130   C: 20000 0   I: 77624 1   C: 71016 0   I: 77201 1   C: 00001 0   C: 03506 1   I: 65315 0   C: 03500 1

35,2140   C: 03634 0   I: 65325 0   C: 03636 1   C: 33732 1   I: 45006 0   C: 73466 1   I: 77624 1   C: 46412 1
35,2150   I: 77624 1   C: 70113 0   I: 43014 0   C: 01311 0   C: 72155 0   C: 00470 1   I: 77745 1   C: 02253 1
35,2160   C: 02253 1   I: 51025 1   C: 32422 1   C: 72160 0   I: 77745 1   C: 02255 1   C: 02255 1   I: 51025 1
35,2170   C: 32422 1   C: 72166 0   I: 77776 1      32412 1      03712 0      06037 0   I: 45175 0   C: 02267 0

35,2200   C: 71100 0   C: 26267 0   C: 02311 0   C: 26303 0   C: 02275 0   I: 45170 0   C: 01522 0   C: 72370 0
35,2210   I: 77745 1   C: 03636 1   C: 37640 1   C: 73606 0   I: 77650 1   C: 72131 1      02347 0      02221 1
35,2220      02354 1      02361 1      32411 1      03712 0      06037 0   I: 77745 1   C: 03640 0   C: 17636 1
35,2230   C: 01777 1   C: 37442 1   C: 20000 0   I: 77624 1   C: 71016 0   I: 77624 1   C: 71133 0   I: 77201 1

35,2240   C: 00001 0   C: 03544 1   I: 45115 0   C: 02311 0   C: 71071 1   I: 77624 1   C: 46402 0   I: 77201 1
35,2250   C: 00001 0   C: 03530 1   I: 45115 0   C: 03522 1   C: 71071 1   I: 77624 1   C: 46412 1   I: 43145 0
35,2260   C: 32420 0   C: 03460 0   C: 36317 1   C: 72764 1   I: 77454 1   C: 72302 0      05567 0   C: 00611 1
35,2270      35006 1      04616 1   C: 20476 0      06001 0      02276 0      02221 1      06037 0   I: 77745 1

35,2300   C: 32420 0   C: 02317 0   I: 43014 0   C: 01311 0   C: 72306 1   C: 00470 1   I: 43345 1   C: 02317 0
35,2310   C: 03636 1   C: 03636 1   I: 77625 0   C: 01777 1   I: 51025 1   C: 32422 1   C: 72314 1   I: 77615 0
35,2320   C: 32422 1   C: 16253 1   C: 03636 1   I: 41425 1   C: 03640 0   I: 45246 0   C: 32422 1   I: 43244 1
35,2330   C: 72325 0   C: 32422 1   I: 45565 0   C: 75522 0   I: 77776 1      32412 1      03712 0      06037 0

35,2340   I: 45175 0   C: 02275 0   C: 71100 0   C: 36275 1   C: 73606 0   I: 77650 1   C: 72233 0      00006 1
35,2350      23470 0      05504 0   C: 00050 1      01470 0      00006 1      23470 0      05516 0   C: 00050 1
35,2360      01470 0      00006 1      23470 0      05504 0   C: 00027 1      05504 0   C: 00031 0      01470 0
35,2370   C: 03434 1   I: 45020 1   C: 03463 0   C: 71120 1   I: 64375 1   C: 03434 1   C: 00001 0   I: 66172 0
```

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                    3:15 DEC.  2,1970                PAGE 1707

OCTAL LISTING FOR PARAGRAPH # 205,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2400      C: 03615 0     C: 03434 1     I: 77776 1        31615 1        03712 0        06037 0     I: 77650 1     C: 03463 0
35,2410      C: 01413 0     C: 01415 0     C: 01513 1     C: 77776 1     C: 62460 1     C: 17777 0     C: 37776 0     C: 00000 1
35,2420      C: 00000 1     C: 00025 0     C: 37100 1     C: 00600 1     C: 00601 0     C: 00602 0     C: 00603 1     C: 00604 0
35,2430      C: 00605 1     C: 00606 1        00006 1        23465 1        34755 1        55163 0        34752 0        00004 0

35,2440         05203 0     C: 02717 1     C: 74067 0        05327 1     C: 40036 0     C: 05024 1     C: 13000 0        01465 1
35,2450         02361 1        32025 1        03712 0        06037 0     I: 71214 0     C: 00670 0     C: 03442 0     C: 34041 0
35,2460      C: 27057 0     I: 40375 1     C: 00001 0     C: 00001 0     C: 03642 1     C: 26323 1     C: 00007 0     C: 03650 1
35,2470      C: 16331 1     C: 32420 0     I: 65206 0     C: 03452 1     I: 66015 0     C: 03442 0     C: 02776 0     C: 03631 0

35,2500      I: 45134 0     C: 02777 1     C: 22000 1     I: 41575 0     C: 02366 0     C: 03656 1     I: 43046 1     C: 01267 0
35,2510      C: 37664 1     C: 15733 1     I: 63375 0     C: 03642 1     C: 02337 1     I: 77624 1     C: 46316 1     I: 77624 1
35,2520      C: 46426 0     I: 77624 1     C: 45636 0     C: 16321 0     C: 00005 1     I: 77624 1     C: 46426 0     I: 77624 1
35,2530      C: 45636 0     C: 02317 0     I: 77776 1        33727 0        03712 0        32026 1        03712 0        06037 0

35,2540      I: 45014 0     C: 01071 0     C: 73606 0     I: 77650 1     C: 72540 0        02347 0        02550 0        02354 1
35,2550         02361 1        33723 1        03712 0        00006 1        33746 1        53621 1        32417 1        55466 0
35,2560         03674 1        06037 0     I: 71214 0     C: 01270 0     C: 03636 1     C: 17442 0     C: 02257 0     I: 43054 1
35,2570      C: 72572 1     C: 01070 1     I: 77624 1     C: 20000 0     I: 43145 0     C: 06522 1     C: 03460 0     I: 43014 0

35,2600      C: 01310 1     C: 72603 1     C: 03660 1     C: 02317 0     I: 43345 1     C: 03636 1     C: 02317 0     C: 34041 0
35,2610      C: 46360 0     I: 77624 1     C: 72764 1     I: 77454 1     C: 72625 0        05567 0     C: 00611 1        35006 1
35,2620         04616 1     C: 20476 0        06001 0        02550 0        02615 1     I: 43014 0     C: 03600 1     C: 72604 0
35,2630      C: 01310 1     C: 72635 1     I: 77776 1        03674 1        02640 1     I: 77776 1        33723 1        03712 0

35,2640         06037 0     I: 71201 1     C: 00001 0     C: 02777 1     C: 14047 1     C: 03621 1     I: 71406 0     C: 16732 0
35,2650      I: 77756 0     C: 26730 1     C: 03552 0     I: 77657 0     C: 57176 0     C: 26655 0     C: 03560 1     I: 43057 1
35,2660      C: 57176 0     C: 03466 0     C: 36744 0     C: 24732 1     I: 77745 1     C: 03636 1     C: 03610 0     I: 77615 0
35,2670      C: 00037 0     C: 37631 1     C: 73306 0     I: 51575 1     C: 02366 0     C: 27576 0     C: 03506 1     I: 51451 0

35,2700      C: 03566 1     C: 26350 0     C: 03536 1     I: 45115 0     C: 02337 1     C: 46316 1     I: 77624 1     C: 46426 0
35,2710      C: 17606 1     C: 03636 1     C: 03442 0     I: 77776 1        33725 1        03712 0        06037 0     I: 77624 1
35,2720      C: 73522 0     I: 77624 1     C: 73606 0     I: 77650 1     C: 72574 1        02347 0        00006 1        31401 0
35,2730         02734 0        02354 1        00006 1        31403 1        53576 0        02361 1        06037 0     I: 77624 1

35,2740      C: 20000 0     I: 77634 0     C: 21573 0     C: 03612 1     I: 77615 0     C: 03576 0     C: 03442 0     C: 03610 0
35,2750      C: 34041 0     C: 46360 0     I: 77624 1     C: 73274 1     I: 77624 1     C: 73306 0     I: 77624 1     C: 73522 0
35,2760      I: 77624 1     C: 73606 0     I: 77650 1     C: 72741 0     I: 66220 1     C: 03463 0     C: 03614 1     C: 40000 0
35,2770      I: 40345 1     C: 33734 1     C: 00001 0     C: 27574 1     C: 03536 1     C: 27500 1     C: 03544 1     C: 27506 1
```

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OCTAL LISTING FOR PARAGRAPH # 206,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3000     C: 03552 0    C: 27522 1    C: 03560 1    C: 03530 1    I: 77624 1    C: 73274 1    I: 63235 0    C: 03536 1
35,3010     I: 53515 0    C: 03536 1    I: 46315 1    I: 51352 1    C: 02311 0    I: 63256 0    I: 63241 0    C: 00001 0
35,3020     I: 75241 1    C: 02311 0    I: 65552 0    I: 50315 0    C: 02311 0    C: 03536 1    I: 71244 0    C: 73032 1
35,3030     C: 06530 1    I: 41425 1    I: 71214 0    C: 03740 1    C: 73261 0    C: 03576 0    C: 14033 1    I: 77625 0

35,3040     C: 02257 0    C: 03576 0    I: 45246 0    C: 33740 1    I: 77640 0    C: 73271 1    I: 70535 0    C: 03614 1
35,3050     I: 72030 1    C: 03463 0    C: 00154 1    I: 77330 1    C: 03613 0    C: 03552 0    I: 65256 0    C: 00045 0
35,3060     I: 53515 0    C: 03536 1    I: 77725 1    I: 41525 0    C: 00045 0    I: 77621 1    C: 00015 0    C: 14037 0
35,3070     C: 06520 0    I: 41425 1    C: 02257 0    I: 50165 0    C: 00037 0    C: 03463 0    I: 71545 0    I: 56205 0

35,3100     C: 00017 1    C: 00015 0    I: 77676 0    C: 00035 1    I: 44246 1    C: 06520 0    I: 77240 1    C: 03463 0
35,3110     C: 02261 0    I: 53435 0    C: 00007 0    I: 41241 0    C: 03544 1    C: 00015 0    I: 47315 0    C: 00001 0
35,3120     C: 03560 1    I: 53435 0    C: 00001 0    I: 41241 0    C: 03560 1    C: 00017 1    I: 77621 1    I: 63301 0
35,3130     C: 00047 1    C: 00007 0    I: 50235 0    C: 00001 0    C: 02261 0    I: 50315 0    C: 00001 0    C: 00007 0

35,3140     I: 65552 0    I: 77765 0    I: 43225 0    C: 06520 0    C: 02257 0    I: 65525 0    C: 00035 1    I: 75221 1
35,3150     C: 06520 0    C: 00037 0    I: 77615 0    I: 56205 0    C: 33732 1    I: 77605 1    I: 41257 1    C: 20176 0
35,3160     I: 51406 1    I: 50025 0    C: 03574 1    C: 73167 0    I: 75345 1    C: 03574 1    I: 77606 1    I: 51135 1
35,3170     C: 03614 1    C: 73177 1    I: 71331 0    C: 03614 1    C: 37777 1    I: 77650 1    C: 73235 1    I: 41345 0

35,3200     C: 03576 0    C: 00033 1    I: 71244 0    C: 73213 0    C: 03574 1    I: 77605 1    C: 33736 0    C: 17574 1
35,3210     I: 70446 0    I: 52076 1    C: 73223 0    I: 51545 1    C: 03576 0    I: 51525 1    C: 00033 1    I: 77625 0
35,3220     I: 71240 1    C: 73226 0    I: 77646 0    I: 52165 1    C: 03606 1    C: 73235 1    I: 57545 1    C: 03606 1
35,3230     I: 70406 1    C: 03606 1    I: 77615 0    I: 77650 1    C: 73236 1    C: 03606 1    I: 77615 0    C: 02317 0

35,3240     C: 02317 0    I: 63375 0    C: 03506 1    C: 03530 1    I: 77624 1    C: 73462 0    I: 77624 1    C: 46402 0
35,3250     I: 63375 0    C: 03530 1    C: 03522 1    I: 77624 1    C: 73462 0    I: 77624 1    C: 46412 1    I: 77650 1
35,3260     C: 73004 1    I: 43345 1    C: 03636 1    C: 02317 0    C: 17636 1    I: 77614 1    C: 01310 1    C: 73271 1
35,3270     C: 02257 0    I: 52145 0    C: 06522 1    C: 03463 0    I: 52375 1    C: 03552 0    C: 03536 1    I: 41456 0

35,3300     C: 26311 0    C: 03536 1    I: 53435 0    C: 03544 1    C: 02261 0    I: 77616 0    I: 77220 1    C: 03470 1
35,3310     C: 03560 1    I: 65315 0    C: 03552 0    C: 03610 0    I: 65325 0    C: 03631 0    C: 33732 1    I: 46125 0
35,3320     C: 03467 1    C: 73325 1    I: 77745 1    I: 41545 0    C: 06522 1    I: 77624 1    C: 73466 1    C: 27444 0
35,3330     C: 00007 0    C: 27506 1    C: 03444 0    I: 63256 0    C: 03536 1    I: 41456 0    I: 50235 0    C: 00001 0

35,3340     C: 02261 0    I: 77715 1    I: 72441 0    C: 00001 0    I: 75326 1    I: 43244 1    C: 73350 0    C: 06530 1
35,3350     C: 15756 1    C: 03631 0    I: 77625 0    C: 03610 0    C: 03452 1    I: 40335 0    C: 03467 1    C: 00001 0
35,3360     I: 63325 0    C: 33744 0    C: 03536 1    C: 26323 1    C: 03544 1    C: 36331 0    C: 22000 1    I: 77624 1
35,3370     C: 73447 1    I: 64375 1    C: 02366 0    C: 00001 0    I: 77772 0    C: 37434 0    C: 03470 1    I: 45020 1
```

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                    3:15 DEC.  2,1970                    PAGE 1709

OCTAL LISTING FOR PARAGRAPH # 207,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3400     C: 03463 0   C: 73447 1   I: 61375 1   C: 03434 1   C: 00001 0   I: 77772 0   C: 02366 0   I: 63255 0
35,3410     C: 03544 1   C: 03536 1   I: 65325 0   C: 03442 0   C: 03631 0   I: 41525 0   C: 06530 1   I: 77624 1
35,3420     C: 73466 1   I: 77775 1   C: 00001 0   C: 03444 0   I: 41575 0   C: 02311 0   I: 57435 1   C: 02261 0
35,3430     I: 41456 0   I: 76435 1   C: 02311 0   I: 77715 1   I: 64315 1   C: 02366 0   C: 00001 0   I: 77772 0

35,3440     C: 36303 1   C: 03463 0   I: 40220 0   C: 03463 0   C: 00001 0   I: 77650 1   C: 73424 1   I: 57575 1
35,3450     C: 02261 0   C: 24007 0   C: 03536 1   I: 57456 1   C: 00015 0   I: 76435 1   C: 02261 0   C: 00001 0
35,3460     I: 43401 0   C: 00023 0   I: 65325 0   C: 06522 1   C: 02317 0   I: 41406 0   I: 45020 1   C: 03465 0
35,3470     C: 27414 0   I: 71214 0   C: 01673 1   I: 43054 1   C: 73476 0   C: 01473 0   I: 45545 1   C: 63736 0

35,3500     I: 73014 0   C: 00063 1   C: 02777 1   I: 43014 0   C: 04303 0   C: 73507 1   C: 00263 0   C: 25517 0
35,3510     I: 77657 0   C: 57176 0   C: 25535 0   I: 77657 0   C: 57176 0   C: 35543 0   C: 27107 1   I: 52175 0
35,3520     C: 00001 0   C: 03465 0   I: 43020 1   C: 03470 1   C: 01311 0   C: 73531 1   I: 52014 0   C: 00470 1
35,3530     C: 73576 1   I: 77214 0   C: 03274 0   C: 03434 1   C: 01237 0   I: 77776 1      33727 0      04616 1

35,3540     C: 20476 0      06001 0      03544 1      03536 1      35016 0      54003 0      22007 0      34756 1
35,3550        54002 1      50002 0      41433 0      50002 0      61236 1      26001 1      10002 1      13550 0
35,3560        22000 1      00006 1      13565 0      05504 0   C: 00146 1      06037 0   I: 45014 0   C: 03354 0
35,3570     C: 73572 0   C: 73377 0   I: 77214 0   C: 01267 0   C: 02366 0   C: 03656 1   I: 77624 1   C: 73442 1

35,3600     I: 77776 1      33726 1      03712 0      06037 0   I: 77650 1   C: 03470 1   I: 71220 1   C: 03470 1
35,3610     C: 33742 0   C: 02253 1   I: 71214 0   C: 01351 1   C: 73634 1   C: 33742 0   I: 77615 0   C: 33742 0
35,3620     C: 02253 1   I: 77414 0   C: 01742 1   C: 73634 1      03704 1      03627 1      03635 1      06037 0
35,3630     I: 41575 0   C: 03656 1   I: 77624 1   C: 15717 1   I: 77776 1      02432 0      31470 0      55464 1

35,3640        34777 1      04616 1   C: 01735 1      33730 0      04616 1   C: 20476 0      03651 0      03654 0
35,3650        03664 0      30005 1      55163 0      06001 0      40076 1      74746 1      00006 1      13651 1
35,3660        05353 1   C: 04024 0      05504 0   C: 00047 1      30005 1      55163 0      05353 1   C: 04024 0
35,3670        06037 0   I: 52014 0   C: 00670 0   C: 03464 1      00006 1      23463 1      33724 0      04616 1

35,3700     C: 20476 0      16001 1      01463 1      13676 1      37744 1      71011 1      00006 1      13711 1
35,3710        24002 0      00002 0      00006 1      23465 1      55615 0      31615 1      04616 1   C: 20476 0
35,3720        16001 1      01465 1      13715 0   C: 01445 0   C: 01467 0   C: 01472 1   C: 01473 0   C: 01521 0
35,3730     C: 04055 0   C: 14441 0   C: 37325 1   C: 00001 0   C: 20650 0   C: 12525 0   C: 12525 0   C: 00004 0

35,3740     C: 21505 1   C: 77777 0   C: 61337 1   C: 01252 0   C: 25253 1   C: 13434 0   C: 16162 0      04645 1
35,3750        55164 1      04616 1   C: 54255 1      10000 0      13766 1      34737 0      70106 1      10000 0
35,3760        13773 0      34747 1      00006 1      02030 0      00006 1      13773 0      33775 1      04616 1
35,3770     C: 20623 1      16001 1      13751 0      31164 0      04640 1   C: 00203 0   C: 03776 1   CKSM 44737 1
```

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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM AP11ROPE BY EYLES                       3:15 DEC.  2,1970                PAGE 1710

OCTAL LISTING FOR PARAGRAPH # 210,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2000      C: 01056 0   C: 37147 0   C: 00457 1   C: 03250 0   C: 77777 0   C: 77731 1   C: 00307 0   C: 11040 0
36,2010      C: 00151 1   C: 05214 0   C: 77777 0   C: 77765 0   C: 00026 0   C: 30605 1   C: 00013 0   C: 14303 1
36,2020      C: 00030 1   C: 00014 1   C: 01512 0      12325 0      12612 1      13062 1      15261 0      12146 1
36,2030      C: 00000 1   C: 03770 1   C: 64067 1      12376 0      12563 1      12521 1   C: 01450 1      12325 0

36,2040         12614 1      13047 0      15261 0      12146 1   C: 04300 0   C: 03666 1   C: 74066 1      12366 1
36,2050         12563 1      12504 0      13123 0      12151 1   C: 77776 1   C: 03376 0   C: 74066 1      12400 0
36,2060         12567 0   C: 01450 1      12322 1      12614 1      13047 0      15261 0      12146 1   C: 05120 1
36,2070      C: 03666 1   C: 74066 1      12366 1      12563 1      12541 1      13420 0   C: 01476 0      12325 0

36,2100         12612 1      12777 0      15261 0      12151 1   C: 04300 0   C: 03770 1   C: 64067 1      12376 0
36,2110         12563 1      12455 0   C: 01477 1      12325 0      12612 1      13062 1      15261 0      12120 1
36,2120         12121 0      12122 0      12123 1      12376 0      12563 1      12531 0      05353 1   C: 04024 0
36,2130         34755 1      55507 0      55510 0      04616 1   C: 73747 1      00006 1      31442 1      53512 1

36,2140         00004 0      04474 0   C: 75564 1      00003 1      51455 1      10005 0      44762 1      04616 1
36,2150      C: 74664 0      06037 0   I: 45345 1   C: 03442 0   C: 35143 1   C: 34041 0   C: 61104 0   I: 45014 0
36,2160      C: 03347 1   C: 74200 0   C: 27043 0   I: 64375 1   C: 00025 0   C: 01734 0   I: 77762 1   C: 25726 0
36,2170      C: 00017 1   I: 64312 0   C: 01734 0   C: 35720 1   C: 67130 1   C: 16317 0   C: 00015 0   C: 00041 1

36,2200      I: 77624 1   C: 27557 0      12211 0      00006 1      31561 1      53442 0      00006 1      33143 1
36,2210         21442 0      52155 1      53500 1      00006 1      43756 1      21500 1      00006 1      31500 0
36,2220         05277 0   C: 02240 0   C: 74067 0      05353 1   C: 20254 0      05321 1   C: 00077 1      15155 1
36,2230         44762 1      55163 0      06037 0   I: 51575 1   C: 03553 1   C: 03472 0   I: 77776 1      15155 1

36,2240         33756 0      05173 1   C: 02276 0      05353 1   C: 40154 0      44752 1      55163 0      51455 1
36,2250         40006 0      00006 1      65261 1      33145 1      05173 1   C: 02266 1      35027 1      05072 1
36,2260      C: 02263 1   C: 74067 0      15261 0      04616 1   C: 20456 1      15155 1      35027 1      05072 1
36,2270      C: 02273 0   C: 74067 0      15261 0      33761 1      04616 1   C: 20465 1      33144 0      05173 1

36,2300      C: 02352 1      44762 1      55163 0      51455 1      30006 1      00006 1      62325 1      55477 0
36,2310         05173 1   C: 02346 1      36245 1      54001 1      46245 0      52753 1      40025 1      55053 1
36,2320         51455 1      10001 1      40106 1      74737 1      26106 1      00006 1      51455 1      30010 0
36,2330         53253 0      34752 0      54001 1      44752 1      52761 0      40025 1      55061 0      00006 1

36,2340         34755 1      52755 1      10763 1      15261 0      04635 0   C: 77410 1      02657 1      05353 1
36,2350      C: 00001 0      15261 0      00006 1      34755 1      52757 0      33756 0      05173 1   C: 02403 1
36,2360         05516 0   C: 00153 0      05516 0   C: 00154 1      51455 1      10011 0      10757 0      12376 0
36,2370         34736 1      05105 0   C: 02540 1   C: 56067 0      05353 1   C: 00053 1      44760 0      55163 0
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OCTAL LISTING FOR PARAGRAPH # 211,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2400       05353 1    C: 40074 0       15261 0       40103 1       74737 1       26103 1       05321 1    C: 00077 1
36,2410       12421 0       31422 1       05203 0    C: 02007 1    C: 36067 0       05327 1    C: 40033 0    C: 05014 1
36,2420    C: 77777 0       34740 0       70103 1       00006 1       51455 1       10012 0       40101 0       74745 1
36,2430       26101 0       44355 1       00006 1       02011 0       64737 0       00006 1       01011 0       00006 1

36,2440       30025 0       53345 0       00006 1       31517 0       53442 0       00006 1       30025 0       21442 0
36,2450       44742 0       70104 0       54104 0       51455 1       10013 1       00006 1       33137 1       53253 0
36,2460       30005 1       55163 0       40105 1       74743 1       26105 1       40103 1       74741 0       26103 1
36,2470       44735 0       70111 1       54111 1       00006 1       30025 0       53442 0       34755 1       55351 0

36,2500       55621 1       34752 0       55623 0       12541 1       40101 0       74740 1       00006 1       12541 1
36,2510       31422 1       05203 0    C: 02015 1    C: 36067 0       05327 1    C: 40033 0    C: 05014 1    C: 77777 0
36,2520       12541 1       35015 0       54003 0       31412 1       55537 0       31413 0       55541 1       35016 0
36,2530       54003 0       30005 1       55163 0       00006 1       33141 0       53253 0       40103 1       74741 0

36,2540       26103 1       44744 0       70111 1       54111 1       34743 0       70076 1       10000 0       13522 0
36,2550       05516 0    C: 00153 0       05516 0    C: 00154 1       05516 0    C: 00161 1       05353 1    C: 40054 1
36,2560       05221 0    C: 00062 0       02653 0       00006 1       34755 1       52761 0       15261 0       04635 0
36,2570    C: 34000 1       05504 0    C: 00161 1       05504 0    C: 00175 1       34751 0       55515 0       10765 1

36,2600       12603 1       04616 1    C: 74663 1       44765 0       55163 0       05353 1    C: 00004 0       15155 1
36,2610       51455 1       10002 1       30005 1       12615 0       44762 1       55163 0       05516 0    C: 00161 1
36,2620       05516 0    C: 00175 1       15155 1       05353 1    C: 00003 1       00004 0       06027 1    C: 36022 1
36,2630       04674 0    C: 75561 1       05504 0    C: 00312 1       02645 1    C: 00310 0       05504 0    C: 00314 1

36,2640       34753 1       00004 0       05173 1    C: 02352 1       15155 1       30002 0       05522 1       40000 0
36,2650       00006 1       06001 0       15511 0       44746 1       70111 1       54111 1       00002 0       40111 1
36,2660       74746 1       26111 1       00002 0       34755 1       55163 0       04645 1       55061 0       00006 1
36,2670       31442 1       52155 1       00006 1       40025 1       20155 1       07257 0       34777 1       54002 1

36,2700       52155 1       74346 0       00006 1       10002 1       30001 0       64752 0       00004 0       05173 1
36,2710    C: 02717 1       05327 1    C: 40036 0    C: 05024 1    C: 13000 0       31061 1       04640 1       40025 1
36,2720       55065 1       11163 0       12733 0       12724 0       37715 0       05072 1    C: 02737 0    C: 74067 0
36,2730       05221 0    C: 00144 0       12717 0       00006 1       34755 1       52765 1       15261 0       00006 1

36,2740       41442 0       53454 1       00006 1       30025 0       21454 1       00004 0       11163 0       15155 1
36,2750       15155 1       40000 0       00003 1       50000 1       13011 0       44755 0       55067 0       30371 1
36,2760       04616 1    C: 20473 0       13013 1       12610 0       12623 0       33146 1       04616 1    C: 20457 0
36,2770       13013 1       13030 0       12764 1       51455 1       30000 1       04616 1    C: 20465 1       44743 1
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OCTAL LISTING FOR PARAGRAPH # 212,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3000      55067 0     51455 1     30000 1     04616 1  C: 20473 0     13013 1     13041 0     13044 0
36,3010      04616 1  C: 20456 1     15155 1     03015 0     16001 1     00004 0     00006 1     23142 1
36,3020      02653 0     06027 1  C: 74346 0     05353 1  C: 00001 0     30005 1     55163 0     01142 1
36,3030      05353 1  C: 04024 0     34755 1     55163 0     35023 0     05105 0  C: 03210 1  C: 64065 0

36,3040      15155 1     05504 0  C: 00154 1     13102 0     00004 0     51455 1     10003 0     34644 0
36,3050      05105 0  C: 03223 1  C: 74067 0     00004 0     04674 0  C: 40204 0     03015 0     05353 1
36,3060   C: 00134 1     15155 1     35027 1     05105 0  C: 02424 1  C: 30067 0     05516 0  C: 00175 1
36,3070      00004 0     04674 0  C: 40204 0     03015 0     05353 1  C: 07024 0  C: 17000 1  C: 02424 1

36,3100   C: 30067 0     15155 1     40103 1     74737 1     10000 0     13116 0     34753 1     00004 0
36,3110      05173 1  C: 02426 0     34360 0     54001 1     40000 0     52761 0     44762 1     55163 0
36,3120      15155 1     05567 0  C: 01706 1     35006 1     04616 1  C: 20476 0     16001 1     13131 0
36,3130      13123 0     51455 1     10014 0  C: 02036 0  C: 02046 1  C: 02061 1  C: 03471 0  C: 62067 1

36,3140   C: 03642 1  C: 70067 1  C: 00000 1  C: 05656 1  C: 04672 0  C: 00752 1  C: 01475 0     05353 1
36,3150   C: 04024 0     33133 0     55455 0     30106 0     74737 1     10000 0     13121 1     04616 1
36,3160   C: 11254 1     40111 1     74737 1     10000 0     32020 1     62021 0     55251 1     34751 0
36,3170      55515 0     06037 0  I: 43175 0  C: 34001 1  C: 02663 0  C: 03735 0  I: 77735 0  C: 26002 1

36,3200   I: 70476 0  C: 37743 0  C: 56246 1  I: 77624 1  C: 56413 1  I: 77776 1     00004 0     04674 0
36,3210   C: 40142 1     03213 1     12126 1     00006 1     23142 1     00003 1     05516 0  C: 00124 0
36,3220      04616 1  C: 54123 0     01142 1     30005 1     55163 0     00006 1     32056 0     53253 0
36,3230      33760 0     04616 1  C: 20635 0     03256 0     13241 1     03223 1     05353 1  C: 00014 1

36,3240      15155 1     00004 0     04674 0  C: 40153 1     04674 0  C: 40140 0     00003 1     33761 1
36,3250      04616 1  C: 20462 0     03256 0     13256 1     03247 0     13236 1     00006 1     32106 1
36,3260      53253 0     34755 1     55462 1     30005 1     55163 0     00004 0     04674 0  C: 40123 0
36,3270      00003 1     06001 0     33134 1     55455 0     04616 1  C: 11254 1     06037 0  I: 71214 0

36,3300   C: 00700 0  C: 75305 0  C: 34015 1  C: 37735 1  C: 75310 1  I: 77745 1  C: 34017 0  C: 03735 0
36,3310   I: 77624 1  C: 56246 1  I: 77624 1  C: 56413 1  I: 77776 1     00004 0     04674 0  C: 40153 1
36,3320      04674 0  C: 40140 0     03213 1     06037 0  I: 45175 0  C: 03701 1  C: 57267 0  C: 03502 0
36,3330   I: 77776 1     33761 1     04616 1  C: 20446 0     35017 1     55163 0     05105 0  C: 03361 0

36,3340   C: 74067 0     05327 1  C: 00076 0  C: 04024 0     12135 0     34777 1     04616 1  C: 01735 1
36,3350      31163 1     64752 0     00006 1     13345 1     33761 1     04616 1  C: 20446 0     35017 1
36,3360      05146 1     31163 1     00006 1     65155 0     06037 0  I: 45175 0  C: 03701 1  C: 57267 0
36,3370   C: 03502 0  I: 77776 1     34777 1     04616 1  C: 01735 1     13361 1     06037 0  I: 77624 1
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OCTAL LISTING FOR PARAGRAPH # 213,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3400    C: 75611 0   I: 45175 0   C: 03701 1   C: 57267 0   C: 03502 0   I: 77776 1      04635 0   C: 65770 1
36,3410       05353 1   C: 04024 0      33135 0      55455 0      40106 1      74737 1      10000 0      03121 0
36,3420       04616 1   C: 11254 1      36000 1      55251 1      34751 0      55515 0      06037 0   I: 77214 0
36,3430    C: 01072 0   C: 34007 1   C: 03735 0   I: 52135 1   C: 26001 1   C: 75200 1      04616 1   C: 11254 1

36,3440       06037 0   I: 77624 1   C: 27553 1      30155 0      05173 1   C: 03447 0      15155 1      05353 1
36,3450    C: 05014 1   C: 77777 0      00006 1      33764 1      53253 0      34736 1      05105 0   C: 03513 0
36,3460    C: 74067 0      12342 1      06037 0   I: 53375 0   C: 03502 0   C: 03527 1   C: 03656 1   I: 77624 1
36,3470    C: 57267 0   C: 03623 0   I: 77776 1      05353 1   C: 10035 0      06037 0   I: 77775 1   C: 03656 1

36,3500    C: 03502 0   I: 77776 1      04635 0   C: 65770 1      33762 1      04616 1   C: 20635 0      06001 0
36,3510       06001 0      13513 1      13236 1      06037 0   I: 77775 1   C: 05522 1   C: 03623 0   C: 03502 0
36,3520    I: 77776 1      03504 0      31517 0      03735 0      05173 1   C: 03542 1      05516 0   C: 00153 0
36,3530       05516 0   C: 00154 1      05516 0   C: 00044 1      05353 1   C: 40114 1      05221 0   C: 00062 0

36,3540       02653 0      05261 1      04674 0   C: 75545 1      05261 1      34644 0      05105 0   C: 03223 1
36,3550    C: 74067 0      34753 1      05203 0   C: 03606 1   C: 74066 1      40103 1      74745 1      26103 1
36,3560       02653 0      00006 1      30025 0      53345 0      44745 1      70101 0      54101 0      44355 1
36,3570       00006 1      02011 0      64736 1      00006 1      01011 0      40111 1      74736 0      26111 1

36,3600       44737 1      54055 0      34750 1      00006 1      05014 1      04707 0      04674 0   C: 40204 0
36,3610       05261 1   I: 45020 1   C: 03665 1   C: 56447 0   I: 43014 0   C: 01307 1   C: 03665 1   C: 03705 0
36,3620    C: 75633 0   I: 45345 1   C: 01235 1   C: 03763 0   I: 50025 0   C: 03432 1   C: 75656 0   I: 43345 1
36,3630    C: 03763 0   C: 03432 1   C: 03765 0   I: 77776 1      10755 1      13663 0      34737 0      00004 0

36,3640       05105 0   C: 02707 0   C: 56067 0      05327 1   C: 00172 0   C: 10035 0      06037 0   I: 77745 1
36,3650    C: 03765 0   C: 27763 0   C: 01221 1   C: 26323 1   C: 01227 1   C: 02331 1   I: 45345 1   C: 03631 0
36,3660    C: 01235 1   C: 37452 0   C: 03665 1      06037 0   I: 77650 1   C: 03665 1      06037 0   I: 77624 1
36,3670    C: 75611 0   I: 77776 1      00004 0      35016 0      54003 0      40076 1      74743 1      10000 0

36,3700       13705 1      40103 1      74745 1      10000 0      13707 0      04635 0   C: 65770 1      04674 0
36,3710    C: 40165 1      05516 0   C: 00044 1      05504 0   C: 00161 1      00004 0      00006 1      31442 1
36,3720       52155 1      00006 1      40025 1      20155 1      07257 0      30155 0      03735 0      05173 1
36,3730    C: 03542 1      05327 1   C: 40114 1   C: 00035 1      15155 1      10000 0      13741 1      13741 1

36,3740       34755 1      64753 1      56001 0      34755 1      53517 1      31517 0      00002 0   C: 00000 1
36,3750    C: 02734 0   C: 60000 1   C: 05670 0   C: 00000 1   C: 10624 0   C: 00000 1   C: 00764 1   C: 05050 1
36,3760    C: 04050 0   C: 04125 0   C: 04123 0   C: 03462 1   C: 74067 0   C: 03765 0   C: 03766 0 CKSM 53320 0
36,3770          @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 214, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2000   C: 07623 1   C: 26552 1      05311 1   C: 00007 0      02325 1      34755 1      55414 0      55440 1
37,2010      55441 0      55576 0      34361 1      55571 1      32476 0      02367 1      34736 1      55664 0
37,2020      06037 0   I: 62545 1   C: 02403 1   C: 15047 0   C: 02401 0   I: 77434 1   C: 21614 1      56154 1
37,2030      55045 0      32473 0      04616 1   C: 20476 0      02270 0      02037 1      02031 1      06037 0

37,2040   I: 47135 0   C: 01046 1   C: 21576 0   C: 02401 0   I: 60535 1   C: 01047 0   C: 02403 1   I: 57546 1
37,2050   I: 77752 1   C: 16437 0   C: 02403 1   I: 72556 1   C: 16435 1   C: 02401 0   I: 73406 1   C: 02675 1
37,2060   C: 16705 1   I: 77746 1   C: 02677 0   I: 77676 0   C: 36703 0   C: 47353 1   I: 77776 1      04616 1
37,2070   C: 17000 1      34736 1      70077 0      00006 1      12076 0      25414 1      05516 0   C: 00056 1

37,2100      02315 1      11414 0      02126 0      02320 1      00006 1      31575 1      05277 0   C: 02113 0
37,2110   C: 76065 0      32116 0      05133 0      32116 0      05137 1      05261 1   C: 76500 0      34755 1
37,2120      55050 1      31504 1      55051 0      51416 0      55420 1      02457 0      51414 1      02130 1
37,2130      02447 1      34361 1      55476 1      32474 1      55412 0      34753 1      55537 0      34755 1

37,2140      51415 0      54037 1      55472 0      02332 1      00004 0      34752 0      05173 1   C: 02151 0
37,2150      05155 0      00006 1      27412 0      31412 1      00006 1      62161 0      34742 1      05173 1
37,2160   C: 02151 0      34736 1      05105 0   C: 02166 1   C: 76065 0      05261 1      51414 1      02170 0
37,2170      02447 1      31412 1      00006 1      62175 0      05155 0      34756 1      55537 0      02332 1

37,2200      11473 1      02205 1      05705 0      41476 1      55476 1      00006 1      41473 1      21477 0
37,2210      06037 0   I: 45345 1   C: 02501 1   C: 02475 0   I: 45044 0   C: 76217 1   C: 76275 0   I: 56325 0
37,2220   C: 02477 1   I: 47075 0   C: 37056 0   C: 21612 1   C: 01051 1   I: 77776 1      11414 0      02301 1
37,2230      02457 0      32471 1      55412 0      51416 0      41417 0      55442 0      11415 1      12245 1

37,2240      44747 0      27565 1      34747 1      27567 0      12251 1      44747 0      27565 1      34747 1
37,2250      27563 1      02447 1      34755 1      55404 1      55405 0      34733 1      55440 1      55441 0
37,2260      30032 0      55413 1      02500 0      31502 1      55051 0      34755 1      55050 1      02457 0
37,2270      05516 0   C: 00007 0      44755 0      05314 1      05472 0   I: 43215 0   C: 06530 1   C: 37064 1

37,2300   I: 77616 0      00006 1      23571 0      34755 1      54321 0      54322 0      54323 1      04616 1
37,2310   C: 17000 1      04616 1   C: 17716 1      03047 1      01571 0      00006 1      23571 0      02311 0
37,2320      00006 1      23571 0      04616 1   C: 17210 1      02311 0      00006 1      23571 0      04616 1
37,2330   C: 16714 1      02311 0      00006 1      23417 1      02342 0      00003 1      30067 0      00006 1

37,2340      62346 1      05122 0      00004 0      51415 0      40037 1      55571 1      00004 0      51415 0
37,2350      30037 0      61571 0      00006 1      12335 1      51415 0      30037 0      51537 1      55472 0
37,2360      04102 0      51537 1      55473 1      51537 1      23474 1      00003 1      01417 1      54001 1
37,2370      12372 1      55571 1      34755 1      50001 0      54000 0      24001 0      11571 1      12371 1
```

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OCTAL LISTING FOR PARAGRAPH # 215,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2400         00002 0    I: 65345 0    C: 37057 1    C: 02403 1    I: 57546 1    I: 73525 1    C: 02403 1    I: 74266 0
37,2410      C: 36001 0    C: 02405 1    I: 77634 0    C: 21573 0    C: 26433 1    C: 37057 1    C: 02564 1    I: 77616 0
37,2420      I: 47020 0    C: 00051 0    C: 21573 0    C: 02431 0    I: 51025 1    C: 02433 1    C: 76431 0    I: 77624 1
37,2430      C: 76275 0    I: 74261 1    C: 20212 1    C: 02405 1    I: 53321 1    C: 02643 1    C: 02564 1    C: 16564 1

37,2440      C: 02431 0    C: 02433 1    I: 47170 1    C: 02563 0    C: 21705 0    I: 77650 1    C: 00051 0       00006 1
37,2450         23420 0       06037 0    I: 77624 1    C: 76420 0    I: 77776 1       02315 1       01420 0       00006 1
37,2460         23417 1       31416 0       55052 0       32472 1       04616 1    C: 20476 0       02270 0       01417 1
37,2470         12461 1    C: 07626 1    C: 01542 0    C: 01451 0    C: 00072 1    C: 02737 0    C: 01664 1    C: 01642 0

37,2500         00004 0       31572 0       05173 1    C: 02536 0       34755 1       54037 1       54040 1       54041 0
37,2510         00003 1       33075 0       55571 1       33075 0       02367 1       06037 0    I: 77735 0    C: 37057 1
37,2520      C: 25477 1    C: 37070 1    C: 26445 0    C: 37057 1    C: 00325 0    C: 01472 1    I: 77735 0    C: 02441 1
37,2530      I: 50076 0    C: 76534 1    I: 77624 1    C: 76401 0    I: 77776 1       03035 1       31576 1       00006 1

37,2540         12542 1       05241 1       11530 1       30000 1       55531 0       40000 0       55530 1       44753 0
37,2550         61562 1       00006 1       12556 1       31412 1       00006 1       62562 1       31572 0       05173 1
37,2560      C: 02536 0       34755 1       56037 0       54324 0       34755 1       56040 0       54326 1       34755 1
37,2570         56041 1       54330 0       34736 1       05105 0    C: 02577 0    C: 76065 0       05261 1       11562 0

37,2600         02602 1       02604 1       04616 1    C: 15263 1       06037 0    I: 77745 1    C: 37066 0    C: 24051 0
37,2610      C: 00325 0    I: 76505 0    C: 02643 1    I: 57545 1    C: 00160 0    C: 16523 1    C: 00162 1    C: 02527 0
37,2620      I: 76001 1    C: 00001 0    C: 00010 0    I: 57535 0    C: 02563 0    I: 77640 0    C: 76772 1    I: 50135 0
37,2630      C: 02532 1    C: 76644 0    I: 72174 0    C: 00014 1    C: 02444 1    I: 62143 0    C: 02243 0    C: 77775 1

37,2640      C: 12545 0    I: 66104 1    C: 76635 0    C: 02444 1    I: 77770 1    C: 00010 0    I: 41343 0    C: 02533 0
37,2650      C: 37100 1    I: 43601 1    C: 21212 0    C: 02501 1    C: 06501 0    I: 40725 0    C: 37102 0    C: 02521 0
37,2660      I: 77732 1    I: 45425 0    C: 71216 1    C: 06563 1    I: 77100 0    C: 76646 1    C: 00004 0    I: 56743 1
37,2670      C: 75324 0    C: 75240 0    C: 12453 0    I: 77104 1    C: 76667 1    C: 00010 0    I: 66140 1    C: 02445 0

37,2700      C: 02445 0    I: 56743 1    C: 02450 1    C: 75216 0    I: 77613 0    C: 75276 0    C: 12501 0    I: 42743 1
37,2710      C: 75314 0    C: 75230 1    C: 12463 0    I: 42673 0    C: 75216 0    C: 75266 1    C: 12511 1    I: 40743 0
37,2720      C: 37105 1    C: 75216 0    I: 42772 0    C: 75256 1    C: 12521 1    I: 76104 0    C: 76676 1    C: 00010 0
37,2730      I: 64743 0    C: 02523 1    C: 02521 0    I: 55523 0    C: 02531 1    I: 76521 0    C: 02001 1    I: 77745 1

37,2740      C: 00155 0    C: 06531 0    I: 77745 1    C: 00160 0    C: 06521 1    I: 77745 1    C: 00162 1    C: 06523 0
37,2750      I: 77700 0    C: 76730 1    I: 76174 1    C: 00006 1    C: 00002 0    I: 57343 1    C: 02503 0    C: 37110 0
37,2760      I: 77722 0    I: 73406 1    I: 56072 1    C: 00046 0    C: 10021 0    I: 77745 1    I: 77746 1    C: 10027 0
37,2770      I: 77704 1    C: 76755 1    I: 77776 1       35016 0       54003 0       01400 1       11412 0       03034 0
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OCTAL LISTING FOR PARAGRAPH # 216,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3000        11440 1       13003 0       03005 1       30032 0       55414 0       06037 0    I: 65345 0    C: 02473 0
37,3010     C: 02477 1    I: 55525 0    C: 02501 1    I: 74276 1    C: 37110 0    I: 74521 1    C: 02643 1    C: 02740 0
37,3020     I: 77776 1       32475 0       04616 1    C: 17323 0       02315 1       11440 1       02263 1       06037 0
37,3030     I: 77624 1    C: 76401 0    I: 77776 1       02117 1       55412 0       11440 1       02447 1       05155 0

37,3040        35014 1       54003 0       34753 1       55576 0       05567 0    C: 01600 0       02270 0       33054 0
37,3050        05744 0       05516 0    C: 00007 0       05155 0    C: 01601 1    C: 06200 0    C: 00000 1    C: 00000 1
37,3060     C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00001 0    C: 00004 0    C: 00002 0    C: 00220 1
37,3070     C: 77776 1    C: 35730 0    C: 00035 1    C: 10317 0    C: 17550 1    C: 00115 1    C: 01443 0    C: 04133 1

37,3100     C: 02265 1    C: 57223 0    C: 66451 1    C: 05427 0    C: 12577 1    C: 77567 0    C: 44202 1    C: 24276 1
37,3110     C: 14066 1    C: 23073 1    C: 11773 1       33407 1       04616 1    C: 20334 1       05563 1       05563 1
37,3120        13113 0       40103 1       74747 0       00006 1       13377 0       40104 0       74744 0       00006 1
37,3130        13403 1       06037 0    I: 77634 0    C: 21573 0    C: 34041 0    C: 27057 0    I: 77775 1    C: 00017 1

37,3140     C: 26170 0    C: 00025 0    C: 15105 1    C: 00015 0    C: 02114 1    C: 34041 0    C: 27043 0    I: 77775 1
37,3150     C: 00017 1    C: 26140 0    C: 00025 0    C: 02120 0    I: 77776 1       40103 1       74747 0       00006 1
37,3160        13326 1       40104 0       74744 0       00006 1       13370 1       06037 0    I: 77634 0    C: 21573 0
37,3170     C: 34041 0    C: 27414 0    I: 43175 0    C: 02170 0    C: 00263 0    C: 25535 0    C: 02105 1    C: 15543 1

37,3200     C: 02114 1    I: 43014 0    C: 04344 0    C: 77205 0    C: 00063 1    I: 77614 1    C: 01473 0    C: 35517 1
37,3210     C: 27107 1    I: 77775 1    C: 00001 0    C: 26207 0    C: 00007 0    C: 36215 1    C: 27414 0    I: 71214 0
37,3220     C: 01473 0    C: 00015 0    C: 00041 1    I: 43175 0    C: 02140 0    C: 00263 0    C: 25535 0    C: 02120 0
37,3230     C: 15543 1    C: 02114 1    I: 43014 0    C: 04344 0    C: 77236 0    C: 00063 1    C: 35517 1    C: 27107 1

37,3240     I: 52375 1    C: 00001 0    C: 02207 0    I: 65234 1    C: 21724 0    C: 00045 0    I: 77657 0    C: 20201 0
37,3250     C: 26201 0    C: 00007 0    I: 50251 1    C: 02215 0    I: 77752 1    C: 26203 1    C: 02207 0    I: 63256 0
37,3260     C: 06514 1    I: 77624 1    C: 47661 0    I: 41505 1    C: 01734 0    I: 72431 1    C: 00001 0    I: 53445 1
37,3270     C: 00007 0    I: 47315 0    C: 00001 0    C: 02215 0    I: 50235 0    C: 00001 0    C: 00015 0    I: 77715 1

37,3300     I: 75241 1    C: 00007 0    C: 00015 0    I: 65512 1    C: 26205 1    C: 00001 0    I: 51041 0    C: 00007 0
37,3310     C: 77315 0    I: 45345 1    C: 06530 1    C: 02205 1    C: 02205 1    I: 77776 1       34747 1       71044 1
37,3320        00006 1       15472 1       41044 1       74740 1       27044 1       13155 1       37710 0       05146 1
37,3330        06037 0    I: 40375 1    C: 01221 1    C: 00001 0    C: 26207 0    C: 01227 1    C: 26215 0    C: 01726 0

37,3340     I: 65315 0    C: 01720 0    C: 01235 1    I: 77776 1       35015 0       05146 1       06037 0    I: 77214 0
37,3350     C: 03347 1    C: 77363 1    I: 60505 1    C: 01734 0    I: 77715 1    I: 76505 0    C: 01734 0    I: 40206 1
37,3360     C: 00001 0    I: 77650 1    C: 77240 1    I: 77624 1    C: 27414 0    I: 52014 0    C: 01673 1    C: 77222 0
37,3370        06037 0    I: 77634 0    C: 21573 0    C: 34041 0    C: 27057 0    I: 77650 1    C: 77211 0       40102 0
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OCTAL LISTING FOR PARAGRAPH # 217, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3400      74744 0      00006 1      13326 1      06037 0   I: 52034 1   C: 21573 0   C: 77144 0   C: 04066 0
37,3410      34757 0      03531 0      35031 0      05072 1   C: 03663 1   C: 14063 1      03544 1      40103 1
37,3420      74773 1      26103 1      44735 0      70076 1      54076 1      34751 0      55257 1      33537 0
37,3430      55260 0      37710 0      05105 0   C: 02461 0   C: 46067 1      34752 0      03525 0      35000 1

37,3440      05224 0      43540 1      60030 1      10000 0      44753 0      13447 1      34753 1      26030 0
37,3450      03541 1      34756 1      03531 0      34753 1      55257 1      34736 1      05105 0   C: 02206 1
37,3460   C: 66067 0      34743 0      00006 1      05011 1      30103 0      74747 0      00006 1      13517 0
37,3470      30102 1      74744 0      00006 1      13515 1      10755 1      13515 1      34757 0      55056 1

37,3500      40025 1      64756 1      64734 0      64734 0      57055 0      34361 1      54001 1      40000 0
37,3510      52755 1      36007 0      05203 0   C: 02006 0   C: 42067 0      34751 0      13436 1      00006 1
37,3520      33536 1      53253 0      34751 0      03525 0      05261 1      54001 1      40025 1      55063 1
37,3530      13532 1      54001 1      40001 1      52763 1      00002 0   C: 03661 0   C: 44067 0   C: 65772 0

37,3540   C: 37771 1      00006 1      30025 0      53561 0      44755 0      55254 1      55255 0      55256 0
37,3550      34755 1      54330 0      54331 1      54326 1      54327 0      54325 1      55257 1      00006 1
37,3560      40040 1      53255 0      52040 1      54324 0      22326 0      40041 0      57256 1      56041 1
37,3570      54330 0      00006 1      31561 1      53250 0      00006 1      41235 0      21250 0      30032 0

37,3600      55155 0      30033 1      55156 0      30034 0      55157 1      30324 1      55160 0      30326 0
37,3610      55161 1      30330 1      55162 1      00002 0      11257 1      13441 1      33654 0      54002 1
37,3620      10330 0      13571 0      13625 1      13571 0      13571 0      22007 0      10326 1      13632 1
37,3630      13641 0      13632 1      22041 1      11256 0      41256 0      13570 1      13634 1      22330 1

37,3640      13571 0      11254 1      41254 1      13646 1      13642 0      13557 1      54324 0      41255 0
37,3650      54326 1      44755 0      52040 1      13565 0   C: 03451 1      05504 0   C: 00054 0      00004 0
37,3660      00006 1      30025 0      52315 1      03714 0      03657 0      52155 1      52317 0      00004 0
37,3670      04616 1   C: 17175 1      05516 0   C: 00007 0      05516 0   C: 00010 0      34741 1      00006 1

37,3700      05013 0      05353 1   C: 07024 0   C: 20000 0   C: 03734 1   C: 76060 0      34774 1      04616 1
37,3710   C: 20623 1      13706 1      13706 1      13706 1      00006 1      22156 0      04103 1      00003 1
37,3720      52155 1      34747 1      54001 1      34755 1      20155 1      44346 0      70155 1      56155 0
37,3730      74346 0      10000 0      24156 0      00156 0      44741 0      00006 1      03013 0      00004 0

37,3740      34755 1      54001 1      52025 1      03714 0      03737 1      00006 1      40317 0      20155 1
37,3750      34742 1      07307 1      34755 1      54156 1      07257 0      10154 0      03763 0      03763 0
37,3760      03761 1      34742 1      26154 0      00006 1      30315 0      20155 1      07257 0      52155 1
37,3770      20025 1      05516 0   C: 00054 0      06001 0   C: 03774 0   C: 03775 1 CKSM 47535 1         @
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OCTAL LISTING FOR PARAGRAPH # 220,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2000        35017 1     05105 0  C: 02017 0  C: 60104 1     34740 0     05146 1     32076 1     04616 1
40,2010     C: 20353 0     05563 1     05563 1     05563 1     34751 0     05464 1     05155 0     00006 1
40,2020        30036 1     52155 1     06037 0  I: 77624 1  C: 46065 0  C: 00001 0  C: 14007 0  C: 06522 1
40,2030     C: 24011 1  C: 00007 0  I: 77656 1  C: 00007 0  I: 77641 1  C: 06514 1  C: 24021 1  C: 06520 0

40,2040     I: 77641 1  C: 00007 0  C: 34023 1  C: 47320 0  I: 43244 1  C: 60047 1  C: 06530 1  C: 26203 1
40,2050     C: 00001 0  I: 77641 1  C: 06516 0  C: 24023 0  C: 00001 0  I: 77641 1  C: 00007 0  C: 34021 0
40,2060     C: 47320 0  I: 43244 1  C: 60064 0  C: 06530 1  C: 02201 0  I: 77776 1     34777 1     04616 1
40,2070     C: 01735 1     34747 1     71044 1     10000 0     02017 0     05472 0  C: 04070 1     34753 1

40,2100        57012 0     54115 0     11042 1     02105 1     02112 1     42155 0     60154 1     00006 1
40,2110        12112 0     04374 0     56154 1     54117 1     50000 1     02116 0     03434 1     02175 0
40,2120        02175 0     02175 0     02175 0     02175 0     02175 0     02175 0     02161 0     02161 0
40,2130        03434 1     03434 1     03434 1     03434 1     03434 1     03434 1     02173 0     02354 1

40,2140        03603 1     03434 1     03434 1     03434 1     03434 1     03434 1     03434 1     03461 1
40,2150        02407 0     02374 0     02157 0     03434 1     02467 0     02370 1  C: 00022 1     04635 0
40,2160     C: 62002 1     10777 1     02166 1     02166 1     05155 0     05155 0     36245 1     71000 1
40,2170        10000 0     02175 0     03434 1     34755 1     54117 1     10777 1     02202 0     02202 0

40,2200        02201 0     05155 0     02324 0     11015 0     34755 1     55015 0     02207 0     50117 0
40,2210        34066 0     74346 0     54124 1     30777 0     54143 0     03322 1     36245 1     71000 1
40,2220        10000 0     02232 0     50137 1     57001 1     54022 0     40022 0     40022 0     56022 1
40,2230        60117 0     02247 1     50137 1     57001 1     54154 0     34755 1     54155 1     34363 0

40,2240        07307 1     56155 0     60117 0     54155 1     02247 1     26154 0     02265 1     50137 1
40,2250        55001 0     40777 1     50137 1     52315 1     00006 1     12257 1     02312 0     36245 1
40,2260        71000 1     10000 0     02265 1     40777 1     02313 1     44753 0     60137 1     00006 1
40,2270        62263 1     07103 1  C: 02322 0     36245 1     71000 1     50000 1     02276 0     02303 0

40,2300        00006 1     40156 1     52156 1     56156 0     50137 1     55004 0     56155 0     50137 1
40,2310        55001 0     02263 1     10777 1     54777 1     05155 0  C: 00022 1  C: 00020 0  C: 00012 1
40,2320     C: 00005 1  C: 00000 1  C: 05174 0  C: 13261 0     50777 0     32330 0     54137 0     00002 0
40,2330     C: 00004 0  C: 00004 0  C: 00004 0  C: 00004 0  C: 00004 0  C: 00003 1  C: 00003 1  C: 00003 1

40,2340     C: 00003 1  C: 00003 1  C: 00002 0  C: 00002 0  C: 00002 0  C: 00002 0  C: 00002 0     05705 0
40,2350     C: 00001 0  C: 00001 0  C: 00000 1  C: 00000 1     34755 1     55001 0     34360 0     54777 1
40,2360        02601 1     34753 1     55000 1     34755 1     55013 0     34217 1     54136 1     05155 0
40,2370        34755 1     55002 0     34361 1     02357 1     02446 0     02433 1     34752 0     50137 1
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OCTAL LISTING FOR PARAGRAPH # 221,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2400      64745 0     27000 1     11015 0     34755 1     55015 0     02406 1     05155 0     02446 0
40,2410      02413 0     34753 1     02377 0     22002 0     02324 0     50137 1     32441 1     54123 0
40,2420      54753 1     54122 1     34755 1     54124 1     56123 1     03404 1     34741 1     54124 1
40,2430      56122 0     03404 1     00001 0     22002 0     02324 0     50137 1     32441 1     54122 1

40,2440      64753 1     54123 0     02422 1  C: 00005 1  C: 00003 1  C: 00000 1     22002 0     36245 1
40,2450      71000 1     10000 0     05155 0     44317 1     02462 0     44320 0     02462 0     44321 1
40,2460      02462 0     05155 0     60777 0     00006 1     12466 0     00002 0     00001 0     10777 1
40,2470      64753 1     02473 0     64753 1     50000 1     32330 0     54137 0     11015 0     02505 0

40,2500      02502 1     02502 1     30137 1     02527 0     02522 0     10137 0     54137 0     02527 0
40,2510      32577 0     27013 0     30137 1     54125 0     00006 1     27001 0     04616 1  C: 62340 1
40,2520      30125 1     54137 0     02525 1     25015 1     05155 0     22002 0     02540 1     67746 0
40,2530      10000 0     00002 0     05705 0     05155 0     00002 0     54777 1     22002 0     02324 0

40,2540      34755 1     50137 1     55001 0     50137 1     55004 0     54124 1     50137 1     44745 1
40,2550      71000 1     72600 1     55000 1     50137 1     32570 1     54143 0     03322 1     50137 1
40,2560      32573 1     54777 1     02601 1     44752 1     26777 1     02601 1     50137 1     34315 1
40,2570      54777 1     00001 0  C: 00016 0  C: 00005 1  C: 00004 0  C: 00015 0  C: 00011 1  C: 00003 1

40,2600   C: 77774 0     30777 0     54021 0     42614 1     00004 0     50021 1     57023 1     00006 1
40,2610      62612 0     25016 1     00003 1     00002 0  C: 04000 0     34755 1     54156 1     02652 1
40,2620      02622 0     02645 1     02663 0     02625 1     02615 1     30154 1     74733 0     00006 1
40,2630      12634 0     40154 0     64753 1     54154 0     00002 0     00006 1     00033 1     00006 1

40,2640      74742 0     40000 0     76245 0     54154 0     02677 0     00006 1     50156 0     32674 0
40,2650      52124 1     00002 0     10154 0     00002 0     00002 0     12656 1     44735 0     70154 0
40,2660      54154 0     50002 0     00001 0     00006 1     50156 0     32674 0     52155 1     07307 1
40,2670      52124 1     20155 1     02702 0  C: 05605 1  C: 03656 1  C: 16314 0  C: 31463 1     52124 1

40,2700      52155 1     04415 0     04635 0  C: 62566 0     52124 1     52155 1     04415 0     02711 1
40,2710      02723 0     56156 0     56155 0     54154 0     02702 0     02723 0     02702 0     02723 0
40,2720      36242 0     03153 0     02702 0     56002 0     54162 0     02747 1     07257 0     07103 1
40,2730   C: 00123 1     00162 1     02536 0     02413 0     30154 1     03306 1     46245 0     50117 0

40,2740      64317 0     54777 1     02747 1     30155 0     03306 1     04635 0  C: 62570 1     56002 0
40,2750      54144 1     50140 1     02752 0     02767 0     50117 0     30150 0     74356 1     04313 1
40,2760      00006 1     50000 1     30001 0     52155 1     34755 1     54156 1     00144 0     30145 1
40,2770      02760 1     50140 1     02772 1     02775 0     03420 1     00006 1     50145 1     30001 0
```

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OCTAL LISTING FOR PARAGRAPH # 222, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3000          52155 1       34317 0       54777 1       34755 1       54156 1       07257 0       03273 1       00136 0
40,3010          07103 1    C: 03074 1       10155 1       34741 1       03016 0       44741 0       60155 0       03165 0
40,3020          04404 0       04404 0       03174 0       04404 0       10154 0       03031 0       03031 0       40000 0
40,3030          54154 0       10162 0       03070 0       03043 0       10154 0       05705 0       03066 1       03040 0

40,3040          56154 1       74733 0       54154 0       50140 1       03044 1       03050 1       03060 1       03051 0
40,3050          03063 1       40000 0       64752 0       00006 1       13056 0       02625 1       04635 0    C: 63155 0
40,3060          04616 1    C: 63034 0       03047 1       04616 1    C: 63026 0       03051 0       44733 0       03042 1
40,3070          40154 0       74733 0       40000 0       03042 1    C: 25161 0    C: 30707 1       07103 1    C: 00123 1

40,3100          56156 0       56155 0       56154 1       00006 1       13106 1       04145 0       03163 0       03174 0
40,3110          03056 1       07103 1    C: 00123 1       03106 0       07103 1    C: 00123 1       56156 0       60000 1
40,3120          54156 1       34755 1       60155 0       03165 0       03174 0       50140 1       03126 1       03137 1
40,3130          30117 0       50145 1       54002 1       56155 0       50002 0       54001 1       03056 1       34755 1

40,3140          03131 1       07103 1    C: 00123 1       36242 0       03153 0       03116 1       07103 1    C: 00123 1
40,3150          34752 0       03153 0       03116 1       56002 0       54124 1       56002 0       54123 0       04404 0
40,3160          10123 0       03156 0       00124 0       56155 0       60000 1       54155 1       00002 0       60154 1
40,3170          54154 0       00002 0       54162 0       00002 0       10162 0       04145 0       00002 0       04145 0

40,3200          56002 0       54144 1       10154 0       03213 1       03213 1       64753 1       54154 0       02433 1
40,3210          40155 1       54155 1       00144 0       02413 0       00144 0       00006 1       33261 1       20155 1
40,3220          00006 1       13225 0       00006 1       34733 1       52155 1       00002 0       56002 0       54115 0
40,3230          03200 0       03215 1       34751 0       54137 0       34363 0       07307 1       50154 1       34066 0

40,3240          74346 0       54124 1       34755 1       56156 0       56155 0       54154 0       56777 0       54143 0
40,3250          10000 0       54777 1       03322 1       10137 0       03233 0       44360 1       54777 1       00115 1
40,3260       C: 00000 1    C: 02476 0       56002 0       54115 0       03200 0       03232 1       56002 0       54115 0
40,3270          03200 0       34753 1       03233 0       56002 0       54115 0       34755 1       54124 1       36245 1

40,3300          03404 1       34751 0       03404 1       03200 0       34320 1       03233 0       00006 1       73316 1
40,3310          22154 1       34755 1       54155 1       56002 0       54115 0       03271 0    C: 00244 0       03306 1
40,3320          04635 0    C: 62347 0       56002 0       54114 1       34346 1       70143 0       54021 0       56021 1
40,3330          54141 1       34753 1       70143 0       10000 0       03336 1       03346 0       56124 0       04340 1

40,3340          54124 1       34736 1       70143 0       10000 0       34752 0       64753 1       54143 0       00004 0
40,3350          50141 0       11023 0       03354 0       05705 0       64753 1       54142 1       50143 1       73400 1
40,3360          00006 1       60124 0       00006 1       13376 1       50143 1       43400 1       70142 1       60124 0
40,3370          40000 0       50141 0       57023 1       00006 1       63376 0       25016 1       00003 1       00114 0
```

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OCTAL LISTING FOR PARAGRAPH # 223,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3400     C: 00037 0   C: 01740 0   C: 02000 0   C: 03740 1      54141 1      34752 0      54143 0      56002 0
40,3410        54114 1      03347 1      03322 1      33415 1      04640 1   C: 63411 0      44360 1      54777 1
40,3420        43441 1      60136 0      00006 1      13436 1      43440 0      60136 0      00006 1      13431 0
40,3430        03434 1      04204 0      04364 1      04124 1      04364 1      05155 0      05652 0   C: 01501 1

40,3440     C: 04124 1      04202 0      34753 1      55014 1      04204 0      04457 0      04433 1      03547 1
40,3450        44753 0      03443 1      34755 1      55013 0      44360 1      54777 1      03442 0      44755 0
40,3460        03443 1      44751 1      00006 1      03011 1      10115 0      34736 1      71021 1      10000 0
40,3470        03477 0      04457 0      11042 1      03475 1      05155 0      04635 0   C: 21050 1      34755 1

40,3500        55012 1      11042 1      05155 0      04502 1      05155 0      30777 0      54132 0      34753 1
40,3510        03527 1      34317 0      02535 0      34752 0      03527 1      34320 1      02535 0      34751 0
40,3520        03527 1      34321 0      02535 0      30132 1      54777 1      52131 0      05166 0      70123 0
40,3530        10000 0      00002 0      50002 0      00002 0      34362 1      56777 0      54140 0      11011 1

40,3540        64753 1      03306 1      03544 1      02601 1      56140 1      54777 1      05155 0      11042 1
40,3550        03552 0      05155 0      34755 1      57042 0      00004 0      05137 1      11014 1      03601 0
40,3560        05155 0      03577 1      34752 0      50064 0      60164 1      50064 0      54164 0      31002 1
40,3570        54001 1      31001 1      50064 0      52155 1      00003 1      04457 0      05155 0      34755 1

40,3600        03563 1      34753 1      03563 1      56115 1      55012 1      00004 0      34742 1      00006 1
40,3610        05011 1      33672 1      71036 1      64735 1      55036 1      45026 1      71303 1      65026 0
40,3620        55303 1      44742 0      71302 0      64742 1      55302 0      43671 0      70110 0      64745 0
40,3630        54110 0      44742 [illegible]      00006 1      03013 0      43670 1      00006 1      03011 1      34363 0

40,3640        54117 1      00004 0      50117 0      11023 0      64753 1      03652 0      64753 1      40000 0
40,3650        73673 1      03655 1      40000 0      73673 1      40000 0      50117 0      55023 0      00003 1
40,3660        10117 1      03640 0      34755 1      54375 1      54376 1      54377 0      55357 0      05155 0
40,3670     C: 00104 1   C: 00330 1   C: 00050 1   C: 73777 1      35015 0      05105 0   C: 03121 0   C: 76067 1

40,3700        05221 0   C: 00144 0      31044 0      74740 1      00006 1      13700 1      35017 1      05072 1
40,3710     C: 03113 1   C: 76067 1      15261 1   C: 03713 1   C: 03714 0 CKSM 70762 0         @            @
40,3720           @            @            @            @            @            @            @            @
40,3730           @            @            @            @            @            @            @            @

40,3740           @            @            @            @            @            @            @            @
40,3750           @            @            @            @            @            @            @            @
40,3760           @            @            @            @            @            @            @            @
40,3770           @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 224,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2000      03544 1      02775 0      34755 1      55015 0      34217 1      54136 1      11013 0      02035 0
41,2010      02035 0      02012 0      32033 0      61013 1      00006 1      12027 1      36245 1      71000 1
41,2020      10000 0      02023 1      02027 0      10777 1      02351 1      02351 1      02027 0      41013 0
41,2030      55013 0      04433 1      01013 1   C: 03431 1   C: 00034 0      34755 1      55000 1      44360 1

41,2040      54777 1      41001 0      55041 1      62034 1      00006 1      62133 1      00006 1      32114 1
41,2050      52006 0      50140 1      02052 1      02055 0      02221 1      10146 0      02131 0      02351 1
41,2060      02064 1      25017 0      04311 0      02120 0      34735 1      55015 0      44217 0      60136 0
41,2070      00006 1      12073 0      02116 0      02307 1      11000 1      04145 0      44360 1      54777 1

41,2100      11042 1      02104 0      02105 1      02104 0      04427 1      57005 0      04303 0      00006 1
41,2110      32114 1      52006 0      02133 1   C: 02103 1   C: 64101 0   C: 77772 0      30156 0      04303 0
41,2120      44756 0      61001 1      00006 1      12133 0      34321 0      54777 1      31017 0      03363 1
41,2130      02133 1      64753 1      04303 0      42145 1      61001 1      10000 0      64753 1      02141 1

41,2140      02146 0      54154 0      04457 0      04635 0   C: 66000 1   C: 00050 1      51001 1      32151 0
41,2150      04640 1   C: 62351 1   C: 62365 0   C: 62373 1   C: 62400 1   C: 62360 0   C: 62353 0   C: 62523 1
41,2160   C: 60771 0   C: 62351 1   C: 62351 1   C: 61420 0   C: 63230 0   C: 63230 0   C: 63230 0   C: 63230 0
41,2170   C: 63230 0   C: 63230 0   C: 63230 0   C: 62351 1   C: 62351 1   C: 62351 1   C: 62732 0   C: 62743 0

41,2200   C: 62760 1   C: 62703 1   C: 62616 1   C: 62351 1   C: 63353 1   C: 62351 1   C: 62351 1   C: 63466 0
41,2210   C: 63512 1   C: 61457 0   C: 61442 1   C: 61450 1   C: 63613 0   C: 12447 0   C: 63430 0   C: 62351 1
41,2220   C: 62351 1      10146 0      02226 0      02351 1      02226 0      02226 0      46242 1      61001 1
41,2230      00006 1      62233 1      02133 1      34752 0      54117 1      62260 1      54145 0      50117 0

41,2240      30150 0      54122 1      03034 0      02261 0      02246 0      24122 0      30122 0      74356 1
41,2250      04313 1      50000 1      30000 1      50145 1      56000 1      10117 1      02234 0      02133 1
41,2260      00125 1      50000 1      12263 0      00002 0      00002 0      00002 0      00002 0      12301 0
41,2270      12301 0      00002 0      12301 0      00002 0      00002 0      12301 0      00002 0      00002 0

41,2300      00002 0      50002 0      00001 0      34317 0      12310 0      34320 1      12310 0      34321 0
41,2310      54777 1      40002 1      55013 0      04616 1   C: 60536 1      04427 1      00136 0      55002 0
41,2320      56002 0      54117 1      00006 1      32114 1      52006 0      10146 0      64753 1      12332 0
41,2330      12333 1      12333 1      04303 0      34361 1      54777 1      31002 1      12345 0      55001 0

41,2340      56002 0      54117 1      34360 0      54777 1      31001 1      04635 0   C: 61317 0      00117 0
41,2350      04145 0      04635 0   C: 61420 0      44752 1      02424 1      50145 1      40002 1      56132 1
41,2360      44753 0      02424 1      50145 1      40001 1      56131 1      02443 0      02466 1      50145 1
41,2370      40000 0      56130 0      02405 1      44753 0      02437 0      50145 1      40001 1      02371 0
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OCTAL LISTING FOR PARAGRAPH # 225, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2400        44752 1      02437 0      50145 1      40002 1      02371 0      44752 1      61001 1      10000 0
41,2410        02413 0      00136 0      02413 0      54122 1      50000 1      34317 0      54777 1      50122 0
41,2420        40130 1      03363 1      56122 0      02407 0      54123 0      22002 0      02515 1      04331 1
41,2430        76245 0      60123 1      10000 0      00001 0      05705 0      02351 1      00001 0      54123 0

41,2440        22002 0      02443 0      02426 0      00006 1      22156 0      02515 1      74736 0      10000 0
41,2450        02351 1      00156 0      22002 0      02515 1      74736 0      10000 0      04145 0      00001 0
41,2460        22002 0      02515 1      10000 0      00001 0      00001 0      02351 1      22002 0      30146 1
41,2470        64753 1      00006 1      12504 0      50140 1      02474 1      02477 1      00001 0      03026 0

41,2500        02261 0      00001 0      24145 1      00001 0      31017 0      75004 1      00006 1      50000 1
41,2510        00000 1      40000 0      12371 1   C: 00147 0   C: 00146 1      50140 1      32512 0      50000 1
41,2520        30000 1      74350 1      00002 0      02515 1      04331 1      76245 0      54117 1      54122 1
41,2530        60145 1      50000 1      40000 0      50122 0      57003 0      10122 1      02527 0      34755 1

41,2540        54155 1      54156 1      50117 0      34317 0      54777 1      50117 0      41003 1      54154 0
41,2550        03047 1      54123 0      00006 1      32565 0      52006 0      50140 1      02556 0      02562 1
41,2560        03034 0      02575 1      03026 0      02575 1   C: 02141 1   C: 64101 0      04616 1   C: 61226 0
41,2570        10117 1      02573 1      00136 0      54117 1      02537 1      50000 1      32600 0      04640 1

41,2600     C: 61416 0   C: 62566 0   C: 60615 0   C: 60677 1   C: 60710 1 . C: 60715 1   C: 60635 1   C: 60717 0
41,2610     C: 65230 0   C: 65303 1   C: 60715 1   C: 60704 1   C: 60732 1   C: 60623 0      44752 1      02424 1
41,2620        02460 1      33006 1      02337 1      02303 0      33007 0      02337 1      02305 0      33010 0
41,2630        02337 1      02307 1      46242 1      03011 1      00006 1      32114 1      52006 0      34755 1

41,2640        03075 0      50145 1      54000 0      34753 1      03075 0      50145 1      54001 1      34752 0
41,2650        03075 0      50145 1      54002 1      44757 1      61002 1      00006 1      12660 1      02775 0
41,2660        31003 0      04364 1      31005 0      00004 0      00006 1      12474 1      50145 1      40000 0
41,2670        71004 0      50145 1      26000 0      02701 0      41004 0      50145 1      70000 0      50145 1

41,2700        54000 0      00003 1      02775 0      44753 0      02424 1      02460 1      33006 1      02337 1
41,2710        02303 0      33007 0      02337 1      02305 0      44756 0      03011 1      00006 1      32114 1
41,2720        52006 0      34755 1      03075 0      50145 1      54000 0      34753 1      03075 0      50145 1
41,2730        54001 1      02775 0      02303 0      00006 1      32114 1      52006 0      34755 1      03075 0

41,2740        50145 1      54000 0      02775 0      44753 0      02424 1      34735 1      55015 0      02305 0
41,2750        00006 1      32114 1      52006 0      34753 1      03075 0      50145 1      54001 1      02775 0
41,2760        44752 1      02424 1      34735 1      55015 0      02307 1      00006 1      32114 1      52006 0
41,2770        34752 0      03075 0      50145 1      54002 1      02775 0      34755 1      55000 1      44755 0
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OCTAL LISTING FOR PARAGRAPH # 226,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3000         55014 1      04457 0      44360 1      54777 1      04635 0   C: 61547 0   C: 00025 0   C: 00026 0
41,3010      C: 00027 1      54117 1      41000 1      54021 0      40021 0      40021 0      10000 0      13021 0
41,3020         00002 0      50117 0      00006 1      13025 1      04145 0      00002 0      56002 0      54114 1
41,3030         34347 0      70147 1      04322 0      00114 0      56002 0      54114 1      50117 0      33066 1

41,3040         54001 1      50117 0      34346 1      70153 1      50001 0      00000 1      00114 0      56002 0
41,3050         54114 1      50140 1      03052 0      03071 1      50117 0      33066 1      54001 1      50117 0
41,3060         34346 1      70147 1      50001 0      00000 1      60000 1      00114 0      03025 0      04322 0
41,3070         04331 1      34346 1      70147 1      60000 1      00114 0      54117 1      56002 0      54115 0

41,3100         34755 1      54162 0      50117 0      57006 0      54155 1      50117 0      57003 0      54154 0
41,3110         50140 1      03111 0      03137 1      50117 0      30150 0      74356 1      04303 0      00006 1
41,3120         60117 0      54145 0      11000 1      03174 0      02452 0      03034 0      02261 0      03155 0
41,3130         24145 1      30145 1      26117 1      34755 1      50117 0      53777 0      03155 0      04311 0

41,3140         11000 1      03174 0      02452 0      03026 0      02261 0      03151 1      34755 1      54117 1
41,3150         03130 0      30146 1      64753 1      00006 1      13161 0      56154 1      00115 1   C: 02147 1
41,3160      C: 64101 0      44757 1      61017 0      00006 1      12775 1      31017 0      75004 1      56154 1
41,3170         00006 1      50154 1      01000 0      02775 0      03047 1      54123 0      00006 1      33160 0

41,3200         52006 0      50140 1      03202 1      03206 0      03034 0      03207 1      03026 0      50000 1
41,3210         33212 0      04640 1   C: 62350 0   C: 61106 1   C: 61010 1   C: 61076 1   C: 61114 1   C: 61141 1
41,3220      C: 61420 0   C: 61114 1   C: 65452 1   C: 61420 0   C: 61146 0   C: 61111 1   C: 61420 0   C: 61010 1
41,3230         43237 0      71017 1      54155 1      40136 1      64217 1      10000 0      03245 1   C: 60000 1

41,3240         0324[illegible] 1      34736 1      26155 1      34755 1      55022 1      36074 1      71001 0      04331 1
41,3250         54022 0      40022 0      56022 1      61002 1      54154 0      34755 1      55012 1      11042 1
41,3260         03262 1      04502 1      00004 0      11020 0      03271 0      34753 1      05203 0   C: 03275 1
41,3270      C: 62101 0      52155 1      53021 1      00003 1      00136 0      04400 1      11021 1      03303 1

41,3300         03303 1      03314 1      03314 1      33320 0      05203 0   C: 03275 1   C: 62101 0      34355 0
41,3310         05072 1   C: 03321 1   C: 62101 0      05261 1      34755 1      55020 0      55021 1      05261 1
41,3320      C: 00144 0      11021 1      03326 0      03326 0      05155 0      05155 0      11012 1      03351 0
41,3330         36074 1      71020 0      02317 0      34144 1      71020 0      63347 1      54023 1      30023 0

41,3340         55001 0      33350 1      54136 1      43237 0      71021 1      54156 1      02046 1   C: 75377 0
41,3350      C: 04124 1      04374 0      05155 0      34317 0      54777 1      31047 0      54001 1      31017 0
41,3360         04651 1      03363 1      05155 0      54022 0      56002 0      54115 0      34736 1      26777 1
41,3370         34751 0      54137 0      40022 0      40022 0      40022 0      40000 0      74757 1      50000 1
```

OCTAL LISTING FOR PARAGRAPH # 227, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
41,3400        34066 0      74346 0      54124 1      56777 0      54143 0      10000 0      54777 1      04635 0
41,3410     C: 61412 1      10137 0      03371 1      44360 1      54777 1      00115 1      54020 1      56002 0
41,3420        54115 0      34753 1      54137 0      40020 1      40020 1      56020 0      54022 0      03376 0
41,3430        03452 1      34747 1      60777 0      00006 1      13436 1      04145 0      34755 1      57002 1

41,3440        54154 0      34361 1      54777 1      04616 1   C: 60601 0      44360 1      54777 1      30154 1
41,3450        04635 0   C: 10040 1      40002 1      55013 0      34361 1      54777 1      34755 1      55002 0
41,3460        04616 1   C: 60601 0      04427 1      34753 1      55000 1      00136 0      34753 1      71045 0
41,3470        10000 0      03510 0      34351 1      54154 0      44753 0      71045 0      54160 1      04457 0

41,3500        34217 1      54157 0      00006 1      31047 0      52156 1      30160 0      00004 0      00154 1
41,3510        34354 1      03473 1      34352 1      54154 0      31045 1      03476 1      64757 0      00004 0
41,3520        54124 1      44740 1      50124 0      57023 1      10000 0      25016 1      03527 1      10124 1
41,3530        03520 0      00003 1      50123 1      03540 0      03535 1      55001 0      55002 0      55015 0

41,3540        44360 1      54777 1      04433 1      03566 1      33570 0      54136 1      10123 0      03553 1
41,3550        02351 1      03516 0      02351 1      36074 1      70123 0      54157 0      30123 1      54023 1
41,3560        30023 0      54160 1      10157 0      03571 1      30160 0      02337 1      34755 1      55013 0
41,3570        04202 0      10160 1      03576 0      30157 1      02317 0      04202 0      30156 0      54161 0

41,3600        30160 0      02337 1      30157 1      02317 0      34755 1      55014 1      55015 0      55013 0
41,3610        30161 1      54156 1      02035 0      00004 0      44753 0      71303 1      64753 1      55303 1
41,3620        33656 1      00006 1      05011 1      33657 0      55036 1      34742 1      00006 1      05013 0
41,3630        34363 0      54117 1      43654 1      50117 0      55023 0      10117 1      03631 0      43655 0

41,3640        55024 1      55027 1      55031 0      34760 1      55016 0      00003 1      33661 0      00004 0
41,3650        05203 0   C: 03662 0   C: 62102 0      05155 0   C: 05675 0   C: 07675 1   C: 00175 1   C: 40674 0
41,3660     C: 00115 1   C: 00764 1      34355 0      05072 1   C: 03667 0   C: 62102 0      05261 1      43660 0
41,3670        00004 0      00006 1      03011 1      44742 0      00006 1      03013 0      34750 1      00006 1

41,3700        02012 0      64735 1      55036 1      43726 0      71303 1      65026 0      55303 1      43730 1
41,3710        71302 0      65025 0      55302 0      43727 1      70110 0      64745 0      54110 0      00003 1
41,3720        04616 1   C: 10636 0      04204 0      04433 1      04635 0   C: 61471 1   C: 16001 1   C: 00330 1
41,3730     C: 55000 1   C: 03731 1   C: 03732 1 CKSM 72012 1         @            @            @            @

41,3740           @            @            @            @            @            @            @            @
41,3750           @            @            @            @            @            @            @            @
41,3760           @            @            @            @            @            @            @            @
41,3770           @            @            @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 230, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2000     C: 26723 0   C: 00450 0      35021 1      05146 1      32034 1      04616 1   C: 20334 1      05472 0
42,2010        05472 0      42033 1      60154 1      00006 1      12016 0      05472 0      00004 0      34755 1
42,2020        54156 1      54001 1      52025 1      52155 1      53052 0      20155 1      07257 0      52155 1
42,2030        20025 1      00003 1      05472 0   C: 00027 1   C: 06230 0      34752 0      54002 1      50000 1

42,2040        30321 1      00006 1      72053 1      50002 0      56050 1      10002 1      12036 1      37740 0
42,2050        00006 1      05014 1      15261 0   C: 03146 1      05516 0   C: 00027 1      05516 0   C: 00031 0
42,2060        05516 0   C: 00007 0      06037 0   I: 77624 1   C: 27414 0   I: 77776 1      05353 1   C: 00002 0
42,2070        00004 0      04674 0   C: 40165 1      04674 0   C: 40123 0      06011 1      44736 0      00006 1

42,2100        03012 1      04635 0   C: 12770 1      52152 0      51002 1      32154 0      54146 0      51002 1
42,2110        32320 1      54147 1      41002 0      64771 1      00006 1      62121 1      34753 1      54140 0
42,2120        02137 0      34752 0      54140 0      51002 1      33064 0      54153 1      35012 1      70146 0
42,2130        54002 1      50000 1      32650 0      54150 1      00006 1      50002 0      32652 1      52152 0

42,2140        52006 0      52124 1      00006 1      50000 1      32557 1      52124 1      52006 0      52124 1
42,2150        00006 1      50000 1      32465 1      12145 1   C: 00000 1   C: 40000 0   C: 40000 0   C: 40000 0
42,2160     C: 01045 1   C: 01045 1   C: 01144 1   C: 01003 0   C: 01363 0   C: 00375 0   C: 77776 1   C: 03633 1
42,2170     C: 01051 1   C: 01776 0   C: 01051 1   C: 77777 0   C: 01051 1   C: 00000 1   C: 02344 0   C: 00000 1

42,2200     C: 00032 0   C: 00037 0   C: 00321 1   C: 00000 1   C: 01051 1   C: 01045 1   C: 01045 1   C: 01362 1
42,2210     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 02142 1   C: 03441 0   C: 01045 1   C: 03453 0
42,2220     C: 00024 1   C: 03635 1   C: 01516 1   C: 00000 1   C: 64000 0   C: 02003 0   C: 24006 1   C: 24011 1
42,2230     C: 64014 0   C: 64017 0   C: 00022 1   C: 22025 0   C: 22030 1   C: 24033 1   C: 00000 1   C: 22041 1

42,2240     C: 00044 1   C: 00000 1   C: 24052 0   C: 24055 1   C: 02060 0   C: 20063 0   C: 24066 1   C: 24071 1
42,2250     C: 24074 1   C: 64077 0   C: 64102 0   C: 24105 0   C: 64110 0   C: 24113 1   C: 62116 0   C: 04121 1
42,2260     C: 64124 1   C: 00000 1   C: 04132 0   C: 04135 1   C: 02140 0   C: 02143 0   C: 64146 0   C: 64151 0
42,2270     C: 24154 1   C: 62157 0   C: 02162 0   C: 24165 0   C: 02170 0   C: 24173 1   C: 24176 1   C: 24201 1

42,2300     C: 24204 1   C: 24207 1   C: 24212 0   C: 02215 0   C: 24220 1   C: 24223 1   C: 24226 1   C: 04231 0
42,2310     C: 00000 1   C: 04237 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 04253 1   C: 04256 1   C: 24261 1
42,2320     C: 00000 1   C: 04040 1   C: 04140 0   C: 04102 0   C: 00504 0   C: 00504 0   C: 04000 0   C: 04000 0
42,2330     C: 04000 0   C: 04000 0   C: 00000 1   C: 24400 0   C: 02000 0   C: 24400 0   C: 04140 0   C: 00000 1

42,2340     C: 24400 0   C: 00000 1   C: 04102 0   C: 00000 1   C: 04102 0   C: 04140 0   C: 04102 0   C: 00000 1
42,2350     C: 24400 0   C: 04140 0   C: 04000 0   C: 00140 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
42,2360     C: 24400 0   C: 24400 0   C: 24400 0   C: 24400 0   C: 24400 0   C: 24400 0   C: 24400 0   C: 00000 1
42,2370     C: 24500 1   C: 00542 1   C: 24410 1   C: 20204 0   C: 00410 1   C: 10000 0   C: 00000 1   C: 00306 1
```

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OCTAL LISTING FOR PARAGRAPH # 231,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2400     C: 01367 1     C: 60510 0     C: 00000 1     C: 00204 1     C: 00004 0     C: 00000 1     C: 10507 1     C: 10200 1
42,2410     C: 00204 1     C: 00010 0     C: 24510 0     C: 24512 1     C: 60512 1     C: 54000 0     C: 24012 1     C: 60512 1
42,2420     C: 60500 1     C: 00000 1     C: 00016 0     C: 53223 1     C: 60026 0     C: 00000 1     C: 00000 1     C: 00000 1
42,2430     C: 00102 1     C: 00102 1     C: 10200 1     C: 00010 0     C: 20512 0     C: 00500 1     C: 00654 0     C: 00102 1

42,2440     C: 00200 0     C: 24512 1     C: 24512 1     C: 24512 1     C: 24512 1     C: 24512 1     C: 24512 1     C: 00102 1
42,2450     C: 00000 1     C: 16143 0     C: 10507 1     C: 10450 1     C: 00000 1     C: 06143 1     C: 00000 1     C: 00060 1
42,2460     C: 00000 1     C: 00000 1     C: 00000 1     C: 71572 1     C: 00006 1     C: 03240 1     C: 00000 1     C: 00000 1
42,2470     C: 00000 1     C: 00000 1     C: 10707 0     C: 03435 0     C: 13070 1     C: 34345 1     C: 00005 1     C: 21616 0

42,2500     C: 26113 0     C: 31713 0     C: 00070 0     C: 20460 1     C: 01065 0     C: 05740 1     C: 11414 0     C: 31463 1
42,2510     C: 07475 0     C: 16051 1     C: 00001 0     C: 03434 1     C: 00047 1     C: 21135 0     C: 77766 0     C: 50711 0
42,2520     C: 00005 1     C: 25006 0     C: 00002 0     C: 23224 1     C: 00014 1     C: 06500 1     C: 00012 1     C: 36455 0
42,2530     C: 04256 1     C: 07071 0     C: 77766 0     C: 60557 0     C: 00005 1     C: 01114 1     C: 00007 0     C: 01247 1

42,2540     C: 04324 0     C: 27600 1     C: 00036 1     C: 20440 0     C: 00035 1     C: 30400 0     C: 23420 0     C: 00000 1
42,2550     C: 01670 1     C: 20000 0     C: 07475 0     C: 16051 1     C: 14400 0     C: 00000 1     C: 05174 0     C: 13261 0
42,2560     C: 00000 1     C: 00000 1     C: 00000 1     C: 00000 1     C: 00714 0     C: 31463 1     C: 13412 1     C: 07534 1
42,2570     C: 05605 1     C: 03656 1     C: 00001 0     C: 16170 0     C: 00441 0     C: 34306 0     C: 07176 0     C: 21603 1

42,2600     C: 15340 1     C: 153[illegible]0 1     C: 01031 1     C: 21032 0     C: 34631 1     C: 23146 0     C: 00636 1     C: 14552 0
42,2610     C: 74552 0     C: 70307 1     C: 05520 0     C: 15312 0     C: 14226 1     C: 31757 0     C: 02476 0     C: 05531 0
42,2620     C: 02727 1     C: 16415 0     C: 00007 0     C: 13734 0     C: 74477 0     C: 50643 0     C: 06265 0     C: 16004 1
42,2630     C: 04426 0     C: 31433 1     C: 34772 1     C: 07016 1     C: 01030 0     C: 33675 0     C: 01046 1     C: 15700 1

42,2640     C: 00321 1     C: 26706 1     C: 04231 0     C: 27400 0     C: 01031 1     C: 21032 0     C: 12172 0     C: 34122 1
42,2650     C: 03453 0     C: 03663 1     C: 03507 0     C: 01045 1     C: 01046 1     C: 00000 1     C: 02316 1     C: 02320 1
42,2660     C: 03663 1     C: 01120 0     C: 01122 1     C: 01124 1     C: 02117 1     C: 02121 1     C: 02140 0     C: 03462 1
42,2670     C: 03453 0     C: 02252 0     C: 01343 1     C: 00000 1     C: 00000 1     C: 01331 1     C: 01332 1     C: 00000 1

42,2700     C: 03002 0     C: 03001 0     C: 00000 1     C: 00314 1     C: 00316 0     C: 03745 1     C: 00000 1     C: 00000 1
42,2710     C: 00000 1     C: 02200 1     C: 02202 0     C: 00000 1     C: 01755 1     C: 00000 1     C: 00000 1     C: 00000 1
42,2720     C: 00000 1     C: 00000 1     C: 02200 1     C: 02202 0     C: 02204 0     C: 03466 0     C: 02256 1     C: 03620 0
42,2730     C: 02200 1     C: 02202 0     C: 00000 1     C: 02302 1     C: 00000 1     C: 00000 1     C: 03605 1     C: 03575 0

42,2740     C: 02347 0     C: 02302 1     C: 02304 1     C: 02306 0     C: 02262 0     C: 03473 1     C: 03534 0     C: 03475 1
42,2750     C: 03453 0     C: 02626 1     C: 03471 0     C: 03453 0     C: 03507 0     C: 03471 0     C: 03473 1     C: 03774 0
42,2760     C: 03666 1     C: 03473 1     C: 03534 0     C: 00013 0     C: 00013 0     C: 00013 0     C: 02206 1     C: 00000 1
42,2770     C: 00000 1     C: 02200 1     C: 02202 0     C: 02204 0     C: 02624 0     C: 03475 1     C: 03664 0     C: 00000 1
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OCTAL LISTING FOR PARAGRAPH # 232, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3000     C: 00000 1   C: 00000 1   C: 00735 0   C: 00736 0   C: 00737 1   C: 00735 0   C: 00736 0   C: 00737 1
42,3010     C: 00035 1   C: 00036 1   C: 00000 1   C: 01107 0   C: 01110 0   C: 00000 1   C: 03453 0   C: 02362 1
42,3020     C: 02364 1   C: 03577 1   C: 02252 0   C: 02254 0   C: 02276 0   C: 02272 1   C: 03642 1   C: 03453 0
42,3030     C: 02310 1   C: 00000 1   C: 02200 1   C: 02202 0   C: 00000 1   C: 01236 1   C: 01240 0   C: 01242 1

42,3040     C: 03733 0   C: 03734 1   C: 00000 1   C: 03433 0   C: 03435 0   C: 03437 1   C: 03433 0   C: 03435 0
42,3050     C: 03437 1   C: 03622 1   C: 03624 1   C: 03626 0   C: 02222 1   C: 02224 1   C: 02226 0   C: 03501 0
42,3060     C: 03503 1   C: 03505 1   C: 03433 0   C: 03435 0   C: 03437 1   C: 01347 0   C: 01350 0   C: 00000 1
42,3070     C: 02706 1   C: 02710 0   C: 02712 1   C: 02706 1   C: 02710 0   C: 02712 1   C: 02200 1   C: 02202 0

42,3100     C: 02204 0   C: 03715 1   C: 03711 0   C: 03713 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 02737 0
42,3110     C: 02741 1   C: 02743 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
42,3120     C: 00000 1   C: 00000 1   C: 00000 1   C: 01045 1   C: 01046 1   C: 01047 0   C: 01050 0   C: 01051 1
42,3130     C: 01052 1   C: 02200 1   C: 02202 0   C: 02204 0   C: 16351 1   C: 00142 0   C: 16347 0   C: 16512 0

42,3140     C: 22347 1   C: 24443 1   C: 00000 1   C: 00553 1   C: 00143 1   C: 06347 1   C: 00000 1   C: 00512 1
42,3150     C: 00012 1   C: 00000 1   C: 24344 1   C: 24503 1   C: 00512 1   C: 00007 0   C: 16347 0   C: 16347 0
42,3160     C: 10347 0   C: 24451 1   C: 16447 1   C: 10347 0   C: 10354 1   C: 20410 0   C: 00304 0   C: 10204 0
42,3170     C: 10452 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00115 1   C: 00115 1   C: 24511 1   C: 22447 0

42,3200     C: 16347 0   C: 00351 0   C: 00204 1   C: 06102 1   C: 00503 1   C: 16347 0   C: 16347 0   C: 16347 0
42,3210     C: 16347 0   C: 16347 0   C: 16347 0   C: 00102 1   C: 02041 0   C: 10347 0   C: 24344 1   C: 24507 0
42,3220     C: 00000 1   C: 16347 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 06143 1   C: 06043 0   C: 24247 0
42,3230        04616 1   C: 60747 0      07257 0      03417 0      07103 1   C: 03271 0      34321 0      54777 1

42,3240        04616 1   C: 61226 0      03435 0      33273 1      56154 1      55007 0      33274 0      56155 0
42,3250        04415 0      34320 1      54777 1      04616 1   C: 61226 0      00006 1      33300 1      52155 1
42,3260        31007 1      04415 0      34317 0      54777 1      04616 1   C: 61226 0      00136 0   C: 25660 0
42,3270     C: 31742 1   C: 01727 1   C: 01217 1   C: 00011 1   C: 32445 0   C: 02104 0   C: 10422 1   C: 05174 0

42,3300     C: 13261 0   C: 00000 1   C: 00062 0      04616 1   C: 60747 0      07257 0      10154 0      03311 1
42,3310        03342 1      63377 1      10000 0      03326 0      03342 1      03342 1      10155 1      03321 1
42,3320        03342 1      63400 0      10000 0      03326 0      03342 1      03342 1      10154 0      33402 1
42,3330        03337 0      43402 0      54154 0      43403 1      54155 1      33401 1      03420 1      54154 0

42,3340        33403 0      03334 0      03404 1      33375 0      07307 1      46245 0      26777 1      04616 1
42,3350     C: 61266 1      34755 1      54124 1      44752 1      50117 0      64317 0      54143 0      04616 1
42,3360     C: 61322 0      03435 0      56155 0      00006 1      73376 1      52155 1      50117 0      34317 0
42,3370        54777 1      04616 1   C: 61266 1      04635 0   C: 62570 1   C: 23147 1   C: 23346 1   C: 77753 0
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OCTAL LISTING FOR PARAGRAPH # 233,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3400      C: 41126 1   C: 03343 0   C: 00025 0   C: 37016 1      10155 1      13414 1      13414 1      13410 0
42,3410         00006 1      43302 1      20155 1      13417 1      00006 1      33302 0      13412 1      56002 0
42,3420         54144 1      07103 1   C: 03267 1      00006 1      30155 0      53010 0      04404 0      04404 0
42,3430         34755 1      54156 0      56155 0      56154 1      00144 0      56002 0      54144 1      31010 1

42,3440         00006 1      74751 1      00006 1      74737 1      22155 0      31007 1      54154 0      07103 1
42,3450      C: 03275 1      00144 0      03573 0      07103 1   C: 03534 0      03543 0      34755 1      54156 1
42,3460         33536 1      54154 0      33537 0      56155 0      07307 1      03554 0      52156 1      52124 1
42,3470         31004 1      23007 1      52155 1      07103 1   C: 03534 0      03543 0      43541 0      03561 0

42,3500         56155 0      00006 1      73540 1      20124 1      00006 1      13507 1      04145 0      31005 0
42,3510         23010 1      52155 1      07103 1   C: 03534 0      03543 0      43542 0      03561 0      52124 1
42,3520         20155 1      00006 1      13524 0      04145 0      34755 1      54156 1      07257 0      52155 1
42,3530         50145 1      52001 1      04635 0   C: 62775 0   C: 00006 1   C: 03240 1   C: 00025 0   C: 37100 1

42,3540      C: 13560 0   C: 00073 0   C: 13557 1      56156 0      60000 1      54156 1      34755 1      60155 0
42,3550         54155 1      34755 1      60154 1      56154 1      10154 0      04145 0      00002 0      04145 0
42,3560         00002 0      54156 1      10155 1      64753 1      13566 0      64753 1      60156 0      00006 1
42,3570         63572 1      04145 0      00002 0      43600 0      71000 1      63600 1      10000 0      03603 1

42,3600      C: 77743 1      03603 1      00002 0      46010 1      55041 1      04145 0      04616 1   C: 11254 1
42,3610         06037 0   I: 47001 0   C: 00001 0   C: 21573 0   C: 34041 0   C: 27100 0   I: 46135 1   C: 00050 1
42,3620      C: 65636 1   I: 77775 1   C: 00001 0   C: 16205 1   C: 00015 0   I: 77624 1   C: 33664 0   I: 74375 0
42,3630      C: 02723 0   C: 24001 0   I: 53372 1   C: 02205 1   I: 77650 1   C: 65640 0   I: 77775 1   C: 00001 0

42,3640      I: 53401 1   C: 00001 0   I: 45076 1   C: 47537 0   I: 76521 0   C: 01734 0   I: 71206 0   C: 06522 1
42,3650      C: 02201 0   C: 26203 1   I: 77624 1   C: 47671 1   C: 16205 1   C: 02207 0   I: 45206 1   C: 02205 1
42,3660      I: 77605 1   C: 25771 1   C: 16207 0   I: 41215 1   C: 02205 1   C: 25771 1   C: 26205 1   C: 02205 1
42,3670      I: 63256 0   C: 02205 1   I: 72431 1   C: 06516 0   I: 40045 1   C: 02205 1   C: 65677 1   I: 40056 0

42,3700      C: 65745 1   I: 47206 0   C: 06514 1   I: 57572 0   C: 02205 1   I: 63241 0   C: 06516 0   C: 02205 1
42,3710      I: 75246 0   I: 77736 0   C: 26201 0   C: 00007 0   I: 51041 0   C: 06514 1   C: 65723 1   I: 45345 1
42,3720      C: 06520 0   C: 02201 0   C: 02201 0   I: 47375 0   C: 00001 0   C: 00007 0   I: 77772 0   C: 16205 1
42,3730      C: 02201 0   I: 74356 1   C: 06514 1   I: 71525 0   C: 02201 0   I: 52361 1   C: 06520 0   I: 63241 0

42,3740      C: 02205 1   C: 02205 1   I: 75246 0   I: 77736 0   C: 02203 1   I: 77776 1      31044 0      74747 0
42,3750         00006 1      15472 1      35017 1      05146 1      33767 1      04616 1   C: 20353 0      05563 1
42,3760         05563 1      05155 0      34751 0      05464 1      34740 0      05146 1      03610 0   C: 01463 1
42,3770      C: 26501 1   C: 07463 1   C: 03772 0   C: 03773 1   CKSM 56666 1        @            @            @
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OCTAL LISTING FOR PARAGRAPH # 234,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2000        50154 1       02002 1       02130 1       02171 1       02330 0       02707 0       02302 1       02120 0
43,2010        02120 0       02367 1       03135 0       13015 1       02361 1       02120 0       02361 1       02361 1
43,2020        02361 1       02401 0       03024 1       02322 0       02325 1       02120 0       02151 0       02163 1
43,2030        02166 1       02414 1       02700 1       03221 0       03142 0       03213 1       02120 0       02037 1

43,2040        03724 0       03726 1       03730 0       03732 1       03045 0       03224 0       03001 0       03006 1
43,2050        02404 0       02617 0       03051 0       03054 0       02746 0       02756 1       02120 0       03227 0
43,2060        02120 0       02120 0       02120 0       02764 0       02773 0       03100 0       03064 0       03073 0
43,2070        02120 0       03061 0       03206 0       02361 1       02120 0       02361 1       11044 1       02120 0

43,2100        30100 0       72127 0       10000 0       02120 0       36007 0       55044 1       30002 0       54155 1
43,2110        44752 1       04154 0       02113 0       00155 0       04364 1       05472 0       34755 1       02105 1
43,2120        04364 1       04635 0    C: 21050 1       31011 0       00006 1       16742 1       02120 0    C: 24100 0
43,2130        02174 1       02133 1       02142 1       02375 1       04616 1    C: 16714 1       04616 1    C: 17716 1

43,2140        02141 1       02121 1       02642 0       04616 1    C: 52343 1       04616 1    C: 17714 0       12150 0
43,2150        02121 1       02642 0       04616 1    C: 53471 0       04616 1    C: 17714 0       02160 1       02121 1
43,2160        05567 0    C: 00523 0       02121 1       05516 0    C: 00013 0       02121 1       05504 0    C: 00013 0
43,2170        02121 1       02174 1       02205 1       02227 1       46007 1       61002 1       00006 1       16742 1

43,2200        62204 0       00006 1       16737 0       02120 0    C: 77713 1       02375 1       02076 1       32225 0
43,2210        04616 1    C: 20334 1       05472 0       12214 0       32226 0       04616 1    C: 20620 1       04616 1
43,2220     C: 17000 1       04616 1    C: 17716 1       05472 0       05472 0    C: 06226 1    C: 12200 0       02642 0
43,2230        02076 1       34745 0       70074 0       10000 0       12114 0       42321 1       00004 0       70110 0

43,2240        54110 0       32260 1       04616 1    C: 20334 1       05472 0       12241 0       04616 1    C: 46000 0
43,2250        32226 0       04616 1    C: 20620 1       34736 1       05105 0    C: 02261 0    C: 66107 1       15472 1
43,2260     C: 06111 0       04616 1    C: 52475 0       02264 0       30167 1       75004 1       10000 0       50000 1
43,2270        54000 0       40000 0       26167 0       04616 1    C: 17714 0       02277 1       05155 0       05567 0

43,2300     C: 00503 1       05155 0       10110 0       12121 0       12121 0       12306 1       42321 1       00004 0
43,2310        70110 0       54110 0       06011 1       34777 1       04616 1    C: 01735 1       05516 0    C: 00126 1
43,2320        12121 0    C: 41000 1       05504 0    C: 00254 1       12121 0       05516 0    C: 00254 1       12121 0
43,2330        02375 1       02076 1       32357 1       04616 1    C: 20334 1       05472 0       02337 1       32360 0

43,2340        04616 1    C: 20620 1       04616 1    C: 17210 1       04616 1    C: 17716 1       05472 0       32356 0
43,2350        04616 1    C: 17323 0       04616 1    C: 17716 1       05472 0       05472 0    C: 02737 0    C: 06335 1
43,2360     C: 12400 0       04433 1       34201 0       00006 1       01007 1       04635 0    C: 62001 1       02076 1
43,2370        34740 0       05105 0    C: 02005 0    C: 64064 1       05155 0       31304 1       00006 1       16742 1
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OCTAL LISTING FOR PARAGRAPH # 235, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2400       02120 0      02076 1      04635 0   C: 64002 1      02642 0      30077 1      74743 1      10000 0
43,2410       02120 0      05504 0   C: 00117 0      12420 1      02642 0      02076 1      05504 0   C: 00063 1
43,2420       34741 1      54003 0      32640 1      55755 0      34755 1      55754 1      55756 0      00004 0
43,2430       42641 1      70110 0      54110 0      32641 0      00006 1      02033 0      26110 0      00003 1

43,2440       40077 0      74743 1      10000 0      12575 0      34753 1      55052 0      34751 0      55051 0
43,2450       32635 0      04616 1   C: 20353 0      12603 1      12461 1      12450 0      34751 0      05464 1
43,2460       05155 0      31052 1      55751 1      36242 0      71751 1      10000 0      12577 1      55753 0
43,2470       34752 0      00006 1      02033 0      00006 1      12505 1      32637 1      55045 0      32636 0

43,2500       04616 1   C: 20345 1      12603 1      12470 1      12475 1      34736 1      00006 1      05012 1
43,2510       34752 0      55752 1      05203 0   C: 02003 0   C: 52104 0      00003 1      40077 0      74743 1
43,2520       10000 0      12121 0      36242 0      71751 1      10000 0      12542 1      32631 1      04616 1
43,2530    C: 20334 1      12603 1      12534 0      12526 0      32632 1      04616 1   C: 20334 1      12603 1

43,2540       12556 1      12526 0      32633 0      04616 1   C: 20334 1      12603 1      12550 1      12542 1
43,2550       32634 1      04616 1   C: 20334 1      12603 1      12556 1      12542 1      34755 1      55755 0
43,2560       35000 1      04616 1   C: 01735 1      32640 1      55755 0      34755 1      55754 1      36242 0
43,2570       71751 1      10000 0      44753 0      64752 0      12462 1      34766 1      55755 0      34752 0

43,2600       55753 0      36242 0      12511 1      34755 1      55755 0      34744 1      04616 1   C: 01735 1
43,2610       00004 0      44736 0      00006 1      03012 1      05516 0   C: 00063 1      05472 0      34741 1
43,2620       54003 0      34755 1      55755 0      34746 0      04616 1   C: 01735 1      05516 0   C: 00117 0
43,2630       12121 0   C: 04110 0   C: 04116 0   C: 04102 0   C: 04103 1   C: 01014 0   C: 14431 1   C: 00201 1

43,2640    C: 00145 1   C: 00444 0      40077 0      74741 0      10000 0      02120 0      30101 1      74741 0
43,2650       10000 0      02120 0      40103 1      74746 1      10000 0      12662 0      40107 0      74735 0
43,2660       10000 0      02120 0      40075 1      74747 0      10000 0      12672 1      30074 1      74745 1
43,2670       10000 0      02120 0      41011 1      62677 0      00006 1      12120 1      00002 0   C: 00026 0

43,2700       02123 0      02076 1      34740 0      05105 0   C: 03606 1   C: 64104 0      05155 0      02123 0
43,2710       34763 1      00006 1      02012 0      10000 0      12120 1      34355 0      00006 1      06031 0
43,2720       74355 1      00006 1      12724 0      12120 1      02076 1      32225 0      04616 1   C: 20334 1
43,2730       05472 0      02732 0      32745 0      04616 1   C: 20620 1      34746 0      00006 1      05012 1

43,2740       34752 0      05203 0   C: 02035 0   C: 64100 1      15472 1   C: 12600 1      02076 1      35021 1
43,2750       05146 1      00006 1      32755 1      05165 0   C: 03242 0   C: 44104 1      02076 1      34752 0
43,2760       05203 0   C: 03674 1   C: 60107 1      05155 0      02123 0      02076 1      34737 0      05105 0
43,2770    C: 02022 0   C: 54104 0      05155 0      02076 1      35021 1      05105 0   C: 02656 0   C: 10104 0
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OCTAL LISTING FOR PARAGRAPH # 236,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3000        15155 1     00004 0     40111 1     74735 0     26111 1     12121 0     00004 0     44735 0
43,3010        70111 1     54111 1     04674 0  C: 40153 1     02121 1     02123 0     02076 1     34737 0
43,3020        05105 0  C: 02103 1  C: 46106 1     05155 0     33044 1     70074 0     00006 1     12121 0
43,3030        05516 0  C: 00010 0     05516 0  C: 00006 1     05516 0  C: 00037 0     34747 1     70075 1

43,3040        00006 1     12121 0     04635 0  C: 64054 1  C: 00500 1     33050 1     54335 0     02121 1
43,3050     C: 03707 1     05516 0  C: 00026 0     03056 1     05504 0  C: 00026 0     05516 0  C: 00030 1
43,3060        12121 0     05504 0  C: 00030 1     02121 1     02123 0     02076 1     37710 0     05105 0
43,3070     C: 02002 1  C: 76065 0     05155 0     00004 0     44753 0     70101 0     54101 0     02121 1

43,3100        02123 0     02076 1     35021 1     05146 1     34753 1     55376 0     34755 1     55362 0
43,3110        33245 1     55361 0     03522 1     23372 0     23373 1     33244 0     54156 1     33130 0
43,3120        04616 1  C: 20334 1     03125 1     03633 1     03115 1     33245 1     55371 1     05472 0
43,3130     C: 01201 0     31376 1     00006 1     13336 0     03522 1     02076 1     35021 1     05146 1

43,3140        04635 0  C: 40004 1     34737 0     05105 0  C: 03147 0  C: 66103 0     05155 0     06037 0
43,3150     I: 77624 1  C: 27414 0  I: 43014 0  C: 04063 0  C: 04304 1  C: 67160 1  I: 77614 1  C: 04263 1
43,3160     I: 77776 1     33204 1     05544 1  C: 01626 1  C: 01554 1     00003 1     06037 0  I: 77624 1
43,3170     C: 26760 1  I: 45154 0  C: 02030 0  C: 26114 1  I: 77776 1     33205 0     50120 1     54052 1

43,3200        04635 0  C: 27425 1  I: 77634 0  C: 21050 1  C: 00051 0  C: 67202 0     05504 0  C: 00221 0
43,3210        34755 1     04635 0  C: 10040 1     02076 1     35017 1     05105 0  C: 02007 1  C: 62064 1
43,3220        05155 0     05504 0  C: 00115 1     02121 1     05516 0  C: 00115 1     02121 1     02076 1
43,3230        04635 0  C: 60000 1  C: 00061 0  C: 01373 1  C: 01461 0  C: 01773 0  C: 00060 1  C: 60017 1

43,3240     C: 17777 0  C: 25252 0  C: 52400 1  C: 76777 1  C: 01371 0  C: 03336 1     31360 0     00006 1
43,3250        13257 0     00006 1     31376 1     51377 0     52001 1     34755 1     55360 1     00004 0
43,3260        30002 0     55357 0     55363 1     25365 0     05571 1  C: 01102 0     11362 0     34755 1
43,3270        55362 0     03336 1     01357 1     10000 0     13246 0     13246 0     10000 0     13246 0

43,3300        00002 0     00006 1     23371 0     03332 0     11362 0     03312 1     03303 1     03312 1
43,3310        25366 0     01371 0     65660 1     00006 1     63316 0     03267 1     25366 0     64757 0
43,3320        50000 1     03322 1     01371 0     01371 0     01371 0     03337 0     03520 0     01371 0
43,3330        01371 0     01371 0     00006 1     23361 1     04635 0  C: 03214 0     03301 0     34753 1

43,3340        55372 1     34755 1     54003 0     33234 1     55377 1     35012 1     55373 0     03367 0
43,3350        35007 0     55377 1     35012 1     55373 0     03367 0     35007 0     55377 1     33235 0
43,3360        55373 0     03367 0     55372 1     33232 1     55377 1     33233 0     55373 0     00004 0
43,3370        30003 1     55374 1     00006 1     51377 0     30001 0     53376 0     31377 0     55360 1
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OCTAL LISTING FOR PARAGRAPH # 237,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3400      54001 1      24001 0      50000 1      52001 1      51377 0      40001 1      51377 0      60000 1
43,3410      03273 1      31360 0      00006 1      13437 0      00006 1      51377 0      40001 1      51377 0
43,3420      52001 1      51377 0      40000 0      51377 0      60001 0      03273 1      31360 0      00006 1
43,3430      13437 0      00006 1      31376 1      51377 0      52001 1      34755 1      55360 1      00003 1

43,3440      03332 0      31374 0      54003 0      25377 0      41377 1      61373 1      00006 1      13451 0
43,3450      03367 0      11372 1      03362 0      25372 0      30003 1      64743 0      54003 0      63243 1
43,3460      00006 1      13355 0      10003 0      03350 1      35007 0      54003 0      34771 1      55372 1
43,3470      647[illegible]0 1      50000 1      40000 0      11372 1      03467 1      33241 0      54020 1      54022 0

43,3500      54021 0      54023 1      60020 0      60022 1      60021 1      60023 0      63242 0      03273 1
43,3510      60020 0      60022 1      60021 1      60023 0      64753 1      03273 1      25367 1      03301 0
43,3520      34754 0      55376 0      34755 1      55374 1      34753 1      55377 1      34755 1      55371 1
43,3530      55373 0      34753 1      55375 0      31374 0      54001 1      74350 1      61373 1      04651 1

43,3540      03563 1      [illegible]1 1      03574 1      40000 0      55377 1      00006 1      13551 1      34740 0
43,3550      03552 0      35020 0      55373 0      34755 1      55371 1      34753 1      55375 0      51373 1
43,3560      30000 1      03563 1      03574 1      55372 1      61371 0      55371 1      34755 1      61371 0
43,3570      55371 1      41372 1      61373 1      00002 0      22000 1      31373 1      75012 0      64350 0

43,3600      00006 1      13670 1      11375 0      03606 1      03606 1      03670 0      10001 1      03616 0
43,3610      03616 0      03616 0      11375 0      03617 1      37747 1      03617 1      34753 1      55375 0
43,3620      11376 0      10067 1      05122 0      03625 0      03332 0      25373 1      11377 1      03533 1
43,3630      03533 1      03557 0      03557 0      41374 1      63723 1      00006 1      13131 0      31374 0

43,3640      64741 1      55374 1      03646 0      34735 1      27374 1      03662 0      74350 1      00006 1
43,3650      13660 0      63240 1      00006 1      13655 0      03662 0      33236 0      27374 1      03662 0
43,3660      63237 1      27374 1      11377 1      03525 0      34753 1      03543 0      34745 0      03525 0
43,3670      31374 0      74350 1      04331 1      54001 1      31374 0      74357 0      00006 1      13705 1

43,3700      54021 0      30001 0      74757 1      60021 1      54001 1      31376 1      00006 1      13711 1
43,3710      03113 1      11371 1      03714 0      03715 1      64753 1      55371 1      40001 1      61371 0
43,3720      37747 1      03273 1      03633 1   C: 66100 0      34755 1      13733 1      34753 1      13733 1
43,3730      34752 0      13733 1      36245 1      55166 0      02076 1      31011 0      00006 1      13742 1

43,3740      04635 0   C: 11762 1      31011 0      55171 0      31166 1      55172 0      34753 1      55173 1
43,3750      [illegible]   C: 11401 1   C: 03752 1   C: 03753 0 CKSM 67233 1        @            @            @
43,3760        @            @            @            @            @            @            @            @
43,3770        @            @            @            @            @            @            @            @
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OCCUPIED LOCATIONS  PAGE     OCCUPIED LOCATIONS  PAGE     OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

   4000   TO    4045   153      5360   TO    5425 1299      6523   TO    6556 1020        00,2236   TO 00,2276 1054
   4046   TO    4065   154      5426   TO    5435 1300      6557   TO    6624 1021        00,2277   TO 00,2331 1055
   4066   TO    4101   155      5436   TO    5444 1304                    6625 1022        00,2332   TO 00,2352 1056
   4102   TO    4123   381      5445   TO    5455 1306      6026   TO    6666 1023        00,2353   TO 00,2421 1057

   4124   TO    4144   439                    5456 1307      6667   TO    6722 1024        00,2422   TO 00,2436 1058
   4145   TO    4153   446      5457   TO    5463 1309      6723   TO    6746 1025        00,2437   TO 00,2477 1059
   4154   TO    4203   452      5464   TO    5503 1354      6747   TO    7002 1026        00,2500   TO 00,2537 1060
   4204   TO    4206   454      5504   TO    5532 1375      7003   TO    7004 1027        00,2540   TO 00,2567 1061

   4207   TO    4242   455      5533   TO    5543 1376      7005   TO    7061 1028        00,2570   TO 00,2607 1062
   4243   TO    4302   456      5544   TO    5562 1379      7062   TO    7070 1029        00,2610   TO 00,2624 1063
   4303   TO    4335   460      5563   TO    5566 1380      7071   TO    7102 1030        00,2625   TO 00,2641 1064
   4336   TO    4377   461      5567   TO    5620 1381      7103   TO    7135 1031        00,2642   TO 00,2653 1065

   4400   TO    4436   462      5621   TO    5635 1382      7136   TO    7153 1032        00,2654   TO 00,2720 1066
   4437   TO    4461   464      5636   TO    5714 1383      7154   TO    7214 1033        00,2721   TO 00,2747 1067
   4462   TO    4511   465      5715   TO    5752 1384      7215   TO    7236 1034        00,2750   TO 00,3006 1068
   4512   TO    4522   521      5753   TO    5755 1404      7237   TO    7254 1035        00,3007   TO 00,3022 1069

   4523   TO    4536   522      5756   TO    5774 1405      7255   TO    7315 1036        00,3023   TO 00,3072 1070
   4537   TO    4563   523      5775   TO    5776   28      7316   TO    7330 1037                     00,3073 1071
   4564   TO    4577   524                    6000   40      7331   TO    7341 1038        00,3074   TO 00,3132 1072
   4600   TO    4615   525      6001   TO    6010  224      7342   TO    7400 1039        00,3133   TO 00,3150 1073

   4616   TO    4644   998      6011   TO    6021  516      7401   TO    7424 1040        00,3151   TO 00,3173 1074
   4645   TO    4673   999      6022   TO    6026  593      7425   TO    7457 1041        00,3174   TO 00,3206 1075
   4674   TO    4726  1000      6027   TO    6036  750      7460   TO    7525 1042        00,3207   TO 00,3231 1076
   4727   TO    4731  1001      6037   TO    6056 1002      7526   TO    7571 1043        00,3232   TO 00,3277 1077

   4732   TO    4762  1095      6057   TO    6102 1003      7572   TO    7623 1044        00,3300   TO 00,3342 1078
   4763   TO    5010  1096      6103   TO    6114 1004      7624   TO    7654 1045        00,3343   TO 00,3404 1079
   5011   TO    5031  1097      6115   TO    6143 1005      7655   TO    7707 1046        00,3405   TO 00,3455 1080
   5032   TO    5071  1102      6144   TO    6212 1006      7710   TO    7722 1097        00,3456   TO 00,3516 1081

   5072   TO    5127  1103      6213   TO    6214 1007      7723   TO    7747 1098        00,3517   TO 00,3552 1082
   5130   TO    5132  1104      6215   TO    6246 1008      7750   TO    7753 1302        00,3553   TO 00,3607 1083
   5133   TO    5164  1105      6247   TO    6262 1009      7754   TO    7755 1459        00,3610   TO 00,3651 1084
   5165   TO    5172  1116      6263   TO    6273 1010      7756   TO    7757   28        00,3652   TO 00,3713 1085

   5173   TO    5234  1119      6274   TO    6333 1011    00,2000   TO 00,2016 1013        00,3714   TO 00,3734 1086
                5235  1120      6334   TO    6353 1012    00,2017   TO 00,2041 1047        00,3735   TO 00,3767 1377
   5236   TO    5260  1121      6354   TO    6371 1014    00,2042   TO 00,2100 1048        00,3770   TO 00,3773 1378
   5261   TO    5276  1129      6372   TO    6413 1015    00,2101   TO 00,2120 1049        00,3774   TO 00,3775   28

   5277   TO    5300  1130      6414   TO    6433 1016    00,2121   TO 00,2143 1050        01,2000   TO 01,2001   43
   5301   TO    5310  1131      6434   TO    6457 1017    00,2144   TO 00,2171 1051        01,2002   TO 01,2031  239
   5311   TO    5326  1294      6460   TO    6467 1018    00,2172   TO 00,2213 1052        01,2032   TO 01,2070  240
   5327   TO    5357  1298      6470   TO    6522 1019    00,2214   TO 00,2235 1053        01,2071   TO 01,2133  241
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

01,2134  TO 01,2172  242                  01,3776    28        04,3757  TO 04,3770 1396        06,2000  TO 06,2011  155
01,2173  TO 01,2205  243        04,2000  TO 04,2023    45        04,3771  TO 04,3772   28        06,2012  TO 06,2023  156
            01,2206  293        04,2024  TO 04,2027   224                    05,2000   43        06,2024  TO 06,2074  157
01,2207  TO 01,2265  294        04,2030  TO 04,2037   225        05,2001  TO 05,2020   51        06,2075  TO 06,2115  158

01,2266  TO 01,2342  295        04,2040  TO 04,2072   227        05,2021  TO 05,2064   52        06,2116  TO 06,2127  159
            01,2343  296        04,2073  TO 04,2142   228                    05,2065  193        06,2130  TO 06,2171  160
01,2344  TO 01,2371 1087        04,2143  TO 04,2205   229        05,2066  TO 05,2136  194        06,2172  TO 06,2207  161
01,2372  TO 01,2426 1088        04,2206  TO 04,2253   230        05,2137  TO 05,2171  195        06,2210  TO 06,2226  162

01,2427  TO 01,2446 1089        04,2254  TO 04,2322   231        05,2172  TO 05,2231  196                    06,2227  163
01,2447  TO 01,2466 1090        04,2323  TO 04,2365   232        05,2232  TO 05,2275  198        06,2230  TO 06,2274  164
01,2467  TO 01,2515 1091        04,2366  TO 04,2424   233        05,2276  TO 05,2302  199        06,2275  TO 06,2342  165
01,2516  TO 01,2532 1092        04,2425  TO 04,2462   234        05,2303  TO 05,2343  200        06,2343  TO 06,2373  166

01,2533  TO 01,2554 1093        04,2463  TO 04,2535   235        05,2344  TO 05,2356  201        06,2374  TO 06,2415  167
01,2555  TO 01,2600 1094        04,2536  TO 04,2575   249        05,2357  TO 05,2406  202        06,2416  TO 06,2433  168
01,2601  TO 01,2635 1106        04,2576  TO 04,2614   370        05,2407  TO 05,2445  204        06,2434  TO 06,2457  169
01,2636  TO 01,2703 1107        04,2615  TO 04,2630   371                    05,2446  205        06,2460  TO 06,2513  170

01,2704  TO 01,2757 1108        04,2631  TO 04,2635   372        05,2447  TO 05,2510  211        06,2514  TO 06,2532  171
01,2760  TO 01,2771 1109        04,2636  TO 04,2646   457        05,2511  TO 05,2565  212        06,2533  TO 06,2555  172
01,2772  TO 01,3022 1110        04,2647  TO 04,2655   464        05,2566  TO 05,2643  213        06,2556  TO 06,2564  173
01,3023  TO 01,3071 1111        04,2656  TO 04,2733   701        05,2644  TO 05,2666  214        06,2565  TO 06,2613  174

01,3072  TO 01,3102 1112        04,2734  TO 04,3012   702        05,2667  TO 05,2733  215        06,2614  TO 06,2621  175
01,3103  TO 01,3150 1113        04,3013  TO 04,3026   983        05,2734  TO 05,3010  216        06,2622  TO 06,2647  176
01,3151  TO 01,3153 1114        04,3027  TO 04,3063  1185        05,3011  TO 05,3056  217        06,2650  TO 06,2670  177
01,3154  TO 01,3205 1115        04,3064  TO 04,3076  1186        05,3057  TO 05,3106  218        06,2671  TO 06,2702  178

01,3206  TO 01,3230 1116        04,3077  TO 04,3127  1187        05,3107  TO 05,3153  219        06,2703  TO 06,2717  179
01,3231  TO 01,3257 1122        04,3130  TO 04,3164  1188        05,3154  TO 05,3223  220        06,2720  TO 06,2754  180
01,3260  TO 01,3307 1123        04,3165  TO 04,3211  1225        05,3224  TO 05,3301  221        06,2755  TO 06,3005  181
01,3310  TO 01,3353 1124        04,3212  TO 04,3252  1226        05,3302  TO 05,3355  222        06,3006  TO 06,3025  182

01,3354  TO 01,3370 1125        04,3253  TO 04,3270  1332        05,3356  TO 05,3401  223        06,3026  TO 06,3033  183
01,3371  TO 01,3373 1126        04,3271  TO 04,3273  1333        05,3402  TO 05,3404  830        06,3034  TO 06,3051  184
01,3374  TO 01,3406 1127        04,3274  TO 04,3316  1338        05,3405  TO 05,3452  831        06,3052  TO 06,3070  185
01,3407  TO 01,3451 1128        04,3317  TO 04,3371  1339        05,3453  TO 05,3501  832        06,3071  TO 06,3110  186

01,3452  TO 01,3500 1131        04,3372  TO 04,3400  1340        05,3502  TO 05,3505  852        06,3111  TO 06,3131  187
01,3501  TO 01,3525 1132        04,3401  TO 04,3425  1389        05,3506  TO 05,3530  991        06,3132  TO 06,3143  188
01,3526  TO 01,3565 1303        04,3426  TO 04,3477  1390        05,3531  TO 05,3607  992        06,3144  TO 06,3155  189
01,3566  TO 01,3610 1304        04,3500  TO 04,3535  1391        05,3610  TO 05,3651  993        06,3156  TO 06,3222  191

01,3611  TO 01,3661 1305        04,3536  TO 04,3600  1392        05,3652  TO 05,3706  994        06,3223  TO 06,3262  192
01,3662  TO 01,3706 1306        04,3601  TO 04,3647  1393        05,3707  TO 05,3756  996        06,3263  TO 06,3326  326
01,3707  TO 01,3745 1307        04,3650  TO 04,3714  1394        05,3757  TO 05,3771  997                    06,3327  327
01,3746  TO 01,3775 1308        04,3715  TO 04,3756  1395        05,3772  TO 05,3773   29        06,3330  TO 06,3355  328
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OCCUPIED LOCATIONS  PAGE      OCCUPIED LOCATIONS  PAGE      OCCUPIED LOCATIONS  PAGE      OCCUPIED LOCATIONS  PAGE

06,3356  TO 06,3415  329      07,3367  TO 07,3404 1320      10,3531  TO 10,3543 1373      12,2023  TO 12,2073 1174
06,3416  TO 06,3424  330      07,3405  TO 07,3430 1321      10,3544  TO 10,3561 1374      12,2074  TO 12,2155 1175
06,3425  TO 06,3453  331      07,3431  TO 07,3463 1322      10,3562  TO 10,3572 1382      12,2156  TO 12,2235 1176
06,3454  TO 06,3506  332      07,3464  TO 07,3526 1323      10,3573  TO 10,3623 1397      12,2236  TO 12,2307 1177

06,3507  TO 06,3554  333      07,3527  TO 07,3576 1324      10,3624  TO 10,3665 1398      12,2310  TO 12,2367 1178
06,3555  TO 06,3624  334      07,3577  TO 07,3603 1325      10,3666  TO 10,3704 1399      12,2370  TO 12,2420 1179
06,3625  TO 06,3643  335      07,3604  TO 07,3630 1326      10,3705  TO 10,3711 1400      12,2421  TO 12,2502 1180
06,3644  TO 06,3712  336      07,3631  TO 07,3661 1327      10,3712  TO 10,3746 1401      12,2503  TO 12,2535 1181

06,3713  TO 06,3714  337      07,3662  TO 07,3711 1328      10,3747  TO 10,3774 1402      12,2536  TO 12,2611 1182
06,3715  TO 06,3752  692      07,3712  TO 07,3715 1329      10,3775  TO 10,3776   29      12,2612  TO 12,2652 1183
06,3753  TO 06,3763 1147      07,3716  TO 07,3743 1330      11,2000  TO 11,2036  686      12,2653  TO 12,2731 1184
06,3764  TO 06,3765   29      07,3744  TO 07,3772 1331      11,2037  TO 11,2116  687      12,2732  TO 12,2766 1186

07,2000  TO 07,2043  244      07,3773  TO 07,3774   29      11,2117  TO 11,2161  688      12,2767  TO 12,3041 1189
07,2044  TO 07,2057  245      10,2000  TO 10,2027  693      11,2162  TO 11,2233  689      12,3042  TO 12,3117 1190
07,2060  TO 07,2127  246      10,2030  TO 10,2065 1265      11,2234  TO 11,2274  690      12,3120  TO 12,3173 1191
07,2130  TO 07,2141  247      10,2066  TO 10,2142 1266      11,2275  TO 11,2332  820      12,3174  TO 12,3211 1192

07,2142  TO 07,2170  248      10,2143  TO 10,2212 1267      11,2333  TO 11,2372  821      12,3212  TO 12,3272 1193
07,2171  TO 07,2201  251      10,2213  TO 10,2223 1294      11,2373  TO 11,2375  822      12,3273  TO 12,3352 1194
07,2202  TO 07,2254  252      10,2224  TO 10,2242 1300      11,2376  TO 11,2451 1227      12,3353  TO 12,3427 1195
07,2255  TO 07,2331  253      10,2243  TO 10,2311 1301      11,2452  TO 11,2475 1228      12,3430  TO 12,3501 1196

07,2332  TO 07,2401  254      10,2312  TO 10,2325 1302      11,2476  TO 11,2515 1229      12,3502  TO 12,3546 1197
07,2402  TO 07,2453  255      10,2326  TO 10,2330 1354      11,2516  TO 11,2574 1230      12,3547  TO 12,3627 1198
07,2454  TO 07,2460  256      10,2331  TO 10,2374 1355      11,2575  TO 11,2656 1231      12,3630  TO 12,3673 1199
07,2461  TO 07,2513  257      10,2375  TO 10,2433 1356      11,2657  TO 11,2740 1232      12,3674  TO 12,3741 1200

07,2514  TO 07,2565  258      10,2434  TO 10,2464 1357      11,2741  TO 11,3021 1233      12,3742  TO 12,3744 1201
07,2566  TO 07,2576  259      10,2465  TO 10,2525 1358      11,3022  TO 11,3100 1234      12,3745  TO 12,3775 1246
07,2577  TO 07,2626  260      10,2526  TO 10,2571 1359      11,3101  TO 11,3160 1235                  12,3776   30
07,2627  TO 07,2666  261      10,2572  TO 10,2632 1360      11,3161  TO 11,3230 1236      13,2000  TO 13,2025   46

07,2667  TO 07,2700  851      10,2633  TO 10,2677 1361      11,3231  TO 11,3312 1237      13,2026  TO 13,2065  236
07,2701  TO 07,2713  852      10,2700  TO 10,2737 1362      11,3313  TO 11,3374 1238      13,2066  TO 13,2067  237
07,2714  TO 07,2752 1310      10,2740  TO 10,3006 1363      11,3375  TO 11,3440 1239      13,2070  TO 13,2113  320
07,2753  TO 07,2777 1311      10,3007  TO 10,3051 1364      11,3441  TO 11,3465 1240      13,2114  TO 13,2132  321

07,3000  TO 07,3037 1312      10,3052  TO 10,3121 1365      11,3466  TO 11,3544 1241      13,2133  TO 13,2160  322
07,3040  TO 07,3104 1313      10,3122  TO 10,3172 1366      11,3545  TO 11,3624 1242      13,2161  TO 13,2206  323
07,3105  TO 07,3143 1314      10,3173  TO 10,3242 1367      11,3625  TO 11,3702 1243      13,2207  TO 13,2232  709
07,3144  TO 07,3207 1315      10,3243  TO 10,3310 1368      11,3703  TO 11,3704 1244      13,2233  TO 13,2314  710

07,3210  TO 07,3233 1316      10,3311  TO 10,3361 1369      11,3705  TO 11,3763 1245      13,2315  TO 13,2350  711
07,3234  TO 07,3272 1317      10,3362  TO 10,3420 1370      11,3764  TO 11,3775 1246      13,2351  TO 13,2377 1133
07,3273  TO 07,3322 1318      10,3421  TO 10,3470 1371                  11,3776   29      13,2400  TO 13,2421 1134
07,3323  TO 07,3366 1319      10,3471  TO 10,3530 1372      12,2000  TO 12,2022 1101      13,2422  TO 13,2457 1135
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

13,2460  TO 13,2507 1136        14,2767  TO 14,3014  940        15,3160  TO 15,3236  972        16,3603  TO 16,3640 1441
13,2510  TO 13,2547 1137        14,3015  TO 14,3065  941        15,3237  TO 15,3253  973        16,3641  TO 16,3712 1470
13,2550  TO 13,2557 1138        14,3066  TO 14,3146  942        15,3254  TO 15,3313  974        16,3713  TO 16,3734 1471
13,2560  TO 13,2603 1139        14,3147  TO 14,3163  943        15,3314  TO 15,3366  975        16,3735  TO 16,3765 1476

13,2604  TO 13,2620 1209        14,3164  TO 14,3223  944        15,3367  TO 15,3446  976        16,3766  TO 16,3771 1477
13,2621  TO 13,2667 1210        14,3224  TO 14,3255  945        15,3447  TO 15,3461  977        16,3772  TO 16,3773   31
13,2670  TO 13,2734 1211        14,3256  TO 14,3323  946        15,3462  TO 15,3505  978        17,2000  TO 17,2026  741
13,2735  TO 13,3010 1212        14,3324  TO 14,3374  947        15,3506  TO 15,3540  979        17,2027  TO 17,2064 1404

13,3011  TO 13,3042 1213        14,3375  TO 14,3426  948        15,3541  TO 15,3574  980        17,2065  TO 17,2071 1405
13,3043  TO 13,3104 1214        14,3427  TO 14,3504  950        15,3575  TO 15,3633  981        17,2072  TO 17,2120 1442
13,3105  TO 13,3133 1215        14,3505  TO 14,3563  951        15,3634  TO 15,3651  982        17,2121  TO 17,2174 1443
13,3134  TO 13,3212 1216        14,3564  TO 14,3616  952        15,3652  TO 15,3663  983        17,2175  TO 17,2236 1444

13,3213  TO 13,3256 1217        14,3617  TO 14,3647  953        15,3664  TO 15,3705  985        17,2237  TO 17,2314 1445
13,3257  TO 13,3336 1218        14,3650  TO 14,3667  954        15,3706  TO 15,3767  986        17,2315  TO 17,2365 1446
13,3337  TO 13,3420 1219        14,3670  TO 14,3723  955        15,3770  TO 15,3775  987        17,2366  TO 17,2447 1447
13,3421  TO 13,3466 1220        14,3724  TO 14,3773  956                    15,3776   31        17,2450  TO 17,2531 1448

13,3467  TO 13,3524 1221        14,3774  TO 14,3775   31        16,2000  TO 16,2023 1410        17,2532  TO 17,2600 1449
13,3525  TO 13,3552 1222        15,2000  TO 15,2045  250        16,2024  TO 16,2075 1411        17,2601  TO 17,2625 1450
13,3553  TO 13,3600 1223        15,2046  TO 15,2047  251        16,2076  TO 16,2153 1412        17,2626  TO 17,2660 1451
13,3601  TO 13,3656 1224        15,2050  TO 15,2054  927        16,2154  TO 16,2212 1413        17,2661  TO 17,2726 1452

13,3657  TO 13,3674 1225        15,2055  TO 15,2133  928        16,2213  TO 16,2246 1421        17,2727  TO 17,2764 1453
13,3675  TO 13,3737 1247        15,2134  TO 15,2136  929        16,2247  TO 16,2313 1422        17,2765  TO 17,3035 1454
13,3740  TO 13,3754 1248        15,2137  TO 15,2170  930        16,2314  TO 16,2357 1423        17,3036  TO 17,3107 1455
13,3755  TO 13,3766 1385        15,2171  TO 15,2217  931        16,2360  TO 16,2434 1424        17,3110  TO 17,3130 1456

13,3767  TO 13,3770   30        15,2220  TO 15,2244  932        16,2435  TO 16,2514 1425        17,3131  TO 17,3177 1457
14,2000  TO 14,2007   45        15,2245  TO 15,2311  957        16,2515  TO 16,2575 1426        17,3200  TO 17,3251 1458
14,2010  TO 14,2065   47        15,2312  TO 15,2365  958        16,2576  TO 16,2646 1427        17,3252  TO 17,3312 1461
14,2066  TO 14,2147   48        15,2366  TO 15,2442  959        16,2647  TO 16,2717 1428        17,3313  TO 17,3364 1462

14,2150  TO 14,2231   49        15,2443  TO 15,2471  960        16,2720  TO 16,2757 1429        17,3365  TO 17,3432 1463
14,2232  TO 14,2313   50        15,2472  TO 15,2533  961        16,2760  TO 16,3030 1430        17,3433  TO 17,3500 1464
14,2314  TO 14,2346   51        15,2534  TO 15,2562  962        16,3031  TO 16,3070 1431        17,3501  TO 17,3542 1465
14,2347  TO 14,2373  852        15,2563  TO 15,2574  963        16,3071  TO 16,3124 1432        17,3543  TO 17,3606 1466

14,2374  TO 14,2444  853        15,2575  TO 15,2640  964        16,3125  TO 16,3177 1433        17,3607  TO 17,3627 1467
            14,2445  854        15,2641  TO 15,2715  965        16,3200  TO 16,3260 1434        17,3630  TO 17,3671 1468
14,2446  TO 14,2505  933        15,2716  TO 15,2770  966        16,3261  TO 16,3342 1435        17,3672  TO 17,3743 1469
14,2506  TO 14,2564  935        15,2771  TO 15,2773  967        16,3343  TO 16,3376 1436        17,3744  TO 17,3745   31

14,2565  TO 14,2610  936        15,2774  TO 15,3032  968        16,3377  TO 16,3450 1437                    20,2000   42
14,2611  TO 14,2623  937        15,3033  TO 15,3044  969        16,3451  TO 16,3521 1438        20,2001  TO 20,2003   43
14,2624  TO 14,2705  938        15,3045  TO 15,3100  970        16,3522  TO 16,3530 1439        20,2004  TO 20,2042  292
14,2706  TO 14,2766  939        15,3101  TO 15,3157  971        16,3531  TO 16,3602 1440        20,2043  TO 20,2114  293
```

```
OCCUPIED LOCATIONS  PAGE          OCCUPIED LOCATIONS  PAGE          OCCUPIED LOCATIONS  PAGE          OCCUPIED LOCATIONS  PAGE

20,2115  TO 20,2122  822          21,2306  TO 21,2367  900          22,3054  TO 22,3124  366          23,3054  TO 23,3135 1155
20,2123  TO 20,2150 1407          21,2370  TO 21,2450  901          22,3125  TO 22,3202  367          23,3136  TO 23,3217 1156
20,2151  TO 20,2205 1408          21,2451  TO 21,2527  902          22,3203  TO 22,3212  368          23,3220  TO 23,3246 1157
20,2206  TO 20,2225 1409          21,2530  TO 21,2607  903          22,3213  TO 22,3241  369          23,3247  TO 23,3303 1249

20,2226  TO 20,2237 1414          21,2610  TO 21,2667  904          22,3242  TO 22,3300  713          23,3304  TO 23,3317 1250
20,2240  TO 20,2304 1415          21,2670  TO 21,2751  905          22,3301  TO 22,3355  714          23,3320  TO 23,3352 1251
20,2305  TO 20,2321 1416          21,2752  TO 21,3033  906          22,3356  TO 22,3427  715          23,3353  TO 23,3417 1253
20,2322  TO 20,2364 1418          21,3034  TO 21,3076  907          22,3430  TO 22,3464  716          23,3420  TO 23,3440 1254

20,2365  TO 20,2437 1419          21,3077  TO 21,3122 1472          22,3465  TO 22,3537  717          23,3441  TO 23,3500 1255
20,2440  TO 20,2446 1420          21,3123  TO 21,3174 1473          22,3540  TO 22,3550  718          23,3501  TO 23,3532 1256
20,2447  TO 20,2476 1486          21,3175  TO 21,3242 1474          22,3551  TO 22,3611  720          23,3533  TO 23,3536 1257
20,2477  TO 20,2552 1487          21,3243  TO 21,3315 1475          22,3612  TO 22,3646  721          23,3537  TO 23,3552 1259

20,2553  TO 20,2627 1488          21,3316  TO 21,3326 1476          22,3647  TO 22,3660  827          23,3553  TO 23,3614 1260
20,2630  TO 20,2675 1489          21,3327  TO 21,3334 1478          22,3661  TO 22,3703  863          23,3615  TO 23,3645 1261
20,2676  TO 20,2755 1490          21,3335  TO 21,3407 1479          22,3704  TO 22,3710  864          23,3646  TO 23,3670 1262
20,2756  TO 20,2775 1491          21,3410  TO 21,3440 1480          22,3711  TO 22,3736 1157          23,3671  TO 23,3715 1263

20,2776  TO 20,3016 1492          21,3441  TO 21,3477 1481          22,3737  TO 22,3772 1158          23,3716  TO 23,3765 1264
20,3017  TO 20,3056 1493          21,3500  TO 21,3546 1482          22,3773  TO 22,3774   32                      23,3766 1265
20,3057  TO 20,3130 1494          21,3547  TO 21,3620 1483          23,2000  TO 23,2040  271          23,3767  TO 23,3770   32
20,3131  TO 20,3206 1495          21,3621  TO 21,3645 1484          23,2041  TO 23,2102  324          24,2000  TO 24,2004  492

20,3207  TO 20,3227 1496          21,3646  TO 21,3664 1508          23,2103  TO 23,2115  485          24,2005  TO 24,2035  493
20,3230  TO 20,3273 1497          21,3665  TO 21,3744 1509          23,2116  TO 23,2134  517          24,2036  TO 24,2051  495
20,3274  TO 20,3344 1498          21,3745  TO 21,3767 1510          23,2135  TO 23,2214  518          24,2052  TO 24,2131  496
20,3345  TO 20,3422 1499          21,3770  TO 21,3771   31          23,2215  TO 23,2273  519          24,2132  TO 24,2201  497

20,3423  TO 20,3471 1500          22,2000  TO 22,2003   44          23,2274  TO 23,2313  520          24,2202  TO 24,2253  498
20,3472  TO 20,3545 1501          22,2004  TO 22,2053  351          23,2314  TO 23,2343  695          24,2254  TO 24,2321  499
20,3546  TO 20,3615 1502          22,2054  TO 22,2126  352          23,2344  TO 23,2357  696          24,2322  TO 24,2401  500
20,3616  TO 20,3670 1503          22,2127  TO 22,2201  353          23,2360  TO 23,2415  697          24,2402  TO 24,2403  501

20,3671  TO 20,3741 1504          22,2202  TO 22,2262  354          23,2416  TO 23,2425  698          24,2404  TO 24,2426  502
20,3742  TO 20,3761 1505          22,2263  TO 22,2311  355          23,2426  TO 23,2431  699          24,2427  TO 24,2450  503
20,3762  TO 20,3771 1506          22,2312  TO 22,2357  356          23,2432  TO 23,2442  841          24,2451  TO 24,2472  504
20,3772  TO 20,3773   31          22,2360  TO 22,2421  357          23,2443  TO 23,2460  842          24,2473  TO 24,2552  505

21,2000  TO 21,2005   42          22,2422  TO 22,2503  358          23,2461  TO 23,2510  867          24,2553  TO 24,2632  506
21,2006  TO 21,2046  829          22,2504  TO 22,2546  359          23,2511  TO 23,2530 1100          24,2633  TO 24,2673  507
21,2047  TO 21,2107  830          22,2547  TO 22,2625  360          23,2531  TO 23,2550 1149          24,2674  TO 24,2714  508
21,2110  TO 21,2116  835          22,2626  TO 22,2653  361          23,2551  TO 23,2632 1150          24,2715  TO 24,2775  509

21,2117  TO 21;2127  836          22,2654  TO 22,2723  362          23,2633  TO 23,2714 1151          24,2776  TO 24,3055  510
21,2130  TO 21,2153  872          22,2724  TO 22,2743  363          23,2715  TO 23,2742 1152          24,3056  TO 24,3133  511
21,2154  TO 21,2225  898          22,2744  TO 22,3002  364          23,2743  TO 23,2771 1153                      24,3134  512
21,2226  TO 21,2305  899          22,3003  TO 22,3053  365          23,2772  TO 23,3053 1154          24,3135  TO 24,3166  513
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OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE

24,3167  TO 24,3205  514         25,2574  TO 25,2635  546         26,2463  TO 26,2544  576         27,2707  TO 27,2746  776
24,3206  TO 24,3225  515         25,2636  TO 25,2704  548         26,2545  TO 26,2625  577         27,2747  TO 27,3030  777
24,3226  TO 24,3254  516         25,2705  TO 25,2714  549         26,2626  TO 26,2707  578         27,3031  TO 27,3112  778
24,3255  TO 24,3332  565         25,2715  TO 25,2762  550         26,2710  TO 26,2767  579         27,3113  TO 27,3174  779

24,3333  TO 24,3347  572         25,2763  TO 25,3035  551         26,2770  TO 26,3051  580         27,3175  TO 27,3216  780
24,3350  TO 24,3355  573         25,3036  TO 25,3072  552         26,3052  TO 26,3132  581         27,3217  TO 27,3254  781
24,3356  TO 24,3377  599         25,3073  TO 25,3112  553         26,3133  TO 26,3177  582         27,3255  TO 27,3266  782
24,3400  TO 24,3427  605         25,3113  TO 25,3147  554         26,3200  TO 26,3241  583         27,3267  TO 27,3272  784

24,3430  TO 24,3502  606         25,3150  TO 25,3215  555         26,3242  TO 26,3316  584         27,3273  TO 27,3311  851
24,3503  TO 24,3504  607         25,3216  TO 25,3267  556         26,3317  TO 26,3360  585         27,3312  TO 27,3320  854
24,3505  TO 24,3552  655         25,3270  TO 25,3337  557         26,3361  TO 26,3437  586         27,3321  TO 27,3355  865
24,3553  TO 24,3634  656         25,3340  TO 25,3401  558         26,3440  TO 26,3441  587         27,3356  TO 27,3357  866

24,3635  TO 24,3667  657         25,3402  TO 25,3441  559         26,3442  TO 26,3445  588         27,3360  TO 27,3407 1271
24,3670  TO 24,3717 1142         25,3442  TO 25,3470  560         26,3446  TO 26,3523  589         27,3410  TO 27,3426 1272
24,3720  TO 24,3752 1143         25,3471  TO 25,3533  561         26,3524  TO 26,3603  590         27,3427  TO 27,3464 1274
24,3753  TO 24,3774 1144         25,3534  TO 25,3545  562         26,3604  TO 26,3622  591         27,3465  TO 27,3533 1277

24,3775  TO 24,3776   32         25,3546  TO 25,3564  563         26,3623  TO 26,3670  592         27,3534  TO 27,3574 1278
25,2000  TO 25,2002   41         25,3565  TO 25,3576  566         26,3671  TO 26,3715  593         27,3575  TO 27,3644 1279
25,2003  TO 25,2041  490         25,3577  TO 25,3600  567         26,3716  TO 26,3740 1140         27,3645  TO 27,3711 1280
25,2042  TO 25,2061  491         25,3601  TO 25,3606  597         26,3741  TO 26,3742 1141         27,3712  TO 27,3734 1281

25,2062  TO 25,2070  526         25,3607  TO 25,3647  612         26,3743  TO 26,3774 1146         27,3735  TO 27,3753 1282
25,2071  TO 25,2110  527         25,3650  TO 25,3670  613         26,3775  TO 26,3776   33         27,3754  TO 27,3771 1283
25,2111  TO 25,2126  528         25,3671  TO 25,3722 1144         27,2000  TO 27,2013   38         27,3772  TO 27,3773   33
25,2127  TO 25,2132  529         25,3723  TO 25,3767 1145         27,2014  TO 27,2021   39         30,2000  TO 30,2001   39

25,2133  TO 25,2170  530         25,3770  TO 25,3771   32         27,2022  TO 27,2027   44         30,2002  TO 30,2053  610
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25,2200  TO 25,2240  532         26,2010  TO 26,2021   53         27,2032  TO 27,2105  481         30,2061  TO 30,2121  838
25,2241  TO 25,2251  533         26,2022  TO 26,2071  339         27,2106  TO 27,2157  482         30,2122  TO 30,2176  839

25,2252  TO 25,2305  534         26,2072  TO 26,2120  340         27,2160  TO 27,2177  483         30,2177  TO 30,2254  840
25,2306  TO 25,2322  535         26,2121  TO 26,2122  341                     27,2200  750         30,2255  TO 30,2320  841
25,2323  TO 25,2342  536         26,2123  TO 26,2145  473         27,2201  TO 27,2245  751         30,2321  TO 30,2371  845
25,2343  TO 25,2372  537         26,2146  TO 26,2216  474         27,2246  TO 27,2325  765         30,2372  TO 30,2453  846

25,2373  TO 25,2374  538         26,2217  TO 26,2261  475         27,2326  TO 27,2406  766         30,2454  TO 30,2535  847
25,2375  TO 25,2431  539         26,2262  TO 26,2265  476         27,2407  TO 27,2412  767         30,2536  TO 30,2617  848
25,2432  TO 25,2441  540         26,2266  TO 26,2270  477         27,2413  TO 27,2446  769         30,2620  TO 30,2701  849
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            25,2573  545         26,2412  TO 26,2462  575         27,2640  TO 27,2706  775         30,3036  TO 30,3103  856
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

30,3104  TO 30,3133  910        31,3152  TO 31,3231  809        32,3455  TO 32,3535  819        33,3355  TO 33,3426  887
30,3134  TO 30,3163  911        31,3232  TO 31,3301  810        32,3536  TO 32,3537  820        33,3427  TO 33,3475  888
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30,3334  TO 30,3375  916        31,3514  TO 31,3542  815        32,3737  TO 32,3764  836        33,3657  TO 33,3667  893
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31,2141  TO 31,2143  610        32,2217  TO 32,2242  493        33,2324  TO 33,2373  862        34,2736  TO 34,3015  641
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31,2207  TO 31,2215  792        32,2325  TO 32,2365  495        33,2415  TO 33,2432  867        34,3052  TO 34,3061  643

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31,2246  TO 31,2307  794        32,2431  TO 32,2512  570        33,2440  TO 33,2446  872        34,3100  TO 34,3117  645
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31,2420  TO 31,2437  798        32,2635  TO 32,2701  602        33,2546  TO 33,2620  876        34,3267  TO 34,3270  649
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OCCUPIED LOCATIONS  PAGE      OCCUPIED LOCATIONS  PAGE      OCCUPIED LOCATIONS  PAGE      OCCUPIED LOCATIONS  PAGE

34,3745  TO 34,3774  894      36,2020  TO 36,2021   40      37,2401  TO 37,2457  380      40,3036  TO 40,3110  432
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35,3522  TO 35,3567  678      36,3734  TO 36,3764  763      40,2352  TO 40,2424  402      41,2551  TO 41,2615  417
35,3570  TO 35,3605  679      36,3765  TO 36,3766   36      40,2425  TO 40,2466  403      41,2616  TO 41,2657  425

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35,3704  TO 35,3722  683      37,2120  TO 37,2171  375      40,2656  TO 40,2722  419      41,3067  TO 41,3140  429

35,3723  TO 35,3746  684      37,2172  TO 37,2251  376      40,2723  TO 40,2766  420      41,3141  TO 41,3210  430
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OCCUPIED LOCATIONS PAGE     OCCUPIED LOCATIONS PAGE     OCCUPIED LOCATIONS PAGE     OCCUPIED LOCATIONS PAGE

41,3330 TO 41,3352  439                42,3606  486     43,3271 TO 43,3336 1287
41,3353 TO 41,3362  440     42,3607 TO 42,3670  487     43,3337 TO 43,3412 1288
41,3363 TO 41,3414  443     42,3671 TO 42,3752  488     43,3413 TO 43,3472 1289
41,3415 TO 41,3427  444     42,3753 TO 42,3771  489     43,3473 TO 43,3535 1290

41,3430 TO 41,3470  447     42,3772 TO 42,3773   36     43,3536 TO 43,3614 1291
41,3471 TO 41,3515  448     43,2000 TO 43,2045  262     43,3615 TO 43,3673 1292
41,3516 TO 41,3573  453     43,2046 TO 43,2115  263     43,3674 TO 43,3723 1293
41,3574 TO 41,3612  454     43,2116 TO 43,2127  264     43,3724 TO 43,3743 1388

41,3613 TO 41,3656  467     43,2130 TO 43,2162  265     43,3744 TO 43,3751 1389
41,3657 TO 41,3725  468     43,2163 TO 43,2170  266     43,3752 TO 43,3753   36
41,3726 TO 41,3730  469     43,2171 TO 43,2176  267
41,3731 TO 41,3732   36     43,2177 TO 43,2226  268

42,2000 TO 42,2001   46     43,2227 TO 43,2274  269
42,2002 TO 42,2034  275     43,2275 TO 43,2321  270
42,2035 TO 42,2053  282                43,2322  271
42,2054 TO 42,2064  287     43,2323 TO 43,2327  272

42,2065 TO 42,2102  288     43,2330 TO 43,2360  273
42,2103 TO 42,2141  304     43,2361 TO 43,2400  274
42,2142 TO 42,2207  305     43,2401 TO 43,2403  275
42,2210 TO 42,2243  306     43,2404 TO 43,2446  276

42,2244 TO 42,2270  307     43,2447 TO 43,2517  277
42,2271 TO 42,2330  308     43,2520 TO 43,2573  278
42,2331 TO 42,2400  309     43,2574 TO 43,2641  279
42,2401 TO 42,2437  310     43,2642 TO 43,2706  280

42,2440 TO 42,2503  311     43,2707 TO 43,2744  281
42,2504 TO 42,2562  312                43,2745  282
42,2563 TO 42,2645  313     43,2746 TO 43,2763  283
42,2646 TO 42,2722  314     43,2764 TO 43,3005  284

42,2723 TO 42,3004  315     43,3006 TO 43,3014  285
42,3005 TO 42,3066  316     43,3015 TO 43,3023  286
42,3067 TO 42,3143  317     43,3024 TO 43,3044  287
42,3144 TO 42,3225  318     43,3045 TO 43,3053  288

42,3226 TO 42,3227  319     43,3054 TO 43,3063  289
42,3230 TO 42,3274  421     43,3064 TO 43,3123  290
42,3275 TO 42,3353  422     43,3124 TO 43,3134  291
42,3354 TO 42,3431  423     43,3135 TO 43,3141  292

42,3432 TO 42,3451  424     43,3142 TO 43,3201  297
42,3452 TO 42,3504  434     43,3202 TO 43,3227  298
42,3505 TO 42,3562  435     43,3230 TO 43,3231  299
42,3563 TO 42,3605  436     43,3232 TO 43,3270 1286
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THE SUBROUTINES IN THIS PROGRAM ARE AS FOLLOWS:

              LUMERASE.120
              AP11AID .001
              LEMP20S .127
              LEMP30S .103
              KISSING .050
              FLY     .132
              LEMP50S .115
              SKIPPER .087
              LMDAP   .015


THE ASSEMBLY WAS GOOD AND MANUFACTURABLE. NO LINES WERE CUSSED.

BINARY RECORDS FOR "AP11ROPE.R001" SUCCESSFULLY STORED.
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d38-c

238-c

WILSON JONES

NYLON POST BINDER

14-1411 N

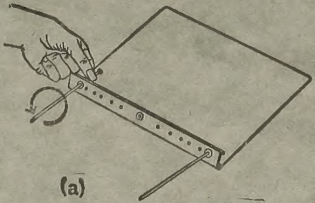
TYPE 1/.020 GENUINE PRESSBOARD

2 PURPOSE BINDER

This binder may be used to bind both marginal-punched sheets and forms punched with 2¾", 4¼", 6", 7", 8½", 13⅜" and 14⅜" center-to-center holes.

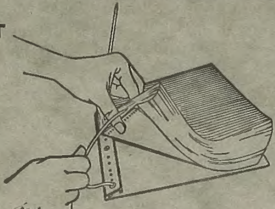
1. MARGINAL-PUNCHED SHEETS

BURST



(a)

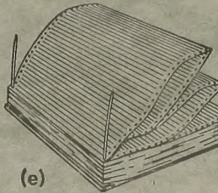
Insert posts in end holes of stub. Turn counter-clockwise until heads are flush against inside of channel.



(b)

Gather sheets in even stack. Insert posts in second holes from both ends of the sheets.

UNBURST

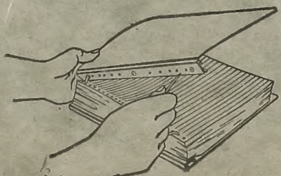


(e)

Insert posts thru end holes of stub as in illustration (a). Plug posts into top holes in both margins of sheets. Put on top cover as in illustrations (c) and (d). (Also see No. 2 below)

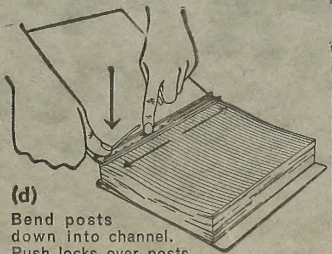
TOP AND BOTTOM LOADING

This binder may be loaded from the top or bottom by using posts without screw heads. Ask the dealer from whom you bought the binder for Posts and Slides Pack No. 1323.



(c)

Put top cover on with stub turned under. Insert posts thru end holes.



(d)

Bend posts down into channel. Push locks over posts toward outside ends of channel until snug.

2. CONVENTIONALLY PUNCHED LOOSE LEAF SHEETS AND STRIPPED UNBURST SHEETS

Follow steps (a) thru (d) at left, except that posts should be threaded into holes in stub that correspond to holes in forms or sheets to be bound.

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(J2675 A)

Made In U. S. A.